Local Government Energy Audit Report

Manasquan High School

January 26, 2022

Prepared for:

Manasquan Public School District
167 Broad Street
Manasquan, New Jersey 08736

Prepared by:

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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 of 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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ENERGY EFFICIENCY INCENTIVE & REBATE TRANSITION

For the purposes of your LGEA, estimated incentives and rebates are included as placeholders for planning purposes. New Jersey utilities are rolling out their own energy efficiency programs, which your project may be eligible for depending on individual measures, quantities, and size of the building.

In 2018, Governor Murphy signed into law the landmark legislation known as the Clean Energy Act. The law called for a significant overhaul of New Jersey's clean energy systems by building sustainable infrastructure in order to fight climate change and reduce carbon emissions, which will in turn create well-paying local jobs, grow the state's economy, and improve public health while ensuring a cleaner environment for current and future residents.

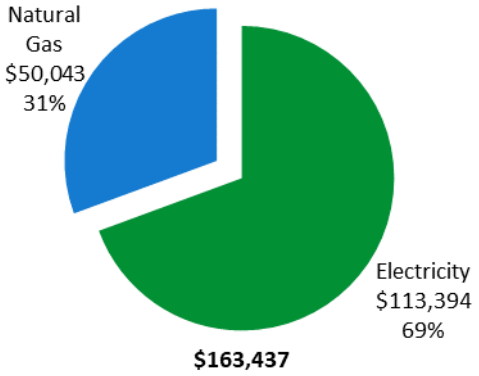
These next generation energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and incentives directly to customers like you. NJCEP will still offer programs for new construction, renewable energy, the Energy Savings Improvement Program (ESIP), and large energy users.

New utility programs are under development. Keep up to date with developments by visiting the NJCEP website.

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Manasquan High 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: $163,437 Electricity: 923,600 kWh Natural Gas: 49,835 Therms	
ENERGY STAR® Benchmarking Score	91 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

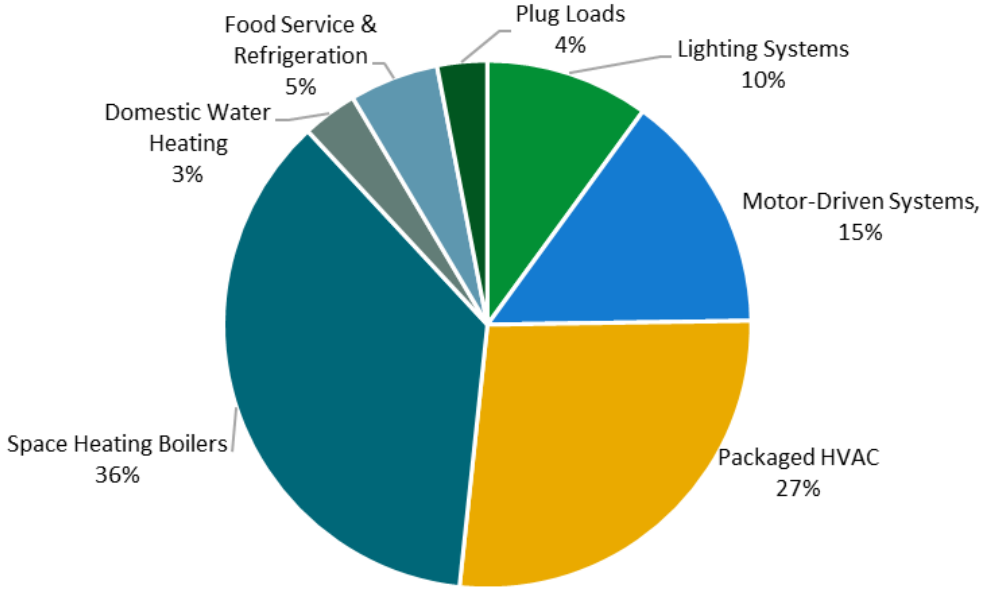


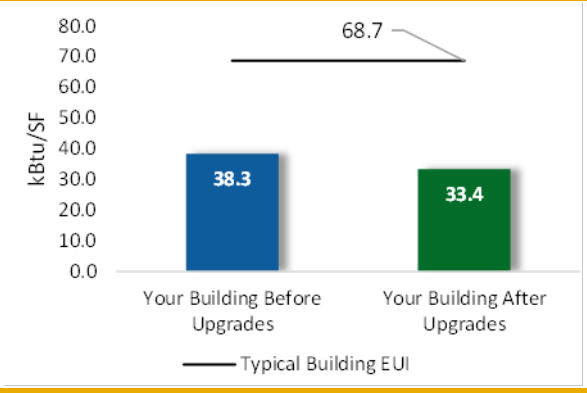
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

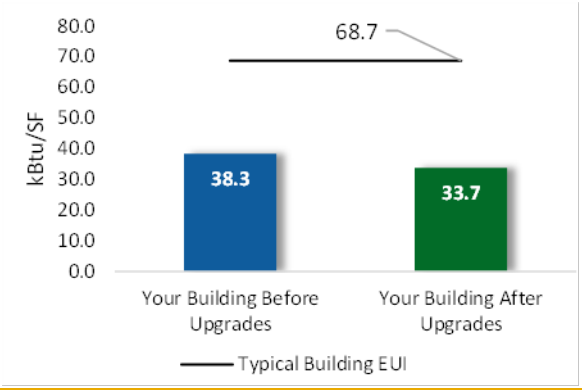
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$180,925
Potential Rebates & Incentives[1]	$18,619
Annual Cost Savings	$29,436
Annual Energy Savings	Electricity: 212,987 kWh Natural Gas: 3,273 Therms
Greenhouse Gas Emission Savings	126 Tons
Simple Payback	5.5 Years
Site Energy Savings (All Utilities)	13%



Scenario 2: Cost Effective Package[2]

Installation Cost	$128,956
Potential Rebates & Incentives	$12,654
Annual Cost Savings	$27,579
Annual Energy Savings	Electricity: 201,098 kWh Natural Gas: 2,878 Therms
Greenhouse Gas Emission Savings	118 Tons
Simple Payback	4.2 Years
Site Energy Savings (all utilities)	12%



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			**141,948**	**18.0**	**-20**	**$17,224**	**$43,893**	**$6,451**	**$37,442**	**2.2**	**140,566**
ECM 1	Install LED Fixtures	Yes	44,535	0.0	0	$5,468	$15,057	$0	$15,057	2.8	44,846
ECM 2	Retrofit Fixtures with LED Lamps	Yes	66,713	15.7	-14	$8,051	$24,564	$6,451	$18,113	2.2	65,556
ECM 3	Install LED Exit Signs	Yes	30,700	2.3	-6	$3,705	$4,273	$0	$4,273	1.2	30,163
Lighting Control Measures			**28,094**	**6.1**	**-6**	**$3,390**	**$25,294**	**$5,505**	**$19,789**	**5.8**	**27,603**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	24,937	5.6	-5	$3,009	$22,144	$2,775	$19,369	6.4	24,501
ECM 5	Install High/Low Lighting Controls	Yes	3,157	0.6	-1	$381	$3,150	$2,730	$420	1.1	3,102
Variable Frequency Drive (VFD) Measures			**11,495**	**4.9**	**0**	**$1,411**	**$27,468**	**$2,225**	**$25,243**	**17.9**	**11,575**
ECM 6	Install VFDs on Constant Volume (CV) Fans	No	11,495	4.9	0	$1,411	$27,468	$2,225	$25,243	17.9	11,575
Unitary HVAC Measures			**395**	**0.7**	**0**	**$48**	**$1,691**	**$100**	**$1,591**	**32.8**	**397**
ECM 7	Install High Efficiency Heat Pumps	No	395	0.7	0	$48	$1,691	$100	$1,591	32.8	397
Domestic Water Heating Upgrade			**0**	**0.0**	**86**	**$862**	**$23,348**	**$3,838**	**$19,509**	**22.6**	**10,051**
ECM 8	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	40	$397	$22,811	$3,640	$19,171	48.3	4,633
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	46	$465	$537	$198	$339	0.7	5,419
Food Service & Refrigeration Measures			**10,146**	**0.5**	**0**	**$1,246**	**$6,132**	**$500**	**$5,632**	**4.5**	**10,217**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	2,077	0.3	0	$255	$1,517	$200	$1,317	5.2	2,091
ECM 11	Refrigeration Controls	Yes	6,457	0.1	0	$793	$4,385	$250	$4,135	5.2	6,502
ECM 12	Vending Machine Control	Yes	1,612	0.2	0	$198	$230	$50	$180	0.9	1,623
Custom Measures			**20,910**	**0.0**	**268**	**$5,255**	**$53,100**	**$0**	**$53,100**	**10.1**	**52,395**
ECM 13	Retro-Commissioning Study	Yes	20,910	0.0	268	$5,255	$53,100	$0	$53,100	10.1	52,395
TOTALS (COST EFFECTIVE MEASURES)			**201,098**	**24.7**	**288**	**$27,579**	**$128,956**	**$12,654**	**$116,302**	**4.2**	**236,199**
TOTALS (ALL MEASURES)			**212,987**	**30.2**	**327**	**$29,436**	**$180,925**	**$18,619**	**$162,306**	**5.5**	**252,804**

* - 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, such as 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.

For details on these programs please visit New Jersey's Clean Energy Program website or contact your utility provider.

Options from Around the State

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the ESIP. Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as attractive financing for implementing ECMs. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat 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 designed to promote self-investment in energy efficiency and combined heat and power or fuel cell projects. 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.

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Manasquan High 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 September 7, 2021, TRC performed an energy audit at Manasquan High School located in Manasquan, New Jersey. TRC met with Peter Crawley to review the facility operations and help focus our investigation on specific energy-using systems.

Manasquan High School located at 167 Broad Street is a four-year public high school serving students in ninth to twelfth grades in Monmouth County in New Jersey. The facility is a two-story, 212,220 square foot school building that includes typical educational, administrative, assembly, and recreation spaces. The original school building was built in 1931 and was expanded in 1995 and 2018 to accommodate the need for additional students and services. Spaces include: classrooms, administrative offices, gymnasiums, locker rooms, theater, media center, band room, kitchen, dining areas, conference rooms, corridors, lobbies, restrooms, storage, and mechanical spaces.

Facility lighting consists mainly of 32-Watt T8 fluorescent fixtures and LED fixtures. The building is fully conditioned; heated mostly by four non-condensing hot water boilers and cooled by two variable speed air-cooled chillers. Packaged units provide space conditioning to most remaining areas.

Recent improvements and Facility Concerns

Over the last few months, the facility completed a major mechanical upgrade that included the installation of four hot water boilers, two variable speed air-cooled chillers and most of the air handling units (AHUs), and exhaust fans. Additionally, the facility has replaced some lighting systems with LED sources.

The facility is interested in replacing the remaining non-LED lights with LED sources and to have a lighting control system.

Manasquan High School

2.2 Building Occupancy

The school operates on a 10-month schedule from September to June. The gymnasiums and locker rooms are used after classes for sports and other events. There are some Saturday activities in the gymnasium. The entire facility is shut down at approximately 11:30 PM after the cleaning process is completed.

During a typical day, the facility is occupied by approximately 1,000 students and 125 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
Manasquan High School General Operating Hours	Weekday	6:00 AM - 11:30 PM
	Saturday	8:00 AM - 12:00 PM
Manasquan High School Class Hours	Weekday	7:30 AM - 2:30 PM
	Weekend	Varies

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

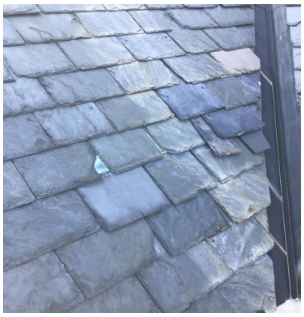
Building walls are concrete masonry units (CMU) over structural steel with a brick façade, with gypsum drywall painted CMU interior finish. The building walls are in good condition. The flat roof sections are supported with steel trusses and a reinforced concrete deck and finished with an insulated layer and a covering of white and black membrane. They are surrounded with pitched clay tile roofing sections on the perimeter. The 2018 and 1995 addition roofs are in good condition, and the 1931 original building roof appears in fair condition. Some areas of the perimeter pitched roof have loose tiles that slide down out of place.

Most windows are constructed of double-pane glass and are operable with vinyl frames. The glass-to-frame seals are in good condition. The window weather seals are in good condition, showing little evidence of excessive wear. Some windows are tinted to filter out the sunlight. Exterior doors are made of fiberglass with metal frames. They are generally in good condition, although some reportedly leak air and rain. The door seals need to be repaired as degraded window and door seals increase drafts and outside air infiltration.

