Local Government Energy Audit Report

Brookside School

May 17, 2022

Prepared for:
Allendale Board of Education
100 Brookside Avenue
Allendale, New Jersey 07401

Prepared by:
TRC
317 George Street
New Brunswick, New Jersey 08901

Disclaimer

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

TRC reviewed the energy conservation measures and estimates of energy savings for technical accuracy. Actual, achieved energy savings depend on behavioral factors and other uncontrollable variables and, therefore, estimates of final energy savings are not guaranteed. TRC and the New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

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

Incentive values provided in this report are estimated based on previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

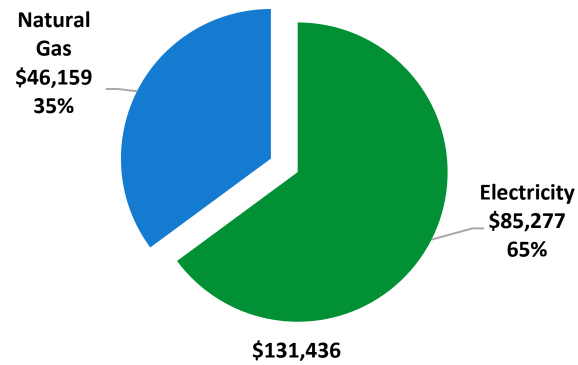
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Brookside 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: $131,436 Electricity: 588,867 kWh Natural Gas: 55,625 Therms	
ENERGY STAR Benchmarking Score	65 *(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.

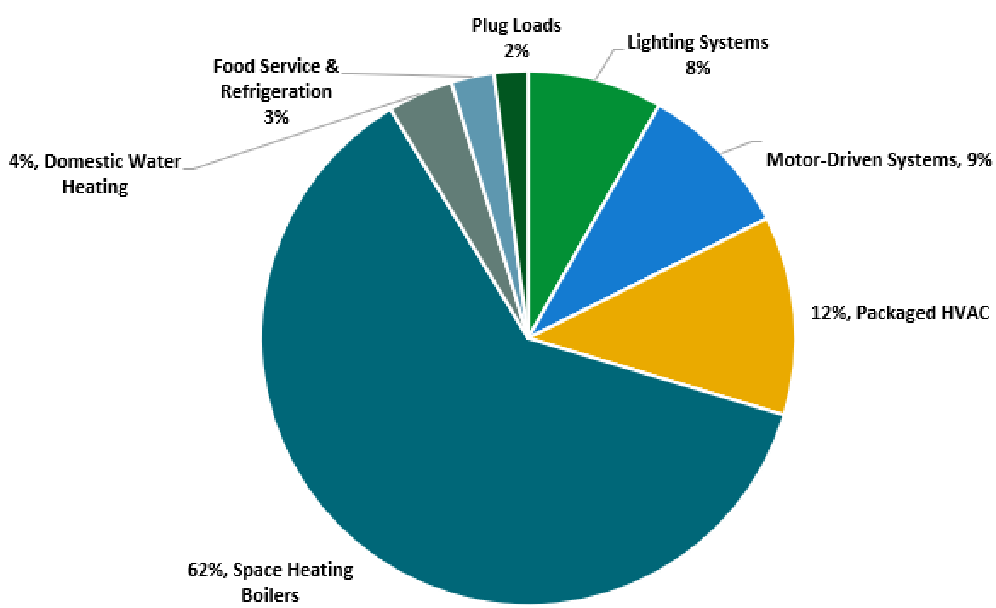


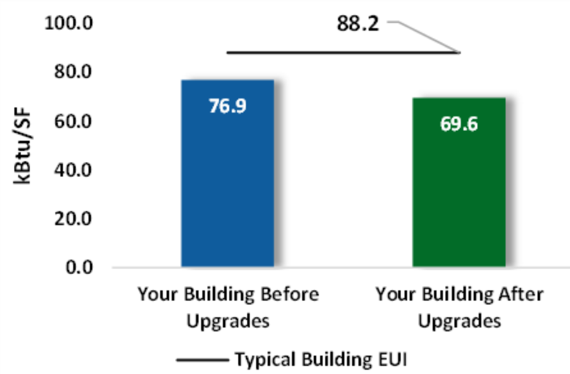
Figure 1 - Energy Use by System

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.