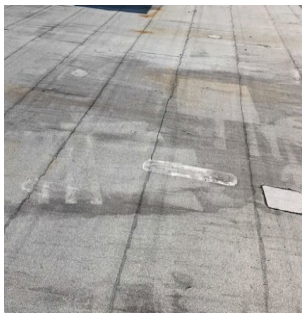
1931 Building Walls

2018 Building Walls

1995 Walls



Clay Tiles



Flat & Clay Tiles Pitched Roof

Flat & Clay Tiles Pitched Roof

Vinyl Frame Windows

Vinyl Frame Windows

Exterior Doors

Exterior Doors

2.4 Lighting Systems

The interior lighting system mainly uses a combination of 32-Watt linear fluorescent T8 lamps and LED sources. There are also some compact fluorescent and incandescent lamps.

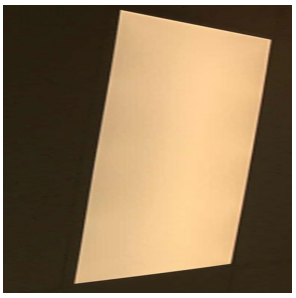
Spaces including classrooms, dining area, kitchen, locker rooms, main hallway, restrooms, stairs, storage rooms, band room, and some offices are lit with linear fluorescent fixtures. Fluorescent fixture types include 2-lamp, 3-lamp, or 4-lamp, 4-foot-long troffer, recessed, surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. LED light sources are found in spaces including gymnasium, dining area, media center, science classrooms, theater, stairway 6 and 7, kitchen, and some classrooms. Most exit signs are incandescent.

Most fixtures are in good condition. Interior lighting levels were generally sufficient. Lighting fixtures in spaces are controlled by manual wall switches except for the 1995 addition classrooms that have occupancy sensors.

Facility exterior perimeter illumination is provided by wall mounted LED fixtures and lamps, and some CFL fixtures. They are controlled by timers. Additionally, there are 400-Watt metal halide pole mounted lamps used in the sports field. They are controlled manually and operate when needed.

4-Foot-Long Recessed LED Fixture

4-Foot-Long Recessed LED Fixture



LED Panel

Linear T8 Fixture

Linear T8 Fixture

2-Foot-Long LED Fixture

U-Bend Fixture

Exterior LED Fixtures

Exterior LED Fixture

Metal Halide Fixture

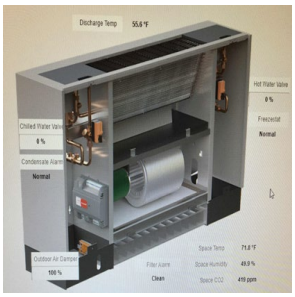
2.5 Air Handling Systems

Unit Ventilators & Fan Coil Units

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

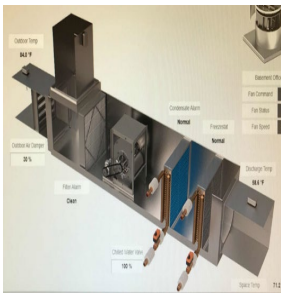
There are 12 Carrier ceiling mounted fan coil units (FCU-1 to 12) at the facility. They are equipped with supply fan motors and hot water and chilled water coils connected to the hot water and chilled water distribution systems. They provide heating and cooling to office spaces and are controlled via the building energy management system (BEMS). They are in good working condition.

Typical Classroom Unit Ventilator



Typical Classroom Unit Ventilator

Typical Fan Coil Unit (FCU)



Typical Fan Coil Unit (FCU)

Unitary Electric HVAC Equipment

Some private offices are conditioned by split system air conditioning (AC) units or heat pumps. There are three, 1-ton split AC units and two split heat pumps with cooling capacities of 1 ton and 3 tons and heating capacities of 14.30 MBh and 34 MBh, respectively. The 1-ton split heat pump appears in fair condition and has been evaluated for replacement. The remaining split AC and heat pump are in good condition.

Additionally, the reception areas, front offices, and classroom 209 are served by one Carrier and four Daikin variable refrigerant flow (VRF), heat recovery system heat pumps. Each outdoor unit has multiple indoor units connected by refrigerant piping and wiring. Their cooling capacity ranges between 8 tons and 12 tons with energy efficiency ratings (EER) ranging between 12.30 EER and 13.20 EER. Heating capacity ranges between 108 MBh and 162 MBh with coefficient of performance (COP) ratings between 3.51 to 3.82. The units are good condition. The split system AC and heat pumps are controlled by the BEMS.

Outdoor Daikin Split System AC

Indoor Daikin Split System AC

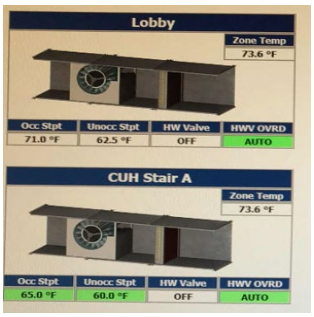
Daikin VRF Heat Pump

Daikin VRF Heat Pump

Unitary Heating Equipment

Various building areas including gym storage, restrooms, lobbies, vestibules, stairs, corridors, and mechanical spaces are heated by cabinet and suspended unit heaters with hot water coils. The units are in good condition and controlled with the BEMS. Heating temperature setpoints are set to 65°F.

BEMS Screenshot - Hydronic Unit Heaters



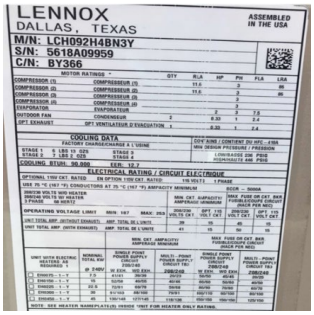
BEMS Screenshot - Hydronic Unit Heaters

Packaged Units

Heating and cooling for larger occupied spaces including classrooms, offices, and other areas are provided by roof mounted packaged units connected to ducted distribution systems. These include two Carrier energy recovery units (ERU-1 & 2) and nine Lennox packaged units. The ERUs serve classrooms, offices, and corridors in the original building. They provide variable air volume distribution and are equipped with direct expansion (DX) coils for cooling and gas-fired furnace sections for heating. The Lennox units have DX coils with cooling capacities from 3 tons to 12.5 tons. Two of the 7.5-ton Lennox units (labelled as CU-1A and CU-1B) serve the cooling coils of the heating recovery units (HRUs). Packaged units are equipped with economizers that are in good condition and are BMS controlled. Please refer to the following table:

Unit Tag	Areas Served	Quantity	Cooling Capacity (Ton)	Heating Capacity (MBh)	Manufacturer	Condition
ERU-1	Classrooms & Offices	1	18	246	Carrier	New
ERU-2	Classrooms, Offices & Corridors	1	18	328	Carrier	New
CU-1A & CU-1B	HRU	2	7.5	N/A	Lennox	Good
N/A	School Building	2	7.5	N/A	Lennox	Good
N/A	School Building	3	3	N/A	Lennox	Good
N/A	School Building	2	12.5	N/A	Lennox	Good

Typical Lennox Packaged Unit



Typical Lennox Packaged Unit

Air Handling Units (AHUs)

Heating and cooling for larger occupied spaces including cafeteria, media center, auditorium, TV, audio and video production, and other areas are provided by five, roof mounted AAON air handling units (AHUs) connected to ducted distribution systems. Each contains chilled water coils, one supply and exhaust fan motor equipped with variable frequency drive (VFD), and economizer to regulate outside air intake. AHU-1 and AHU-2 are also equipped with gas-fired furnace sections with a respective heating capacity of 864 MBh and 648 MBh.

Air distribution is provided to supply air registers by ducts concealed above the ceilings. Heated (AHU-1 & 2) and cooled air is distributed through ducts to variable air volume (VAV) terminals concealed above the ceilings. The AHUs are controlled by the BEMS.

According to the BEMS screenshot, the building air distribution system setpoints are as follow:

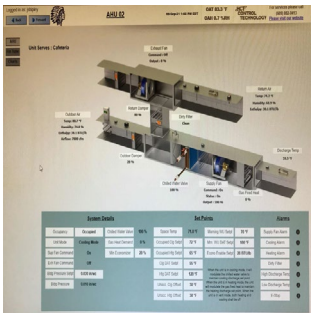
Occupied Cooling Setpoint: 72°F
Occupied Heating Setpoint: 65°F
Unoccupied Cooling & Heating Offsets: 30°F

Unit Tag	Areas Served	Chilled Water Coils	Gas-Fired Heating Capacity (MBh)	Supply Fan Motors (Qty x hp)	Exhaust Fan Motors (Qty x hp)
AHU-1	Auditorium	Yes	864	2 x 10 hp	2 x 2 hp
AHU-2	Cafeteria	Yes	648	1 x 5 hp	1 x 2 hp
AHU-3	TV Production	Yes	None	1 x 5 hp	1 x 2 hp
AHU-4	Audio, Video	Yes	None	1 x 5 hp	1 x 3 hp
AHU-5	Media Center	Yes	None	1 x 7.5 hp	1 x 2 hp

Typical AAON AHU

Typical AAON AHU

AHU-1/Chilled Water and Gas Pipes



AHU-2 EMS Screenshot

2.6 Building General Exhaust System

Various general exhaust fans serve restrooms, laboratory classrooms, locker rooms, boiler and electrical rooms, and other spaces. Several units have motors equipped with variable speed drives. Most of the exhaust fans were part of this year's major mechanical upgrade. They are in good working condition and are controlled with BEMS.

Typical General Exhaust Fan

Typical General Exhaust Fan

2.7 Heating Hot Water Systems

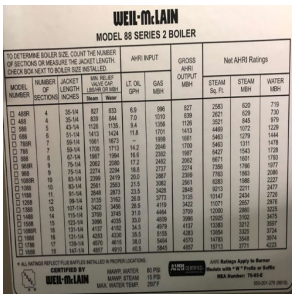
Two Weil McLain 3,135 MBh (#1 & 2) and two Weil McLain 1,413 MBh (#3 & 4) hot water boilers serve the original and 1995 addition building's heating load, respectively. The burners are non- modulating with a nominal efficiency of 83%. The boilers are configured in an automated lead-lag control scheme. Installed within the last year, they are in good condition.

The hydronic distribution system is a two-pipe heating-only system. The boilers are configured in a variable flow primary distribution with two, 15 hp (HWP #1 &2) and two, 7.5 hp (BP-1 &2) variable speed controlled hot water pumps operating in an automated lead-lag control scheme serving the original building hot water loop. The 1995 addition hot water distribution system is provided by two, 7.5 hp (HWP #3 & 4) and two, 5 hp (BP-3 & 4) variable speed controlled hot water pumps operating with an automated lead-lag control scheme.

The boilers provide hot water to fin tube radiators, cabinet heaters, unit ventilators, fan coil units and suspended hydronic unit heaters throughout the building.

The hot water supply temperature is controlled to maintain 160°F when the outside temperature is below 65°F and this setpoint is reset to 185°F when the outside temperature is below 25°F. At the time of the audit, Boilers #2 and #4 were running with respective supply and return temperature of 156.2°F and 155.5°F, and 162.9°F, and 134.6°F.

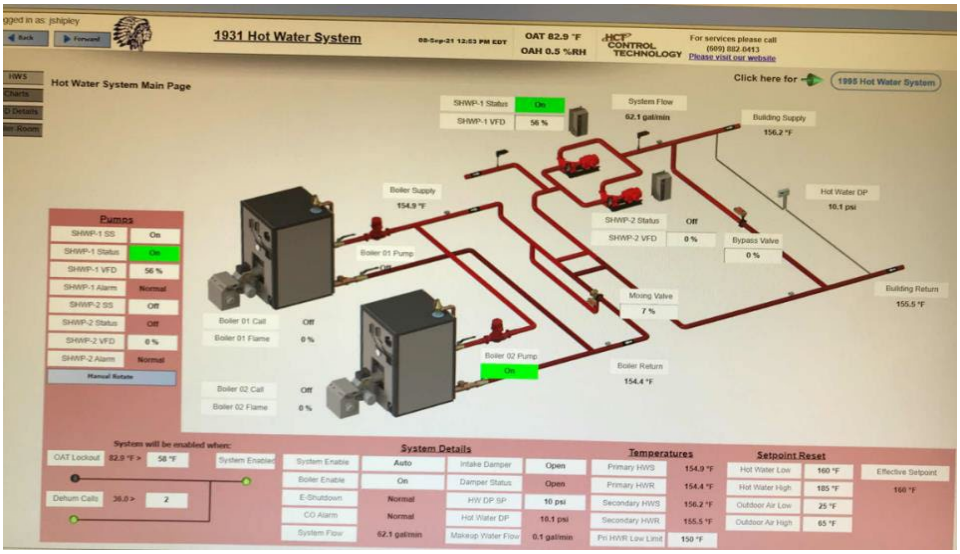
Boilers #1 & 2



Boilers #1 & 2

15 hp Variable Flow Hot Water Pumps

15 hp Variable Flow Hot Water Pumps



Boiler #1 & 2 Hot Water Loop

2.8 Chilled Water Systems

The facility has two roof-mounted Carrier, R-410A, variable speed air-cooled scroll chillers (CH1 and CH2) that were recently installed. The chillers are 150-ton and 120-ton units and serve the original building and 1995 addition, respectively. Each chiller is configured in a variable flow primary distribution with two, 10 hp variable speed controlled chilled water pumps for each chiller. Each pump has a rated flow of 182 gallon per minute (gpm). Each set of chilled water pumps (CHWP #1 & 2 and CHWP #3 & 4) operate in an automated lead-lag control scheme. Chilled water is supplied to AHUs, fan coil units, and unit ventilators.

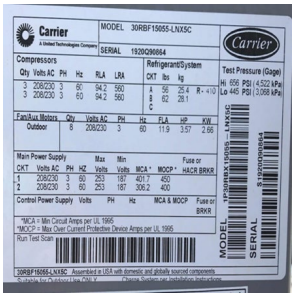
The chilled water supply temperature is reset based on outside air temperature. Chilled water is distributed at 42°F when the outside air temperature is above 60°F, and the setpoint is reset to 50°F when the outside air is below 55°F. The chiller is enabled when the outside air temperature is above 55°F.

At the time of this audit, chilled water temperatures and setpoints were as noted:

Chiller #1
Chilled Water Supply Temperature: 41.2°F.
Chilled Water Return Temperature: 49.5°F.
Chilled Water Setpoint: 44°F

Chiller #2
Chilled Water Supply Temperature: 41.4°F.
Chilled Water Return Temperature: 48.2°F.
Chilled Water Setpoint: 42°F

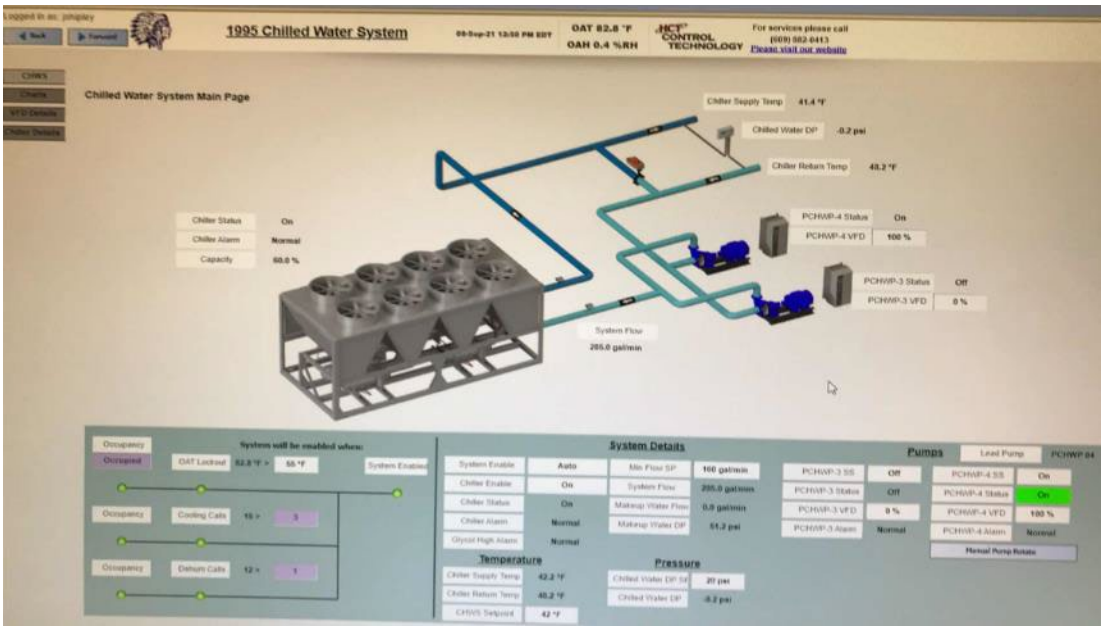

Chiller #1



Chiller #1

Chilled Water Pipes

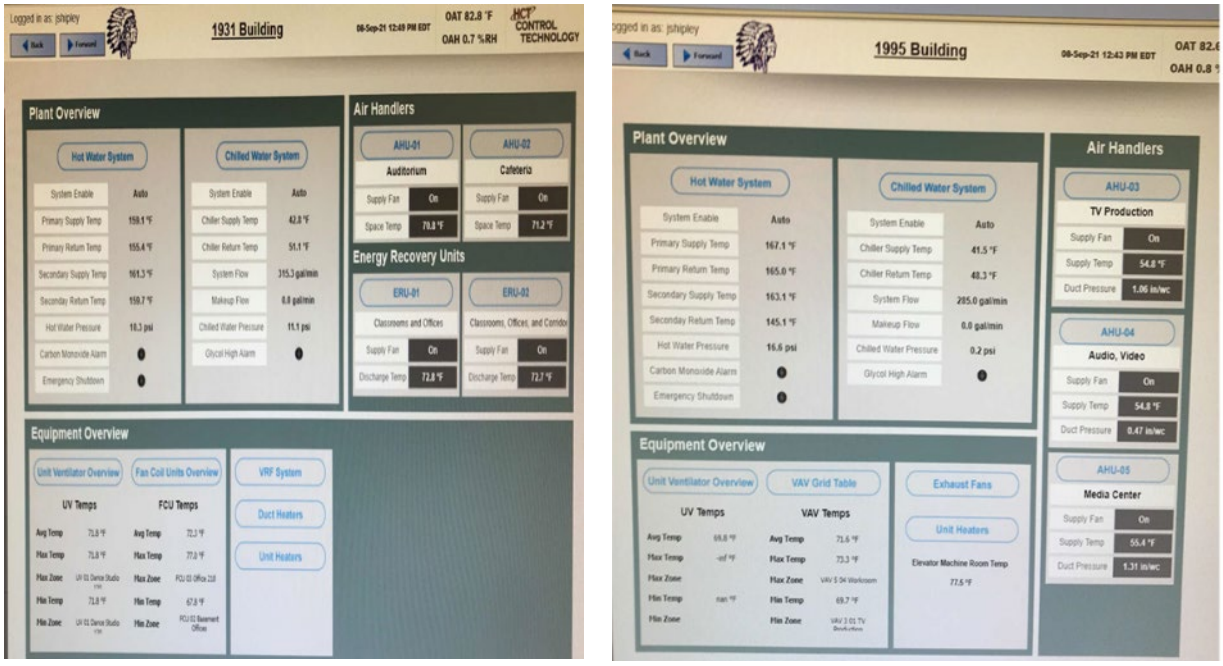

Pumps #1 & 2



1995 Addition Chilled Water BEMS Screenshot

2.9 Building Energy Management Systems (BEMS)

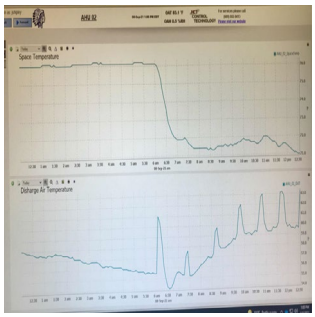
An HCT Control Technology BEMS controls the HVAC equipment, boilers, chillers, AHUs, ERUs, package units, exhaust fans, unit ventilators and fan coil units, cabinet heaters, split system AC, and heat pumps. The BEMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures, and chilled water loop temperatures.



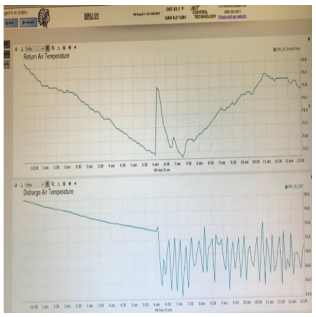
Original & 1995 Addition Main BEMS Screenshot

Below are screenshots from the facility BEMS. Upon examination, anomalous heat spikes appear in the AHU-2 discharge air temperature.

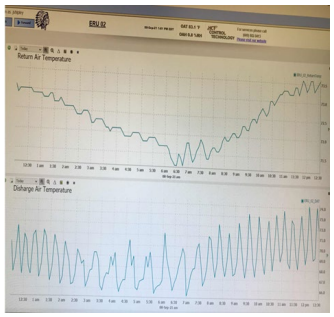
It also appears that ERU-1 is not maintaining the space temperature. ERU-2 is clearly running all night and is not also maintaining space temperature. Based on these observations, we have recommended a retro-commissioning study for the HVAC control systems.



BEMS Screenshot



BEMS Screenshot



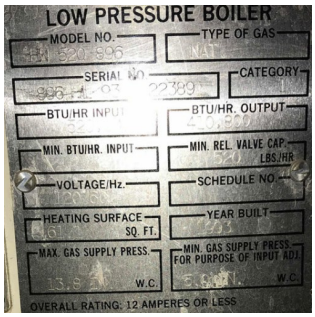
BEMS Screenshot

2.10 Domestic Hot Water

Hot water is produced by two, 520 MBh gas-fired boilers, each with an efficiency rating of 79%. The boilers are in the electrical room. Manufactured in 1993, the boilers have passed their useful service life, appear to be in poor condition, and have been evaluated for replacement.

Five fractional horsepower circulation pumps distribute water to end uses. The domestic hot water pipes are insulated, and the insulation is in good condition.


Domestic Hot Water Boilers



Domestic Hot Water Boilers

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 a convection gas-fired oven. Equipment is high efficiency and is in good condition.

The dishwasher is a non-ENERGY STAR® high temperature, rack type unit. It's in good condition

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

Gas-Fired Kitchen Equipment

2.12 Refrigeration

The dining area has three stand-up refrigerators with solid doors. There are three refrigerator chests. All equipment is standard efficiency and in good condition.

The facility includes a walk-in cooler and freezer that were not accessible during the audit.

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

Stand-up Solid Doors Refrigerators

Stand-up Solid Doors Refrigerators

2.13 Plug Load and Vending Machines

There are 86 computer workstations throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart projectors. There are also typical office loads such as scanner/copiers, small printers, microwaves, and mini fridges. There are nine residential-style refrigerators throughout the facility that are in good condition. There is a refrigerated beverage vending machine in the lounge.

Copier

Residential-style Refrigerator

2.14 Water-Using Systems

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

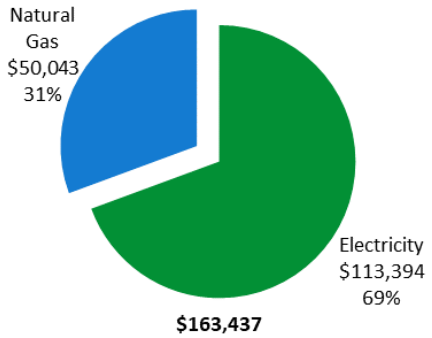
Girls and boy's locker rooms have showerheads rated at 2.5 gpm. The kitchen has seven faucets that rated at 2.5 gpm.

Restroom Sinks

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	923,600 kWh	$113,394
Natural Gas	49,835 Therms	$50,043
Total		**$163,437**



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.