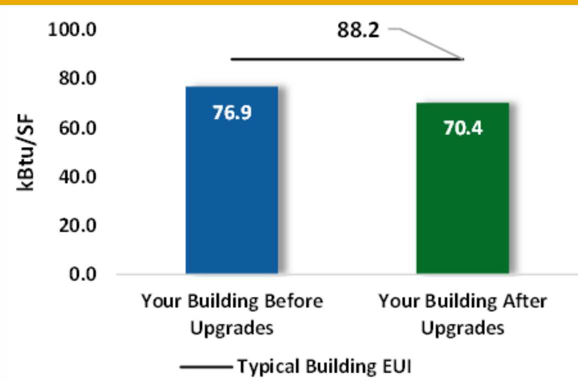
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$393,152
Potential Rebates & Incentives[1]	$33,451
Annual Cost Savings	$20,402
Annual Energy Savings	Electricity: 123,890 kWh Natural Gas: 2,964 Therms
Greenhouse Gas Emission Savings	80 Tons
Simple Payback	17.6 Years
Site Energy Savings (All Utilities)	9%



Scenario 2: Cost Effective Package[2]

Installation Cost	$127,739
Potential Rebates & Incentives	$19,932
Annual Cost Savings	$17,641
Annual Energy Savings	Electricity: 105,270 kWh Natural Gas: 2,886 Therms
Greenhouse Gas Emission Savings	70 Tons
Simple Payback	6.1 Years
Site Energy Savings (all utilities)	9%



On-site Generation Potential

Photovoltaic	Medium
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			**19,984**	**3.0**	**-3**	**$2,870**	**$8,082**	**$1,032**	**$7,050**	**2.5**	**19,779**
ECM 1	Install LED Fixtures	Yes	7,551	0.3	0	$1,091	$4,558	$465	$4,093	3.8	7,564
ECM 2	Retrofit Fixtures with LED Lamps	Yes	12,433	2.7	-3	$1,779	$3,524	$567	$2,957	1.7	12,215
Lighting Control Measures			**35,049**	**6.5**	**-7**	**$5,015**	**$31,535**	**$9,885**	**$21,650**	**4.3**	**34,436**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	25,332	4.8	-5	$3,625	$21,410	$2,640	$18,770	5.2	24,889
ECM 4	Install High/Low Lighting Controls	Yes	9,717	1.8	-2	$1,390	$10,125	$7,245	$2,880	2.1	9,547
Variable Frequency Drive (VFD) Measures			**62,626**	**16.6**	**0**	**$9,069**	**$76,472**	**$8,575**	**$67,897**	**7.5**	**63,063**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	44,445	13.9	0	$6,436	$54,527	$4,775	$49,752	7.7	44,756
ECM 6	Install VFDs on Heating Water Pumps	Yes	18,181	2.7	0	$2,633	$21,946	$3,800	$18,146	6.9	18,308
Unitary HVAC Measures			**18,619**	**20.9**	**8**	**$2,760**	**$265,413**	**$13,520**	**$251,894**	**91.3**	**19,653**
ECM 7	Install High Efficiency Air Conditioning Units	No	18,619	20.9	8	$2,760	$265,413	$13,520	$251,894	91.3	19,653
HVAC System Improvements			**1,651**	**0.0**	**25**	**$442**	**$983**	**$152**	**$831**	**1.9**	**4,531**
ECM 8	Install Pipe Insulation	Yes	1,651	0.0	25	$442	$983	$152	$831	1.9	4,531
Domestic Water Heating Upgrade			**1,668**	**0.0**	**29**	**$486**	**$265**	**$133**	**$133**	**0.3**	**5,124**
ECM 9	Install Low-Flow DHW Devices	Yes	1,668	0.0	29	$486	$265	$133	$133	0.3	5,124
Food Service & Refrigeration Measures			**1,117**	**0.1**	**0**	**$162**	**$2,281**	**$155**	**$2,126**	**13.1**	**1,125**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	517	0.1	0	$75	$607	$80	$527	7.0	520
ECM 11	Refrigeration Controls	Yes	600	0.0	0	$87	$1,674	$75	$1,599	18.4	605
Custom Measures			**-16,824**	**0.0**	**245**	**-$402**	**$8,121**	**$0**	**$8,121**	**-20.2**	**11,745**
ECM 12	Replace Electric Water Heater with Heat Pump Water Heater	Yes	6,154	0.0	0	$892	$4,766	$0	$4,766	5.3	6,197
ECM 13	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-22,978	0.0	245	-$1,294	$3,354	$0	$3,354	-2.6	5,548
TOTALS (COST EFFECTIVE MEASURES)			**128,248**	**26.2**	**44**	**$18,935**	**$124,385**	**$19,932**	**$104,453**	**5.5**	**134,256**
TOTALS (ALL MEASURES)			**123,890**	**47.1**	**296**	**$20,402**	**$393,152**	**$33,451**	**$359,701**	**17.6**	**159,456**