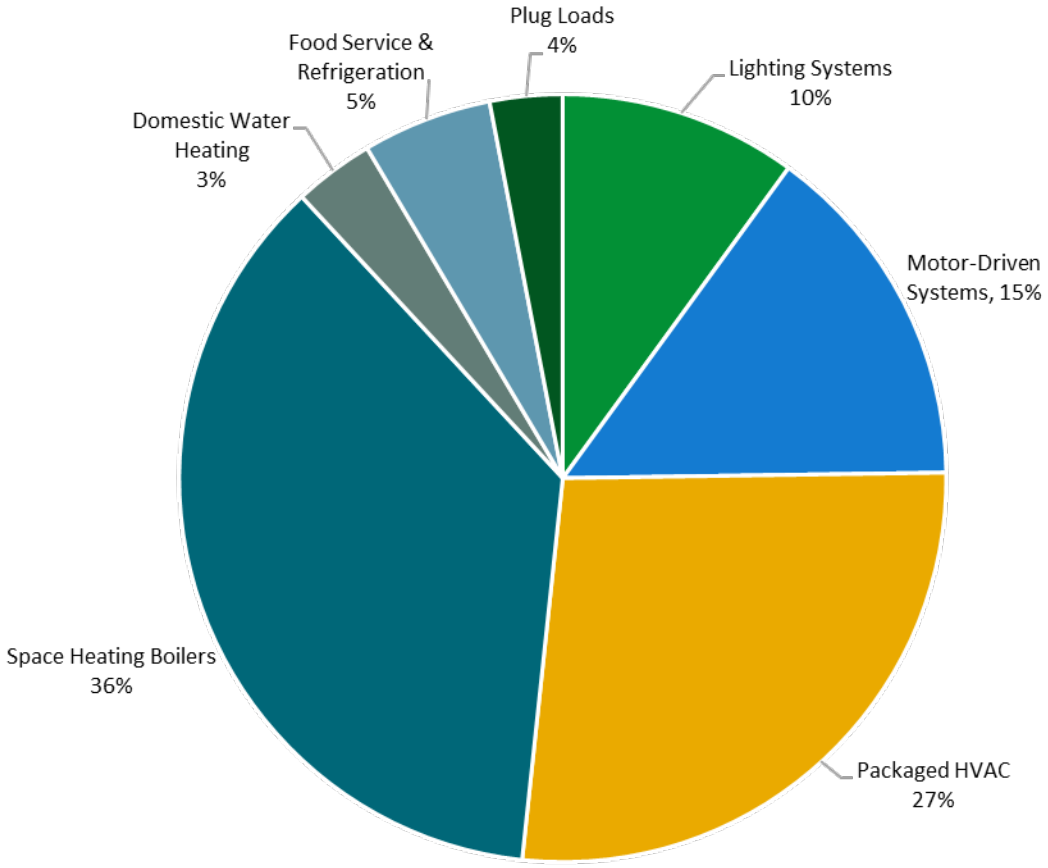
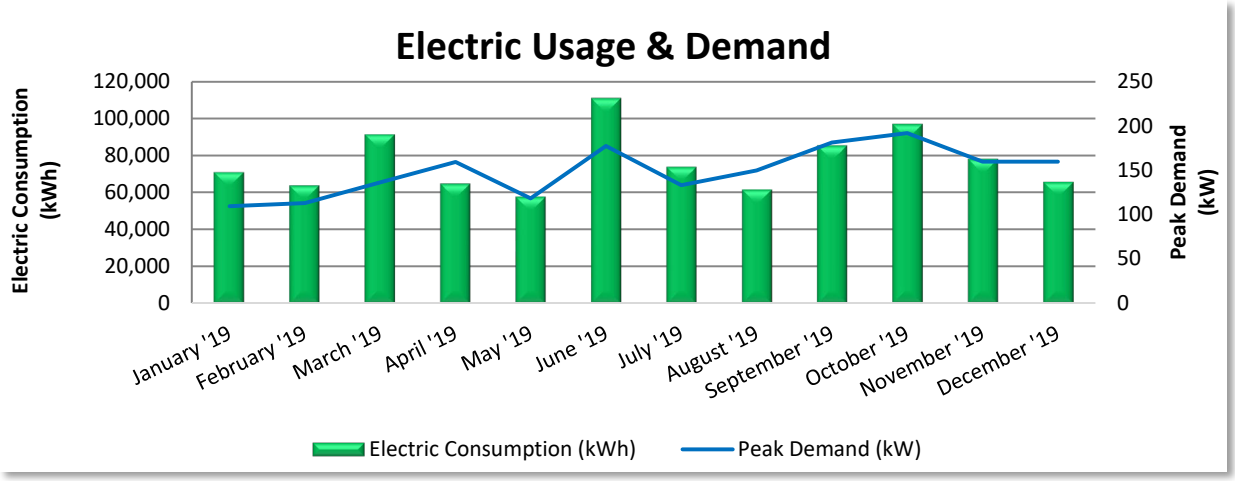


Figure 4 - Energy Balance

3.1 Electricity

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



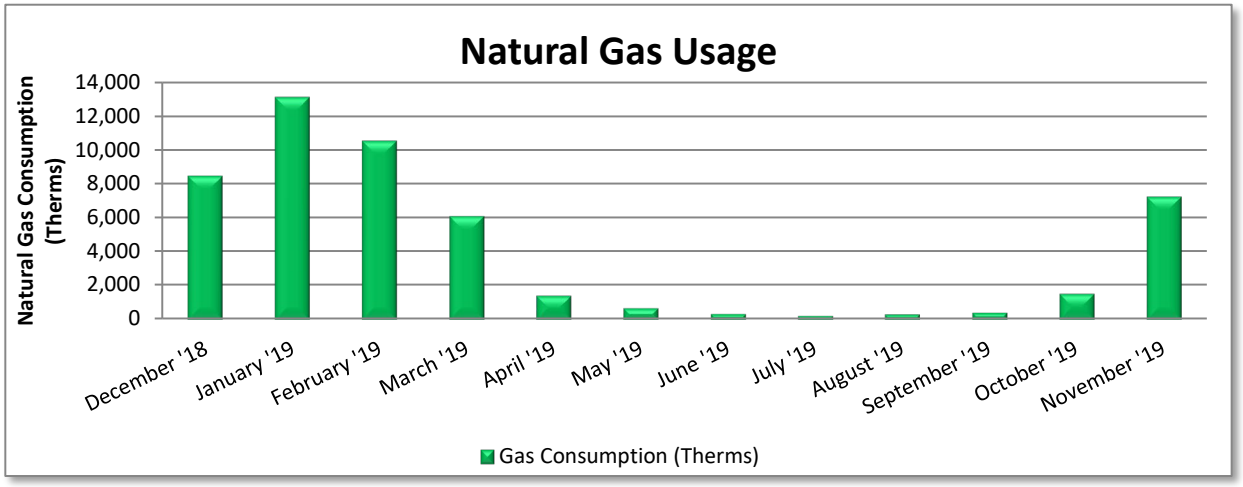
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
1/18/19	31	71,200	109	$623	$8,166
2/18/19	31	64,000	113	$646	$7,674
3/19/19	29	91,600	136	$791	$10,188
4/17/19	29	64,960	159	$935	$8,364
5/16/19	29	57,920	118	$631	$7,665
6/18/19	33	111,120	178	$111	$13,224
7/17/19	29	74,080	133	$815	$9,406
8/19/19	33	61,840	150	$928	$8,299
9/17/19	29	85,520	181	$1,136	$10,779
10/18/19	31	97,200	192	$1,123	$11,709
11/18/19	31	78,240	160	$1,023	$9,853
12/18/19	30	65,920	160	$924	$8,067
Totals	**365**	**923,600**	**192**	**$9,687**	**$113,394**
Annual	**365**	**923,600**	**192**	**$9,687**	**$113,394**

Notes:

- Peak demand of 192 kW occurred in October 2019.
- Average demand over the past 12 months was 149 kW.
- The average electric cost over the past 12 months was $0.123/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

NJ Natural Gas delivers natural gas under rate class Monthly 004M, with natural gas supply provided by UGI Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
1/9/19	34	8,489	$9,537
2/6/19	28	13,120	$10,831
3/8/19	30	10,558	$8,453
4/9/19	32	6,109	$5,783
5/8/19	29	1,407	$1,889
6/10/19	33	659	$875
7/11/19	31	329	$1,010
8/8/19	28	217	$912
9/9/19	32	308	$977
10/7/19	28	403	$1,098
11/6/19	30	1,522	$2,037
12/10/19	34	7,260	$7,188
Totals	**369**	**50,381**	**$50,591**
Annual	**365**	**49,835**	**$50,043**

Notes:

- The average gas cost for the past 12 months is $1.004/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	**91**

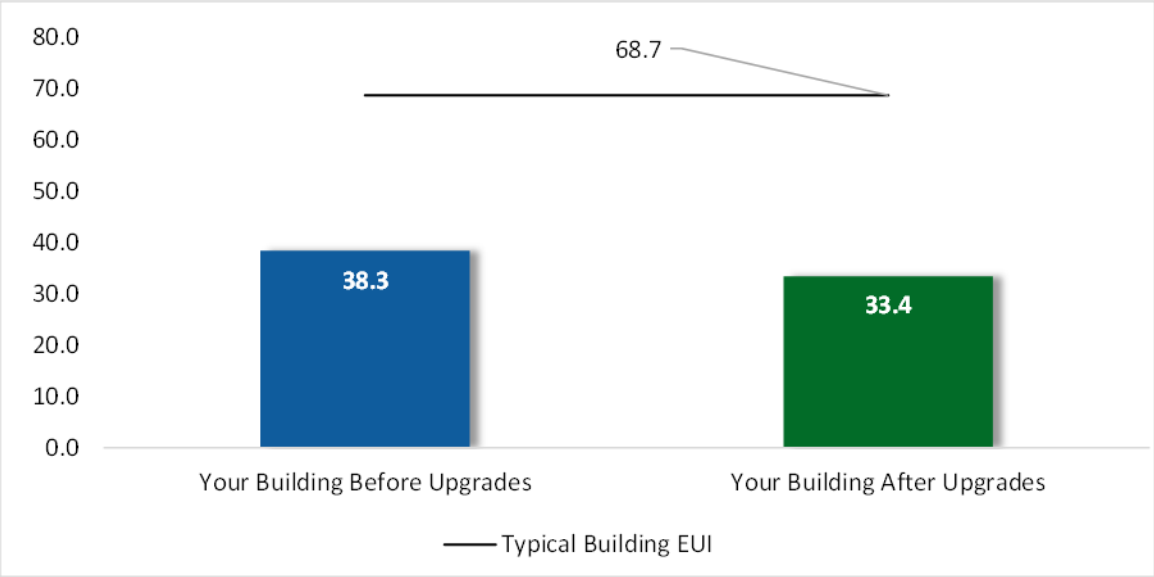


Figure 5 - Energy Use Intensity Comparison[3]

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

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. 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 we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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

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

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 are based on previously run state rebate programs. New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website. Some measures and proposed upgrades may be eligible for higher incentives than those shown below.

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			**141,948**	**18.0**	**-20**	**$17,224**	**$43,893**	**$6,451**	**$37,442**	**2.2**	**140,566**
ECM 1	Install LED Fixtures	Yes	44,535	0.0	0	$5,468	$15,057	$0	$15,057	2.8	44,846
ECM 2	Retrofit Fixtures with LED Lamps	Yes	66,713	15.7	-14	$8,051	$24,564	$6,451	$18,113	2.2	65,556
ECM 3	Install LED Exit Signs	Yes	30,700	2.3	-6	$3,705	$4,273	$0	$4,273	1.2	30,163
Lighting Control Measures			**28,094**	**6.1**	**-6**	**$3,390**	**$25,294**	**$5,505**	**$19,789**	**5.8**	**27,603**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	24,937	5.6	-5	$3,009	$22,144	$2,775	$19,369	6.4	24,501
ECM 5	Install High/Low Lighting Controls	Yes	3,157	0.6	-1	$381	$3,150	$2,730	$420	1.1	3,102
Variable Frequency Drive (VFD) Measures			**11,495**	**4.9**	**0**	**$1,411**	**$27,468**	**$2,225**	**$25,243**	**17.9**	**11,575**
ECM 6	Install VFDs on Constant Volume (CV) Fans	No	11,495	4.9	0	$1,411	$27,468	$2,225	$25,243	17.9	11,575
Unitary HVAC Measures			**395**	**0.7**	**0**	**$48**	**$1,691**	**$100**	**$1,591**	**32.8**	**397**
ECM 7	Install High Efficiency Heat Pumps	No	395	0.7	0	$48	$1,691	$100	$1,591	32.8	397
Domestic Water Heating Upgrade			**0**	**0.0**	**86**	**$862**	**$23,348**	**$3,838**	**$19,509**	**22.6**	**10,051**
ECM 8	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	40	$397	$22,811	$3,640	$19,171	48.3	4,633
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	46	$465	$537	$198	$339	0.7	5,419
Food Service & Refrigeration Measures			**10,146**	**0.5**	**0**	**$1,246**	**$6,132**	**$500**	**$5,632**	**4.5**	**10,217**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	2,077	0.3	0	$255	$1,517	$200	$1,317	5.2	2,091
ECM 11	Refrigeration Controls	Yes	6,457	0.1	0	$793	$4,385	$250	$4,135	5.2	6,502
ECM 12	Vending Machine Control	Yes	1,612	0.2	0	$198	$230	$50	$180	0.9	1,623
Custom Measures			**20,910**	**0.0**	**268**	**$5,255**	**$53,100**	**$0**	**$53,100**	**10.1**	**52,395**
ECM 13	Retro-Commissioning Study	Yes	20,910	0.0	268	$5,255	$53,100	$0	$53,100	10.1	52,395
TOTALS			**212,987**	**30.2**	**327**	**$29,436**	**$180,925**	**$18,619**	**$162,306**	**5.5**	**252,804**