* - 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).

*** - Negative Payback explained in section 4.8.

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

For facilities wishing to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the Prescriptive and Custom Rebates program. To participate, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval may be required for some incentives. Contact your utility company for more details prior to project installation.

Direct Install

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

Engineered Solutions

The Engineered Solutions program provides tailored energy-efficiency assistance and turnkey engineering services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. The program provides all professional services from audit, design, construction administration, to commissioning and measurement and verification for custom whole-building energy-efficiency projects. Engineered Solutions allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs.

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

Options from New Jersey's Clean Energy Program

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

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

Resiliency with Return on Investment through Combined Heat and Power (CHP)

The CHP program provides incentives for combined heat and power (i.e., cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

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

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Brookside 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 December 6, 2022, TRC performed an energy audit at Brookside School located in Allendale, New Jersey. TRC met with Jae Kim to review the facility operations and help focus our investigation on specific energy-using systems.

Brookside School is a 2-story, 98,416 square foot building originally built in 1928, with additions in 1956 and 2001. Spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, offices, a commercial kitchen, and basement storage space.

The building is 100% heated by four condensing boilers and roof top units (RTUs). Direct expansion (DX) equipped condensing units provide cooling to the facility.

Recent Improvements and Facility Concerns

Over the last five years, the facility has replaced almost all its existing T8 fluorescent fixtures with LED tubes. The site is interested in consolidating the BAS systems (Johnson and Honeywell) in one system and replacing the old RTUs and condensing units but has been unable to fund the project.

2.2 Building Occupancy

The facility is occupied Monday through Friday during regular business hours. Janitorial services are performed after hours. The school is fully occupied from September through June. Typical weekday occupancy is 95 staff and 525 students. There are various weekend and after school programs and activities. 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
Brookside Elemenatry School - General Operating Hours	Weekday	6:30 AM - 11:00 PM
	Weekend	Varies
Brookside Elemenatry School - Classes Hours	Weekday	8:30 AM - 3:15 PM
	Weekend	Varies

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a brick veneer facade. The walls are made of a combination of concrete masonry units (CMUs) and painted drywall finish. The roof is mostly flat and covered with gray membrane, and it appears to be in fair condition. The two-story section (original building) has a pitched roof with asphalt shingles that are in good condition.

Most of the windows are double glazed and have aluminum frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. The main entrance doors are fully glass with aluminum frames. Exterior doors have aluminum frames with glass and are in good condition with undamaged door seals. Degraded window and door seals, increase drafts and outside air infiltration.

Building Walls (Original & Addition)

Flat & Pitched Roof Sections

Typical Building Windows

Entrance & Exit Doors

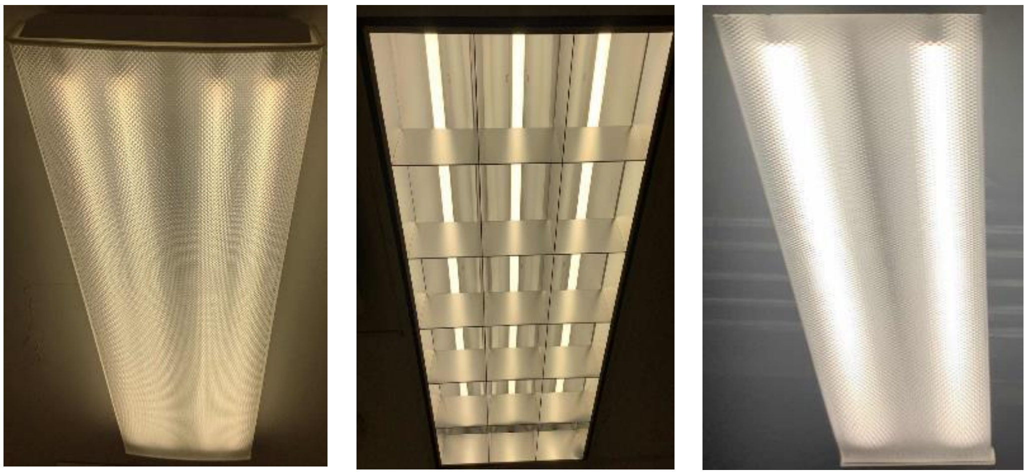
2.4 Lighting Systems

The primary interior lighting system uses 15-Watt LED tube lamps. There are also several LED fixtures, and LED lamps. Additionally, there are some linear fluorescent T5 lamps and compact fluorescent lamps (CFLs). Fixture types include 2-lamp, 3-lamp or 4-lamp, 2-foot or 4-foot long recessed and surface mounted fixtures and 2-foot fixtures with U-bend linear tube lamps. Typically, T5 fluorescent lamps use electronic ballasts.

Most of the linear fixtures have been converted to operate LED tube lamps and LED general purpose lamps. Gymnasium fixtures have manually controlled high bay 26-Watt LED fixtures. The auditorium is lit with 54-Watt T5 high output fluorescent and PAR 38 LED lamps. CFLs are found in spaces including the library and TV studio. Spaces including some classrooms, the main office corridor, portions of the library, and some of the small offices are lit with LED fixtures. The remaining spaces are lit with LED tubes.

All exit signs are LED sources. Most fixtures are in good condition. Interior lighting levels were generally sufficient. Interior lighting control is provided by both occupancy sensors and wall switches. The occupancy sensors are either ceiling or wall mounted depending on the room configuration.

Exterior fixtures include various LED wall packs ranging from 21 to 50-Watts, LED flood lights, and some recessed LED A19 lamps. There is also a high-pressure sodium wall pack. Pole mounted parking lot fixtures mainly incorporate LED corn bulb retrofit lamps with a few 250-Watt metal halide lamps remaining. Most exterior light fixtures are controlled by a photocell, and some by a time clock.



LED Tubes

LED Fixtures, LED Lamps & Exit Sign

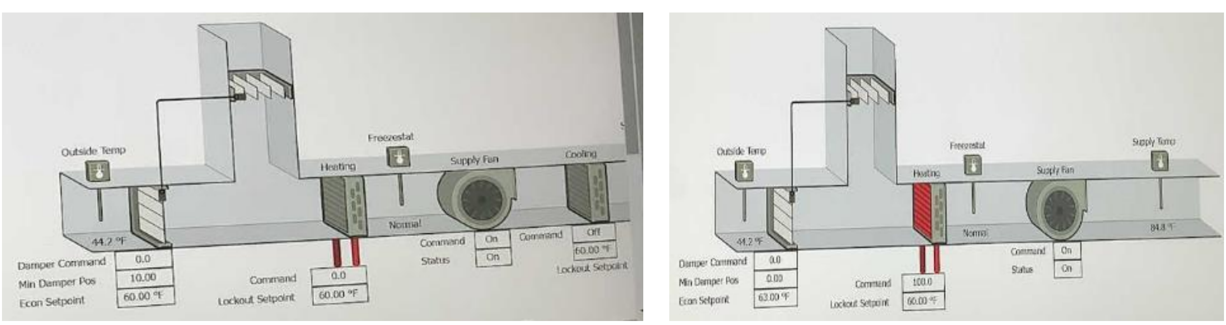
LED Fixtures, LED Corn Bulbs & Metal Halide

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators provide heating cooling and ventilation to classrooms and some offices. They are equipped with supply fan motors, digitally controlled outside air dampers with valves connected to the hot water distribution system for heating and to direct expansion coils (outdoor condensing units) for cooling. Some unit ventilators provide heating only. This system appears to be in good operating condition.