* - 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		**141,948**	**18.0**	**-20**	**$17,224**	**$43,893**	**$6,451**	**$37,442**	**2.2**	**140,566**
ECM 1	Install LED Fixtures	44,535	0.0	0	$5,468	$15,057	$0	$15,057	2.8	44,846
ECM 2	Retrofit Fixtures with LED Lamps	66,713	15.7	-14	$8,051	$24,564	$6,451	$18,113	2.2	65,556
ECM 3	Install LED Exit Signs	30,700	2.3	-6	$3,705	$4,273	$0	$4,273	1.2	30,163
Lighting Control Measures		**28,094**	**6.1**	**-6**	**$3,390**	**$25,294**	**$5,505**	**$19,789**	**5.8**	**27,603**
ECM 4	Install Occupancy Sensor Lighting Controls	24,937	5.6	-5	$3,009	$22,144	$2,775	$19,369	6.4	24,501
ECM 5	Install High/Low Lighting Controls	3,157	0.6	-1	$381	$3,150	$2,730	$420	1.1	3,102
Domestic Water Heating Upgrade		**0**	**0.0**	**46**	**$465**	**$537**	**$198**	**$339**	**0.7**	**5,419**
ECM 9	Install Low-Flow DHW Devices	0	0.0	46	$465	$537	$198	$339	0.7	5,419
Food Service & Refrigeration Measures		**10,146**	**0.5**	**0**	**$1,246**	**$6,132**	**$500**	**$5,632**	**4.5**	**10,217**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	2,077	0.3	0	$255	$1,517	$200	$1,317	5.2	2,091
ECM 11	Refrigeration Controls	6,457	0.1	0	$793	$4,385	$250	$4,135	5.2	6,502
ECM 12	Vending Machine Control	1,612	0.2	0	$198	$230	$50	$180	0.9	1,623
Custom Measures		**20,910**	**0.0**	**268**	**$5,255**	**$53,100**	**$0**	**$53,100**	**10.1**	**52,395**
ECM 13	Retro-Commissioning Study	20,910	0.0	268	$5,255	$53,100	$0	$53,100	10.1	52,395
TOTALS		**201,098**	**24.7**	**288**	**$27,579**	**$128,956**	**$12,654**	**$116,302**	**4.2**	**236,199**

* - 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		**141,948**	**18.0**	**-20**	**$17,224**	**$43,893**	**$6,451**	**$37,442**	**2.2**	**140,566**
ECM 1	Install LED Fixtures	44,535	0.0	0	$5,468	$15,057	$0	$15,057	2.8	44,846
ECM 2	Retrofit Fixtures with LED Lamps	66,713	15.7	-14	$8,051	$24,564	$6,451	$18,113	2.2	65,556
ECM 3	Install LED Exit Signs	30,700	2.3	-6	$3,705	$4,273	$0	$4,273	1.2	30,163

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 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: pole mounted exterior fixtures.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent T8, 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 in locker rooms and incandescent lamps in Storage rooms 5 and 6.

ECM 3: Install LED Exit Signs

Replace incandescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output. Maintenance savings and improved reliability may also be achieved, as the longer-lasting LED lamps will not need to be replaced as often as the existing lamps.

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		**28,094**	**6.1**	**-6**	**$3,390**	**$25,294**	**$5,505**	**$19,789**	**5.8**	**27,603**
ECM 4	Install Occupancy Sensor Lighting Controls	24,937	5.6	-5	$3,009	$22,144	$2,775	$19,369	6.4	24,501
ECM 5	Install High/Low Lighting Controls	3,157	0.6	-1	$381	$3,150	$2,730	$420	1.1	3,102

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, media center, 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 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		**11,495**	**4.9**	**0**	**$1,411**	**$27,468**	**$2,225**	**$25,243**	**17.9**	**11,575**
ECM 6	Install VFDs on Constant Volume (CV) Fans	11,495	4.9	0	$1,411	$27,468	$2,225	$25,243	17.9	11,575

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 6: Install VFDs on Constant Volume (CV) Fans

We evaluated installing VFDs to control constant volume fan motor speeds and exhaust fan motors. 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 Air Handlers: Lennox RTUs & Gymnasium exhaust fan.

4.4 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		**395**	**0.7**	**0**	**$48**	**$1,691**	**$100**	**$1,591**	**32.8**	**397**
ECM 7	Install High Efficiency Heat Pumps	395	0.7	0	$48	$1,691	$100	$1,591	32.8	397

Replacing the split system heat pump has a long payback period and may not be justifiable based simply on energy considerations. However, the heat pump has reached the end of its normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the heat pump is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 7: Install High Efficiency Heat Pumps

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

Affected Units: heat pump (AC-11) serving classroom 209.

4.5 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**86**	**$862**	**$23,348**	**$3,838**	**$19,509**	**22.6**	**10,051**
ECM 8	Install High Efficiency Gas-Fired Water Heater	0	0.0	40	$397	$22,811	$3,640	$19,171	48.3	4,633
ECM 9	Install Low-Flow DHW Devices	0	0.0	46	$465	$537	$198	$339	0.7	5,419

ECM 8: Install High Efficiency Gas-Fired Water Heater

We evaluated replacing the existing domestic hot water boilers with high efficiency condensing tank water heaters. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

ECM 9: 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

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

4.6 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**10,146**	**0.5**	**0**	**$1,246**	**$6,132**	**$500**	**$5,632**	**4.5**	**10,217**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	2,077	0.3	0	$255	$1,517	$200	$1,317	5.2	2,091
ECM 11	Refrigeration Controls	6,457	0.1	0	$793	$4,385	$250	$4,135	5.2	6,502
ECM 12	Vending Machine Control	1,612	0.2	0	$198	$230	$50	$180	0.9	1,623

ECM 10: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in coolers and 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 11: Refrigeration Controls

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

Many walk-in coolers and freezers have continuously operated 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 12: 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.

4.7 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		**20,910**	**0.0**	**268**	**$5,255**	**$53,100**	**$0**	**$53,100**	**10.1**	**52,395**
ECM 13	Retro-Commissioning Study	20,910	0.0	268	$5,255	$53,100	$0	$53,100	10.1	52,395

ECM 13: 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 site that systems may be 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.

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in HVAC control improvements. Based on industry standards and previous project experience, the potential energy savings may be up to 15% of existing HVAC energy use. The average cost of retro-commissioning studies and control improvements is $0.30 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to perform the study. For the purposes of this report, we have conservatively estimated savings to be 2% of the HVAC motor use and 6% of the heating and cooling energy consumption baseline.

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[4]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Weatherization

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

Doors and Windows

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

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

Lighting Maintenance

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

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

Lighting Controls

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

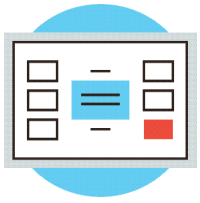
Motor Maintenance

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°F-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

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 EMS 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 (EMS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The EMS 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 EMS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your EMS 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 EMS (if available) to optimize the building warmup sequence. Most EMS 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.

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% to 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[5] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[6] 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.

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

[6] 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.

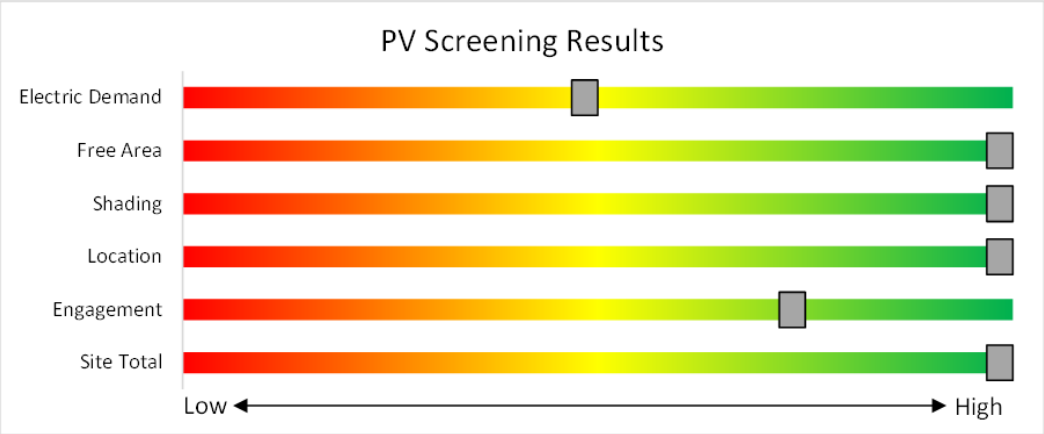
6.1 Solar Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in 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	149	kW DC STC
Electric Generation	177,514	kWh/yr
Displaced Cost	$21,790	/yr
Installed Cost	$387,400	

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

6.2 Combined Heat and Power

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

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

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

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

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

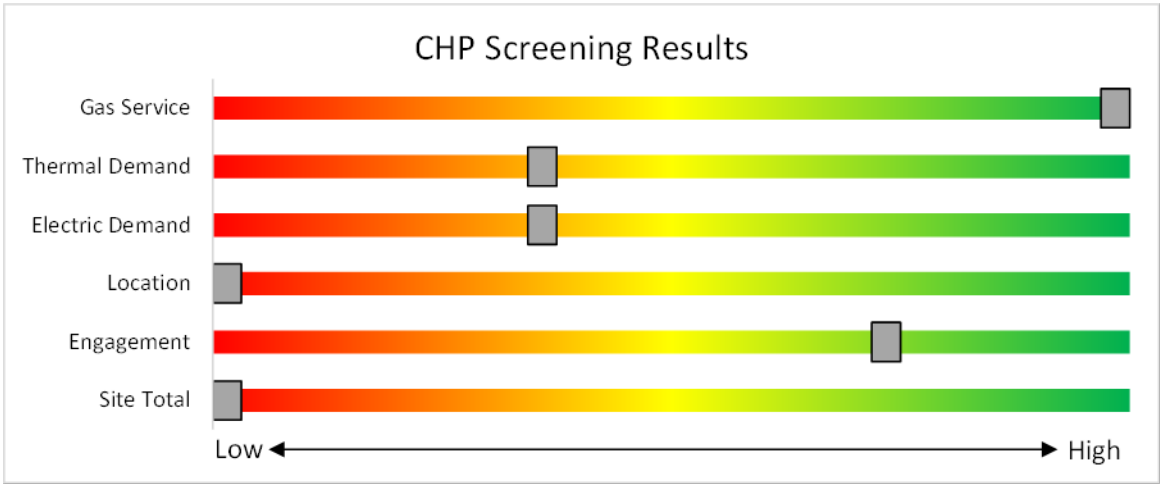


Figure 9 - Combined Heat and Power Screening

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 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? Your utility provider may be able to help.

7.1 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.

These new utility programs are rolling out in the spring and summer of 2021. Keep up to date with developments by visiting:

https://www.njcleanenergy.com/transition

8 New Jersey's Clean Energy Programs

New Jersey's Clean Energy Program will continue to offer some energy efficiency programs.

8.1 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

8.2 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

You 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.

8.3 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 effective August 28, 2021.

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. The program is currently under development with the goal of holding the first solicitation by early-to-mid 2022. 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.

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities, and other public and state entities enter 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 description 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.

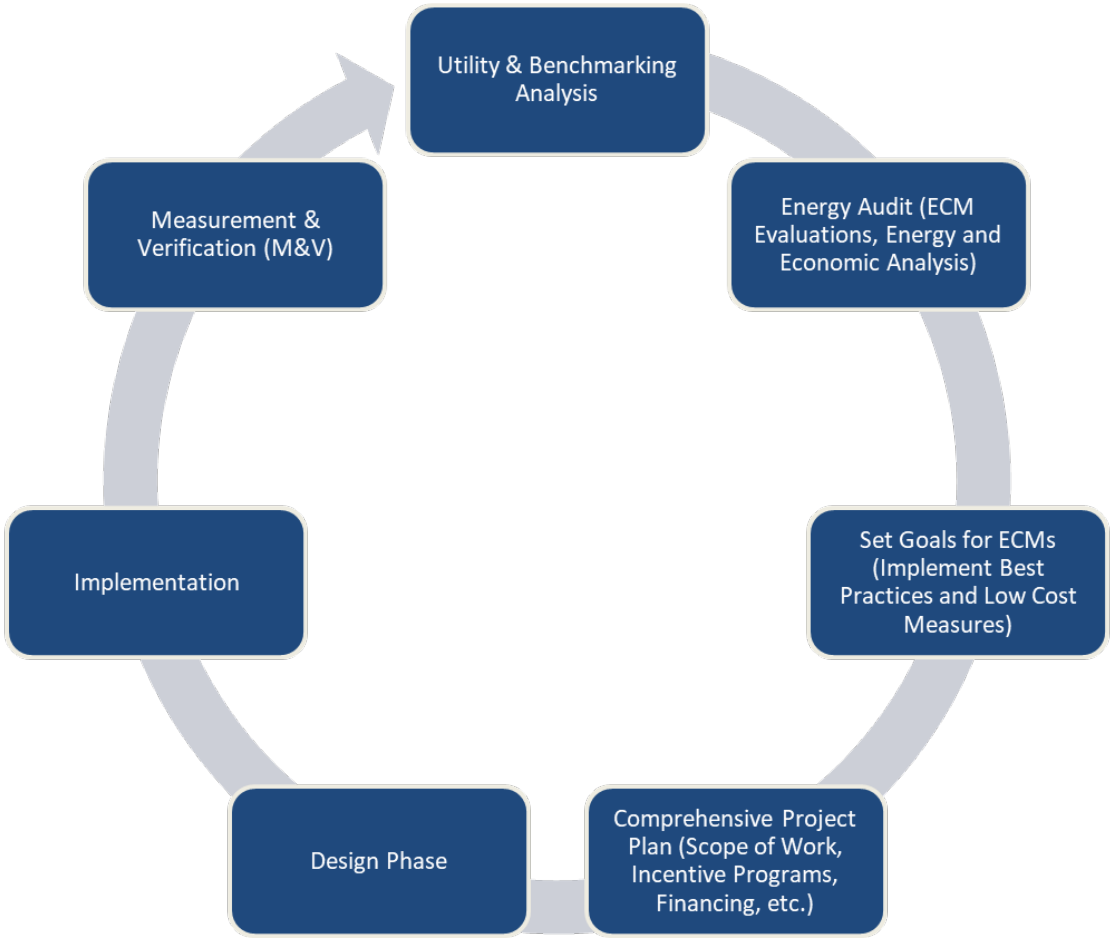


Figure 10 – Project Development Cycle

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[7].

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[8].

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

[8] 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
Assistant Principal Office	2	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$126	$145	$0	1.2
Assistant Principal Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	1,171	0	$141	$562	$115	3.2
Boiler Room 1	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Boiler Room 1	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	1,024	0	$124	$526	$105	3.4
Classroom 101	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$12	$37	$10	2.3
Classroom 108	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 109	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 110	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 111	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$12	$37	$10	2.3
Classroom 112	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,585	0	$191	$745	$165	3.0
Classroom 114	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.2	732	0	$88	$489	$95	4.5
Classroom 118	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,640	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,822	0.0	36	0	$4	$0	$0	0.0
Classroom 118	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.1	488	0	$59	$416	$75	5.8
Classroom 120	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 121	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 463	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	2,640	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	1,822	0.0	58	0	$7	$116	$20	13.8
Classroom 463	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,585	0	$191	$745	$165	3.0
Classroom 464	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$12	$37	$10	2.3
Custodial	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	662	0.1	89	0	$11	$189	$40	13.9
Custodial 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	960	0.0	35	0	$4	$37	$10	6.3
Dining Area 1	2	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$126	$145	$0	1.2
Dining Area 1	15	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168	4	None	Yes	15	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,186	0.1	648	0	$78	$270	$35	3.0
Dining Area 1	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.3	1,317	0	$159	$599	$125	3.0
Electrical Room 2	2	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$126	$145	$0	1.2
Electrical Room 2	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	1,200		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	32	1,200	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
Electrical Room 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	44	0	$5	$37	$10	5.0
Elevator room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	960	0.0	35	0	$4	$37	$10	6.3
Guidance Office	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Guidance Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,168	0.0	115	0	$14	$37	$10	1.9
Gymnasium 1	6	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	6	LED Exit Signs: 2 W Lamp	None	6	8,760	0.2	3,122	-1	$377	$434	$0	1.2
Gymnasium 1	24	LED - Fixtures: High-Bay	Wall Switch	S	135	3,168	4	None	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	135	2,186	0.7	3,500	-1	$422	$540	$70	1.1
Gymnasium 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,168	2	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,168	0.0	61	0	$7	$18	$5	1.8
Home Ec.	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	293	0	$35	$189	$40	4.2
Kitchen 1	3	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,561	0	$188	$217	$0	1.2
Kitchen 1	9	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168	4	None	Yes	9	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,186	0.1	389	0	$47	$270	$35	5.0
Kitchen 1	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,168	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,186	0.1	296	0	$36	$400	$59	9.5
Kitchen 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	585	0	$71	$416	$75	4.8
Locker Room Female	7	Compact Fluorescent: (3) 60W Plug-in Lamps	Wall Switch	S	180	3,168	2, 4	Relamp	Yes	7	LED Lamps: LED Lamps	Occupancy Sensor	126	2,186	0.5	2,270	0	$274	$632	$56	2.1
Locker Room Female	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,168	2, 4	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,186	0.1	537	0	$65	$398	$70	5.1
Locker Room Female	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.5	2,195	0	$265	$818	$185	2.4
Locker Room Male	4	Compact Fluorescent: (3) 60W Plug-in Lamps	Wall Switch	S	180	3,168	2, 4	Relamp	Yes	4	LED Lamps: LED Lamps	Occupancy Sensor	126	2,186	0.3	1,297	0	$157	$477	$47	2.7
Locker Room Male	3	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,561	0	$188	$217	$0	1.2
Locker Room Male	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,168	2, 4	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,186	0.1	537	0	$65	$398	$70	5.1
Locker Room Male	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	293	0	$35	$189	$40	4.2
Lounge 1	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	1,171	0	$141	$562	$115	3.2
Main Hallway 1	7	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	7	LED Exit Signs: 2 W Lamp	None	6	8,760	0.3	3,642	-1	$440	$507	$0	1.2
Main Hallway 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Hallway 1	1	LED Lamps: (4) 5.5W Plug-In Lamps	Wall Switch	S	22	3,733	5	None	Yes	1	LED Lamps: (4) 5.5W Plug-In Lamps	High/Low Control	22	2,576	0.0	28	0	$3	$0	$0	0.0
Main Hallway 1	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,733	5	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	32	2,576	0.0	81	0	$10	$0	$0	0.0
Main Hallway 1	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,733	5	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,576	0.0	153	0	$18	$225	$105	6.5

	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
Main Hallway 1	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,733	2, 5	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.7	4,138	-1	$499	$1,776	$1,080	1.4
Media Center	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Media Center	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,168	4	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	2,186	0.1	311	0	$38	$270	$35	6.3
Media Center	4	LED - Fixtures: Downlight Recessed	Wall Switch	S	10	3,168	4	None	Yes	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	10	2,186	0.0	43	0	$5	$0	$0	0.0
Media Center	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,168	4	None	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,186	0.0	78	0	$9	$270	$35	24.9
Office - Open Plan 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	585	0	$71	$416	$75	4.8
Principal Office	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Principal Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	878	0	$106	$489	$95	3.7
Restroom - Female 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Restroom - Female 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Restroom - Female 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	293	0	$35	$189	$40	4.2
Restroom - Male 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Restroom - Male 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Restroom - Male 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	293	0	$35	$189	$40	4.2
Science Room	5	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,168	4	None	Yes	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	2,186	0.0	173	0	$21	$270	$35	11.3
Science Room	43	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168	4	None	Yes	43	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,186	0.4	1,858	0	$224	$810	$105	3.1
Stairs 1	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Stairs 1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	3,733	2, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.2	1,035	0	$125	$444	$270	1.4
Stairs 2	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Stairs 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	3,733	2, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.2	1,035	0	$125	$444	$270	1.4
Stairs 3	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Stairs 3	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	3,733	2, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.2	1,035	0	$125	$444	$270	1.4
Stairs 4	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Stairs 4	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	3,733	2, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.2	1,035	0	$125	$444	$270	1.4
Stairs 5	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2

	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
Stairs 5	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	3,733	2, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.2	1,035	0	$125	$444	$270	1.4
Stairs 6	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Stairs 6	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch		40	3,733	5	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,576	0.0	204	0	$25	$225	$140	3.5
Stairs 7	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Stairs 7	5	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch		40	3,733	5	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,576	0.0	255	0	$31	$225	$175	1.6
STEM room	3	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,561	0	$188	$217	$0	1.2
STEM room	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,168	0.0	0	0	$0	$0	$0	0.0
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	960	0.0	35	0	$4	$37	$10	6.3
Storage 2	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	662	0.2	222	0	$27	$453	$50	15.0
Theater 1	5	Exit Signs: LED - 2 W Lamp	None		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
Theater 1	6	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	S	20	3,168	4	None	Yes	6	LED Lamps: (2) 10W A19 Screw-In Lamps	Occupancy Sensor	20	2,186	0.0	130	0	$16	$270	$35	15.0
Theater 1	33	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,168	4	None	Yes	33	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	2,186	0.2	1,141	0	$138	$810	$105	5.1
Classroom 201	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 202	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 203	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 204	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.3	1,341	0	$162	$672	$145	3.3
Classroom 205	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.1	488	0	$59	$416	$75	5.8
Classroom 206	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$12	$37	$10	2.3
Classroom 208	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 209	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 210	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 211	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 212	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 214	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.1	488	0	$59	$416	$75	5.8
Classroom 218	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,640	2, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,822	0.2	859	0	$104	$562	$115	4.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 220	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,640	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,822	0.4	1,719	0	$207	$854	$195	3.2
Classroom 221	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 351	5	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	5	LED Exit Signs: 2 W Lamp	None	6	8,760	0.2	2,602	-1	$314	$362	$0	1.2
Classroom 351	5	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	2,640	4	None	Yes	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	1,822	0.0	144	0	$17	$270	$35	13.5
Classroom 351	5	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,640	4	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,822	0.0	180	0	$22	$270	$35	10.8
Classroom 351	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	2,640	4	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,822	0.0	39	0	$5	$0	$0	0.0
Classroom 354	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Classroom 354	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,640	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,822	0.0	72	0	$9	$116	$20	11.0
Classroom 356	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,640	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,822	0.0	36	0	$4	$0	$0	0.0
Classroom 356	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,640	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.0	52	0	$6	$116	$20	15.2
Classroom 560	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.3	792	0	$96	$438	$120	3.3
Classroom 561	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,640		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	2,640	0.0	0	0	$0	$0	$0	0.0
Classroom 562	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.3	792	0	$96	$438	$120	3.3
Classroom 563	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.4	1,463	0	$177	$708	$155	3.1
Classroom 564	2	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$126	$145	$0	1.2
Classroom 564	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.1	264	0	$32	$146	$40	3.3
Classroom 565	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.3	792	0	$96	$438	$120	3.3
Classroom 567	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.3	792	0	$96	$438	$120	3.3
Classroom 569	2	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$126	$145	$0	1.2
Classroom 569	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.0	132	0	$16	$73	$20	3.3
Classroom 570	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,818	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,818	0.3	792	0	$96	$438	$120	3.3
Coach Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.2	878	0	$106	$489	$95	3.7
Lounge 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	878	0	$106	$489	$95	3.7
Lounge 2	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None		93	3,168	2, 4	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.2	1,097	0	$132	$544	$110	3.3
Main Hallway 2	4	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.2	2,081	0	$251	$290	$0	1.2