Typical Unit Ventilator



BAS Screenshot - Unit Ventilators

Unitary Electric HVAC Equipment

Most of the classrooms are cooled using roof mounted Trane condensing units and ductless mini-split air conditioning systems while Classroom 15, 22, and the IT room are conditioned with mini-split heat pumps.

The condensing units are connected to the cooling coils of the unit ventilators. Cooling capacities for the condensing units, ductless mini-split ACs, and heat pumps range from 1 to 3.5 tons while the heating capacities of the heat pumps range from 16.4 and 37 MBh. The heat pumps are in good condition while most of the condensing and ductless mini-split systems have reached the end of their useful life and appear in fair or poor condition. They have been evaluated for replacement.

Typical Trane Condensing Unit

Ductless Mini-Split AC

Heat Pump & Window AC

Unitary Heating Equipment

Elevator room is heated by an estimated 3 kW electric resistance heater. The unit is in fair condition.

Packaged Units

Larger spaces are conditioned by eight packaged roof top units (RTUs). They provide cooling through direct expansion coils. Three units are equipped with gas fired furnace sections while two are equipped with hot water coils. These units vary in cooling capacities between 3 and 26 tons, with gas heating capacities between 79 to 437 MBh for the gas fired units. Units are equipped with economizers. Six RTUs are operating beyond their useful life and appear in fair condition. These have been evaluated for replacement.

Some units serve variable air volume (VAV) boxes. The RTUs are controlled by the building automation system (BAS). Air distribution is provided to supply air registers through ducts to variable air volume (VAV) boxes concealed above the ceilings. The building air distribution setpoints are 72°F for cooling and 68°F for heating.

Refer to Appendix A for detailed information about each unit.

Faculty Room RTU

Auditorium RTU

Location	Area Served	Cooling Capacity (Tons)	Heating Capacity (MBh)	Supply Fan (hp)	Return/Exhaust Fan (hp)	Condition
Roof	Classroom-27	7.5	N/A	2	N/A	Poor
Roof	Faculty Room	3.0	79	0.5	N/A	Poor
Roof	Auditorium	26.0	437	15	7.5	Fair
Roof	Main Office	12.5	203	5	N/A	Fair
Roof	Learning Common	12.5	N/A	5	N/A	Good
Roof	Classroom-25	6.0	Hot Water Coils	2	N/A	Poor
Roof	Band Room	6.0	Hot Water Coils	2	N/As	Poor
Roof	Brookside School	15.0	N/A	1.5	N/A	Good

2.6 Building Exhaust Air Systems

The restrooms, hallways and classrooms are exhausted by motor driven exhaust fans. The kitchen has two exhaust fans with one serving the kitchen hood. Equipment is in good condition and controlled by a BAS.

Typical General Exhaust Fan & Kitchen Hood

2.7 Heating Hot Water Systems

Four AERCO 1900 MBh output condensing hot water boilers serve most of the building heating load. The burners are fully modulating with a nominal efficiency of 95%. The boilers are configured to run simultaneously to modulate the load. Installed in 2006, the boilers are in good condition.

The hydronic distribution system is a two-pipe heating only system. Two 7.5 hp variable flow pumps (P7 & P8), two 7.5 hp (P6 & P6), two 5 hp (P1 & P2), and two 0.5 hp (P3 & P4) constant flow pumps distribute heating hot water to RTUs, UVs, hydronic baseboards, and unit heaters.