	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
Main Hallway 2	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,733		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,733	0.0	0	0	$0	$0	$0	0.0
MEA Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	439	0	$53	$380	$65	5.9
Restroom - Female 4	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,186	0.0	86	0	$10	$116	$20	9.2
Restroom - Female 6	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Restroom - Female 7	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Restroom - Male 4	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,186	0.0	86	0	$10	$116	$20	9.2
Restroom - Male 6	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,168	2, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,186	0.1	658	0	$79	$434	$80	4.5
Roof access	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	3,168	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,168	0.0	230	0	$28	$73	$20	1.9
Small Office	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,168	0.0	0	0	$0	$0	$0	0.0
Small Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.1	293	0	$35	$189	$40	4.2
Storage 6	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	662	0.1	89	0	$11	$189	$20	15.8
Storage 3	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	S	9	960		None	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	960	0.0	0	0	$0	$0	$0	0.0
Storage 9	3	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,561	0	$188	$217	$0	1.2
Storage 9	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	960	2, 4	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	662	0.5	709	0	$86	$1,124	$160	11.3
Assistant office	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.3	1,317	0	$159	$599	$125	3.0
Band room	3	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,561	0	$188	$217	$0	1.2
Band room	45	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	45	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	1.4	6,585	-1	$795	$2,453	$555	2.4
Band room	10	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	10	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,186	0.3	1,367	0	$165	$995	$135	5.2
Health Classroom	2	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$126	$145	$0	1.2
Health Classroom	17	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,168	4	None	Yes	17	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,186	0.2	735	0	$89	$540	$70	5.3
Lounge 3	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	732	0	$88	$453	$85	4.2
Lounge 3	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,168	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,168	0.0	101	0	$12	$72	$10	5.1
Main Hallway 3	1	Exit Signs: Incandescent	None		60	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	520	0	$63	$72	$0	1.2
Main Hallway 3	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,733	2, 5	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,576	0.4	2,069	0	$250	$888	$540	1.4
Restroom - Female 5	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,168		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,168	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
Restroom - Female 5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,168	0.0	115	0	$14	$37	$10	1.9
Restroom - Male 5	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,168		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,168	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	9	3,168	0.0	185	0	$22	$37	$10	1.2
Storage 5	2	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	960	2, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	9	662	0.1	114	0	$14	$150	$2	10.8
Storage 8	2	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	960	2, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	9	662	0.1	114	0	$14	$150	$2	10.8
Storage G01	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	960		None	No	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	960	0.0	0	0	$0	$0	$0	0.0
Supervisor office	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,168	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,186	0.2	1,024	0	$124	$526	$105	3.4
Exterior Wall Pack	5	Compact Fluorescent: 60 W Lamp	Timeclock		60	4,380	2	Relamp	No	5	LED Lamps: LED Lamps	Timeclock	42	4,380	0.0	394	0	$48	$86	$5	1.7
Exterior Wall Pack	3	LED Lamps: 10 W A Lamp	Timeclock		10	4,380		None	No	3	LED Lamps: 10 W A Lamp	Timeclock	10	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	2	LED Lamps: 35 W LED Corn Bulb	Timeclock		35	4,380		None	No	2	LED Lamps: 35 W LED Corn Bulb	Timeclock	35	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed	1	LED - Fixtures: Downlight Recessed	Timeclock		15	4,380		None	No	1	LED - Fixtures: Downlight Recessed	Timeclock	15	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		35	4,380		None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	35	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		50	4,380		None	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	50	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		75	4,380		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	75	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Pole	30	Metal Halide: (1) 400W Lamp	Wall Switch		458	4,392	1	Fixture Replacement	No	30	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	120	4,392	0.0	44,535	0	$5,468	$15,057	$0	2.8

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	ERU-2 - Classrooms, Offices, & Corridors	1	Supply Fan	10.0	91.7%	Yes			N	2,745		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	ERU-2 - Classrooms, Offices, & Corridors	1	Exhaust Fan	7.5	91.7%	Yes			N	2,745		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	ERU-2 - Wheel Motor	1	Other	0.5	70.0%	No			N	1,200		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	ERU-1 - Classrooms & Offices	1	Supply Fan	7.5	91.7%	Yes			N	2,745		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	ERU-1 - Classrooms & Offices	1	Exhaust Fan	5.0	89.5%	Yes			N	2,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	ERU-1 - Wheel Motor	1	Other	0.5	70.0%	No			N	1,200		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2 - Cafeteria	1	Supply Fan	5.0	89.5%	Yes			N	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2 - Cafeteria	1	Exhaust Fan	2.0	86.5%	Yes			N	2,059		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2 - Cafeteria	3	Combustion Air Fan	0.3	65.0%	No			N	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5 - Media Center	1	Supply Fan	7.5	91.7%	Yes			N	2,059		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5 - Media Center	1	Exhaust Fan	2.0	86.5%	Yes			N	2,059		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1 Auditorium	2	Supply Fan	10.0	91.7%	Yes			N	2,059		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1 Auditorium	2	Exhaust Fan	2.0	86.5%	Yes			N	2,059		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1 Auditorium	4	Combustion Air Fan	0.3	65.0%	No			N	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3 - TV Production	1	Supply Fan	5.0	89.5%	Yes			N	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3 - TV Production	1	Exhaust Fan	2.0	86.5%	Yes			N	2,059		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3 - TV Production	1	Supply Fan	5.0	89.5%	Yes			N	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-4 - Audio, Video	1	Exhaust Fan	3.0	89.5%	Yes			N	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Boiler Combustion Air	2	Combustion Air Fan	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Electrical Room	Boiler Combustion Air	2	Combustion Air Fan	3.0	85.5%	No			W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	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	CU-1A & CU-1B	2	Supply Fan	0.5	70.0%	No			N	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Lennox RTUs	2	Supply Fan	2.0	84.0%	No			W	2,059	6	No	86.5%	Yes	2	1.2	2,885	0	$354	$7,246	$200	19.9
Roof	Lennox RTU	3	Supply Fan	0.5	70.0%	No			W	2,059	6	No	78.2%	Yes	3	0.5	1,467	0	$180	$8,545	$150	46.6
Roof	Lennox RTUs	2	Supply Fan	5.0	89.5%	No			W	2,059	6	No	89.5%	Yes	2	2.9	6,435	0	$790	$8,394	$1,800	8.3
Various Spaces	Various Spaces - Hydronic Unit Heater	11	Supply Fan	0.2	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classrooms/Stairs	Unit Ventilators	48	Fan Coil Unit	0.2	65.0%	No			W	3,120		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Electrical Room	Electrical Room	1	Exhaust Fan	2.0	84.0%	Yes			W	2,059		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Gymnasium	Gymnasium	1	Exhaust Fan	1.0	84.0%	No			W	2,059	6	No	85.5%	Yes	1	0.3	707	0	$87	$3,283	$75	36.9
Home EC	EF-14 - Lab 351	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-20 Lab 354A	1	Exhaust Fan	0.1	65.0%	No	Greenheck	GB-071-6	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kiln Exhaust Fan	1	Exhaust Fan	0.5	70.0%	Yes	Lauren Cook	180 ACE	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-9 - Home Economic	1	Exhaust Fan	0.3	65.0%	No	Lauren Cook	181 C4B	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-6 - Art Room 569/Classroom 567	1	Exhaust Fan	1.0	84.0%	Yes	Lauren Cook	210 ACE	W	2,059		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Nurse & Exam Rooms - EF-7	1	Exhaust Fan	0.3	65.0%	No	Lauren Cook	120 ACE	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-3 - Classrooms 561/563/565	1	Exhaust Fan	1.0	84.0%	Yes	Lauren Cook	225 ACE	W	2,059		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-4 - Classrooms 560/562	1	Exhaust Fan	0.5	70.0%	No	Dayton	4YU99	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-3 - Lab 304A	1	Exhaust Fan	0.3	65.0%	No	Greenheck	G-095-D	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-5 - Lab 301A	1	Exhaust Fan	0.3	65.0%	No	Greenheck	GB-141-7	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-8 - Lab 304	1	Exhaust Fan	0.3	65.0%	No	Greenheck		W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-10 - Elevator Machine Room	1	Exhaust Fan	0.3	65.0%	No	Lauren Cook	70 ACE	W	2,059		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
Roof	EF-5 - 1st Floor Storage & Comp Rooms	1	Exhaust Fan	0.5	70.0%	Yes	Lauren Cook	210 ACE	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-9 - Lab 303	3	Exhaust Fan	0.3	65.0%	No	Lauren Cook	CUBE-099-4-X	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-8 - 1st Floor Restroom	1	Exhaust Fan	0.5	70.0%	No	Lauren Cook	150 ACE	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU	2	Exhaust Fan	3.0	89.5%	No	Lauren Cook	7000 ERVH	W	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-10 - Lab 301	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Domestic Hot Water Pumps	3	DHW Circulation Pump	0.3	65.0%	No			W	4,818		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Elevator	1	Other	20.0	84.0%	No			W	480		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Gymnasium	Basket Hoop Motors	7	Other	0.1	65.0%	No			W	120		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Gymnasium	Gymnasium Space Divider	2	Other	0.1	65.0%	No			W	120		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage Room	Water Booster Pumps	2	Water Supply Pump	0.8	75.5%	No			W	2,745		No	75.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Fan Coil Units (FCU-01 & 02) - Basement Offices	2	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Heating System - 1995 Section (HWP#3 & 4)	2	Heating Hot Water Pump	7.5	91.0%	Yes			W	1,536		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Cooling System - 1995 Section (CHWP#3 &4)	2	Chilled Water Pump	10.0	91.7%	Yes			W	1,440		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Recirculation System (BP-3 & 4)	2	Heating Hot Water Pump	5.0	89.5%	Yes			W	1,536		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
School	Hot Water Unit & CabinetHeaters	19	Fan Coil Unit	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Electrical Room	Heating System - 1931 Section (HWP#1 & 2)	2	Heating Hot Water Pump	15.0	93.0%	Yes			W	1,536		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Electrical Room	Cooling System - 1931 Section (CHWP#1 & 2)	2	Chilled Water Pump	10.0	91.7%	Yes			W	1,440		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Electrical Room	Hot Water Recirculation System (BP-1 & 2)	2	Heating Hot Water Pump	7.5	91.0%	Yes			W	1,536		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Electrical Room	Domestic Hot Water Pumps	2	DHW Circulation Pump	0.3	65.0%	No			W	4,818		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Basement Office	1	Exhaust Fan	0.3	65.0%	No			W	2,059		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
Basement	Office & Storage	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-31 - Field Restrooms	1	Exhaust Fan	0.5	70.0%	No			W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-3 - Office 218	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-4 - Principal Office	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-5 - First Offices	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-6 - A P Office	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-7 - Vice Principal Office	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-8 & 9 - SGI 218 & 219	2	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-10 - Office & Storage	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-11 - Classroom 214	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	FCU-12 - Office 205	1	Fan Coil Unit	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	VRF Heat Recovery Unit	2	Supply Fan	0.3	65.0%	No	Carrier	38VMA096RDS5-1	W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Daiking Heat Pump	2	Supply Fan	0.5	70.0%	No	Daikin	REYQ096TATJU	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Daiking Heat Pump	4	Supply Fan	0.8	70.0%	No	Daikin	REYQ144TATJU	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Daiking Heat Pump	2	Supply Fan	0.5	70.0%	No	Daikin	REYQ120TATJU	W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage Room	Sump Pump	2	Other	0.8	75.5%	No			W	360		No	75.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	2	Supply Fan	5.0	89.5%	Yes			W	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	2	Exhaust Fan	3.0	86.0%	Yes			W	2,059		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU	1	Supply Fan	7.5	89.5%	Yes			W	2,059		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU Wheel Motor	1	Other	0.8	70.0%	No			W	1,200		No	70.0%	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
Electrical Room 2	EF-2 - Electrical Room 2	1	Exhaust Fan	1.0	84.0%	Yes			W	2,059		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	EF-11 - Boiler Room	1	Exhaust Fan	0.8	70.0%	No			W	2,059		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HEF-2 - Lab 351	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HEF-6 - Lab 353	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HEF-12 - Lab 303	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HEF-17 - Lab 301	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-23 - 1st Floor Restrooms	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-32 - Athletic Director	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-27 - Girls Locker Room	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-24 - Boys Locker Room Shower	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-25 - Boys Locker Room Office	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-30 - Boys Locker Room Office Restroom	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EEF-33 - Boys Locker Room Restroom	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	TF-1 2nd Floor Restrooms	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-15 Lab 351A	1	Exhaust Fan	0.1	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-18 Lab 353	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-19 Lab 354	1	Exhaust Fan	0.3	65.0%	No			W	2,059		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	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	ERU-2 - Classrooms, Offices, & Corridors	1	Package Unit	18.00	328.00	12.00	0.8 AFUE	Carrier	62X218FKMR	N		No							0.0	0	0	$0	$0	$0	0.0
Roof	ERU-1 - Classrooms & Offices	1	Package Unit	18.00	246.00	12.00	0.8 AFUE	Carrier	62XM18FFKQ	N		No							0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2 - Cafeteria	1	Package Unit	26.00	648.00		0.8 AFUE	AAON	RN-026-8-O-OW9M	N		No							0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5 - Media Center	1	Package Unit	26.00				AAON	RN-026-8-O-OW9M	N		No							0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1 - Auditorium	1	Package Unit	70.00	864.00		0.8 AFUE	AAON	RN-070-8-O-OW9M	N		No							0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3 - TV Production	1	Package Unit	16.00				AAON	RN-016-8-O-OW9N	N		No							0.0	0	0	$0	$0	$0	0.0
Roof	AHU-4 - Audio, Video	1	Package Unit	16.00				AAON	RN-016-8-O-OW9N	N		No							0.0	0	0	$0	$0	$0	0.0
Assistant Principal Office	Assistant Principal Office	1	Electric Resistance Heat		13.65		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Gymnasium Office	Gymnasium Office	1	Split-System	1.00		14.00		Daikin	RKN12NMVJU	W		No							0.0	0	0	$0	$0	$0	0.0
Office - Open Plan	AC-11 - Classroom 209	1	Split-System Air-Source HP	1.00	14.30	12.00	6.5 HSPF	Sanyo	CH1271	B	7	Yes	1	Split-System Air-Source HP	1.00	14.30	15.50	8.5 HSPF	0.7	395	0	$48	$1,691	$100	32.8
Roof	CU-1A & CU-1B - HRU-1 & HRU-2	2	Package Unit	7.50		12.00		Lennox	ELS090S4ST1Y	N		No							0.0	0	0	$0	$0	$0	0.0
Office	AC-02 - Guidance Office South	1	Split-System	1.00		14.00		Daikin	RKN12NMVJU	W		No							0.0	0	0	$0	$0	$0	0.0
Office	AC-01 - Reception	1	Split-System	1.00		10.00		Sanyo	KS1257	B		No							0.0	0	0	$0	$0	$0	0.0
Office	Office	1	Ductless Mini-Split HP	3.00	34.00	8.50	9 HSPF	Fujitsu	AOU36RLXB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	School Building	2	Package Unit	7.50		12.70		Lennox	LCH092H4	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	School Building	3	Package Unit	3.00		12.80		Lennox	LCH036H4EN3P	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	School Building	2	Package Unit	12.50		11.00		Lennox	LCH150H4BN1Y	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	School Building	1	Split-System Air-Source HP	8.00	108.00	13.20	3.82 COP	Carrier	38VMA096RDS5-1	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	VRF - Reception, Offices, Classroom 209	1	Split-System Air-Source HP	10.00	135.00	12.30	3.51 COP	Daikin	REYQ120TATJU	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	VRF - Reception, Offices, Classroom 209	2	Split-System Air-Source HP	12.00	162.00	12.30	3.48 COP	Daikin	REYQ144TATJU	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	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	VRF - Reception, Offices, Classroom 209	1	Split-System Air-Source HP	8.00	108.00	12.80	3.67 COP	Daikin	REYQ096TATJU	W		No							0.0	0	0	$0	$0	$0	0.0
Gymnasium	Gymnasium	1	Window AC	1.00		10.70				W		No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Chilled Water System	1	Air-Cooled Scroll Chiller	150.00	Carrier	30RBF15055-LNX5C	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Chilled Water System	1	Air-Cooled Scroll Chiller	120.00	Carrier	30RBF12055-LNV5C	W		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 Room	Hydronic Heating System (Boiler #3)	1	Non-Condensing Hot Water Boiler	1,413	Weil-McLAIN	688 Series 2 Boiler	W		No						0.0	0	0	$0	$0	$0	0.0
Electrical Room	Hydronic Heating System (Boiler #1)	1	Non-Condensing Hot Water Boiler	3,135	Weil-McLAIN	1288 Series 2 Boiler	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hydronic Heating System (Boiler #4)	1	Non-Condensing Hot Water Boiler	1,413	Weil-McLAIN	688 Series 2 Boiler	W		No						0.0	0	0	$0	$0	$0	0.0
Electrical Room	Hydronic Heating System (Boiler #2)	1	Non-Condensing Hot Water Boiler	3,135	Weil-McLAIN	1288 Series 2 Boiler	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
Electrical Room 2	Domestic Hot Water System	2	Storage Tank Water Heater (≤ 50 Gal)	A O Smith	HW 520 896	B	8	Yes	2	Storage Tank Water Heater (≤ 50 Gal)	Natural Gas	92.00%	Et		0.0	0	40	$397	$22,811	$3,640	48.3

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	9	43	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	41	$410	$308	$154	0.4
Kitchen	9	7	Faucet Aerator (Kitchen)	2.50	1.50	0.0	0	4	$39	$50	$14	0.9
Locker Rooms	9	2	Showerhead	2.50	1.50	0.0	0	2	$16	$179	$30	9.4

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)			10, 11	Yes	Yes	Yes	0.2	3,998	0	$491	$2,799	$205	5.3
Kitchen	1	Medium Temp Freezer (0F to 30F)			10, 11	Yes	Yes	Yes	0.2	4,536	0	$557	$3,103	$245	5.1

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
Dining Area	2	Refrigerator Chest	Stanlex		No		No	0.0	0	0	$0	$0	$0	0.0
Dining Area	1	Refrigerator Chest	Continental		No		No	0.0	0	0	$0	$0	$0	0.0
Dining Area	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Delfield		No		No	0.0	0	0	$0	$0	$0	0.0
Dining Area	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	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen	G20010	No		No	0.0	0	0	$0	$0	$0	0.0

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker 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
Gymnasium	1	Self-Contained Unit (≥175 lbs/day), Batch			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	Gas Combination Oven/Steam Cooker (<15 Pans)			Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Fryer			No		No	0.0	0	0	$0	$0	$0	0.0
Dining Area	1	Insulated Food Holding Cabinet (Full Size)	Metro 3 Series		Yes		No	0.0	0	0	$0	$0	$0	0.0
Dining Area	1	Gas Convection Oven (Half Size)	Lincoln		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Rack Oven (Double)	Alto Shaam		Yes		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions							Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Manufacturer	Model	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Hobart	C44A	Electric	N/A	No		No	0.0	0	0	$0	$0	$0	0.0
Classrooms	4	Under Counter (Low Temp)			Electric	N/A	No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	**Quantity**	**Equipment Description**	**Energy Rate (W)**	**ENERGY STAR Qualified?**	**Manufacturer**	**Model**
Manasquan High School	2	Coffee Machine	800	No		
Manasquan High School	1	Dehumidifier	75	No		
Manasquan High School	86	Desktop	270	No		
Manasquan High School	4	Fan (Ceiling)	85	No		
Manasquan High School	9	Microwave	1,000	No		
Manasquan High School	1	Paper Shredder	400	No		
Manasquan High School	59	Printer (Medium/Small)	120	No		
Manasquan High School	6	Printer/Copier (Large)	600	No		
Manasquan High School	51	Projector	224	No		
Manasquan High School	11	Refrigerator (Mini)	126	No		
Manasquan High School	9	Refrigerator (Residential)	226	No		
Manasquan High School	29	Television	200	No		
Manasquan High School	1	Toaster Oven	1,000	No		
Manasquan High School	2	Water Cooler	192	No		
Manasquan High School	1	Server	5,000	No		

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**
Lounge 3	1	Refrigerated	12	Yes	0.2	1,612	0	$198	$230	$50	0.9

Miscellaneous Fuel Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Input Capacity per Unit (MBh)	ENERGY STAR Qualified?	Manufacturer	Model
Home Ec.	6	Electric Range	6.8	No	0.0	0.0

Custom (High Level) Measure Analysis

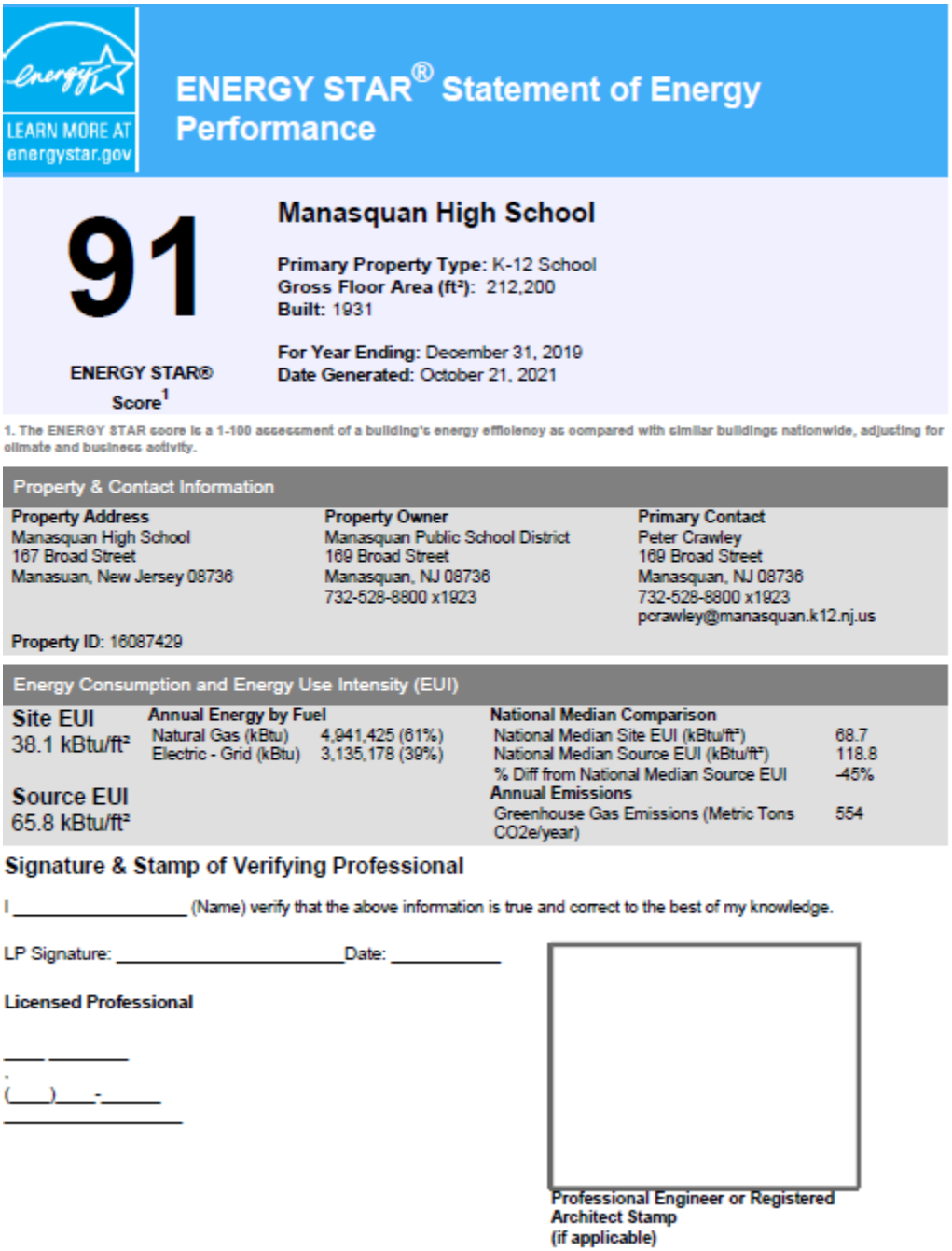
Retro-Commissioning Study

Building Square Footage	212,220	Fuel Utility Rate	$10.042 MMBtu
Percent of Conditioned Area Impacted	100%	Blended Electric Utility Rate	$0.123 kWh

Existing Conditions						Proposed Conditions					Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	Remaining Useful Life	Total HVAC Motor Usage kWh	Total HVAC Electric Usage kWh	Total HVAC Fuel Usage MMBtu	Description	% Savings HVAC Motor Usage kWh	% Savings HVAC Electric Usage kWh	% Savings HVAC Fuel Usage MMBtu	Estimated Cost per Sqft	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	Simple Payback w/ Incentives in Years
HVAC Controls Not Currently Optimized	HVAC Equipment & Systems	3	357,920	229,192	4,461	Retro-Commissioning Study	2%	6%	6%	$0.25	0.00	20,910	268	$5,255	$53,100	$0	$0	$0	$53,100	10.10	10.10

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.



ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Manasquan High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 212,200
Built: 1931

For Year Ending: December 31, 2019
Date Generated: October 21, 2021

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
Manasquan High School 167 Broad Street Manasuan, New Jersey 08736	Manasquan Public School District 169 Broad Street Manasquan, NJ 08736 732-528-8800 x1923	Peter Crawley 169 Broad Street Manasquan, NJ 08736 732-528-8800 x1923 pcrawley@manasquan.k12.nj.us

Property ID: 16087429

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
38.1 kBtu/ft²

Source EUI
65.8 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	4,941,425 (61%)
Electric - Grid (kBtu)	3,135,178 (39%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	68.7
National Median Source EUI (kBtu/ft²)	118.8
% Diff from National Median Source EUI	-45%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	554

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	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
TREC	*Transition Incentive Renewable Energy Certificate:* a factorized renewable energy certificate 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.