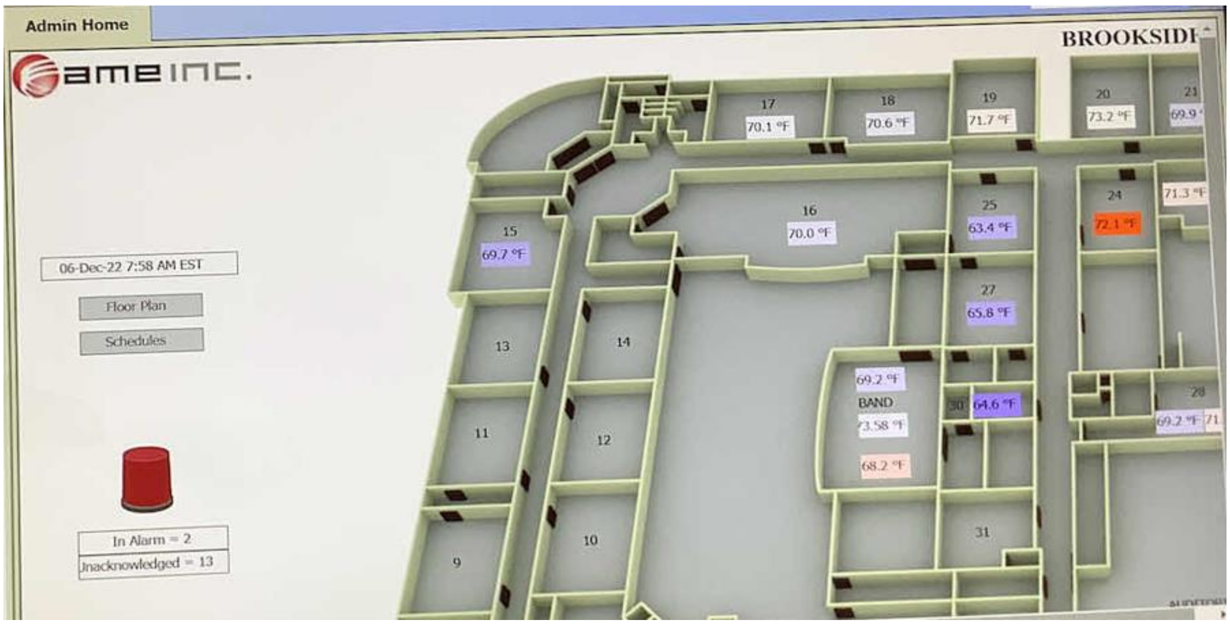
The boilers operate based on outside air temperature. The boilers and the hot water loop are controlled by a Johnson BAS. At the time of the field survey, hot water was being supplied at 150°F when the outside air temperature was 44°F, and the setpoint is adjusted linearly in accordance with the outside air temperature.


AERCO Condensing Boilers & 5 hp Hot Water Pumps

2.8 Building Automation System (BAS)

According to the site, both Johnson and Honeywell BAS control the HVAC equipment, the boilers, the RTUs, the unit ventilators and exhaust fans. They provide equipment scheduling control and they monitor and control space temperatures, supply air temperatures, humidity, and heating water loop temperatures.

The site staff expressed an interest in consolidating the two BAS in one control system and receiving additional training on operating the BAS.



BAS Floor Plan

2.9 Domestic Hot Water

Hot water for most section of the building is produced by an 81-gallon 199 MBh gas-fired storage water heater with an efficiency of 80%. The heater is located in the boiler room and is in good condition. A fractional horsepower pump distributes water to end uses.

Hot water for the 7th and 8th grade sections of the building is produced by an 80-gallon 4.5 kW electric storage water heater located in the storage room. The kitchen has two dedicated 50-gallon electric storage tank water heaters.

The domestic hot water pipes in the boiler room and kitchen are not insulated.

Main Gas-Fired Storage Tank Water Heater

Kitchen Electric Storage Tank Water Heaters & Insulated Hot Water Pipes

2.10 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. Bulk prepared foods are held in one electric holding cabinet. Equipment is in good condition.

The dishwasher is a non-ENERGY STAR, high temperature, door type unit. There is an electric booster water pump.

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

Gas-Fired Cooking Equipment

2.11 Refrigeration

The kitchen has four stand-up refrigerators with a mix of solid and glass doors. There is a freezer chest as well as three refrigerator chests. All equipment is standard efficiency and in good condition.

The walk-in medium temperature cooler was not accessible during the audit. Its capacity and fan specifications have been estimated in this study.

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

Stand-Up Refrigerators

2.12 Plug Load and Vending Machines

There are 49 computer workstations and several laptops throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart projectors. Additional loads typically associated with secondary schools include media center, and a kiln.

There are also typical office loads such as scanner/copiers, small printers, microwaves, and mini fridges; the site also has a server closet. There are approximately three residential style refrigerators throughout the facility that are in good condition.

Copier/Scanner & Residential Refrigerator

2.13 Water-Using Systems

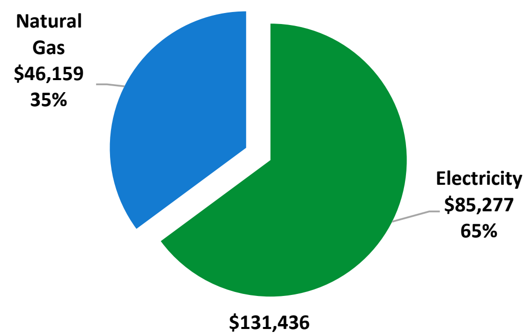
There are several restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf.

Typical Restroom Sink Flow

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	588,867 kWh	$85,277
Natural Gas	55,625 Therms	$46,159
Total		**$131,436**



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.

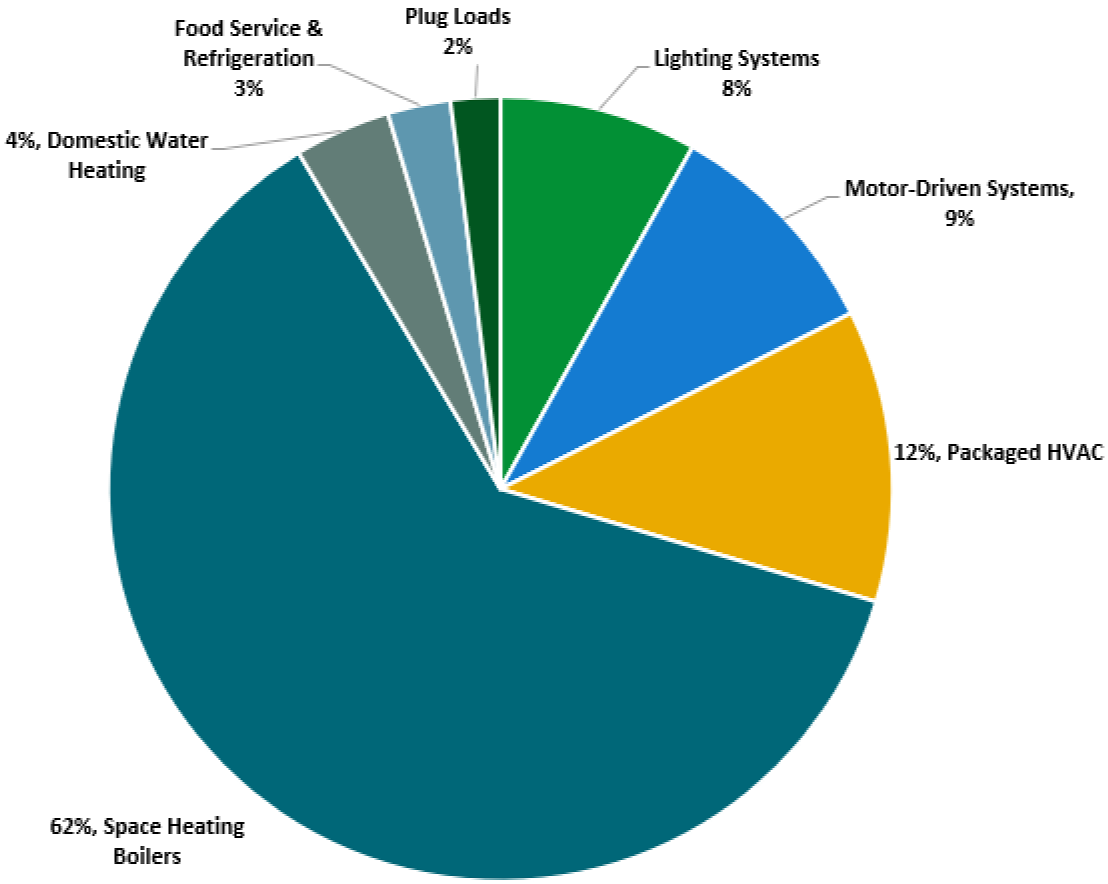
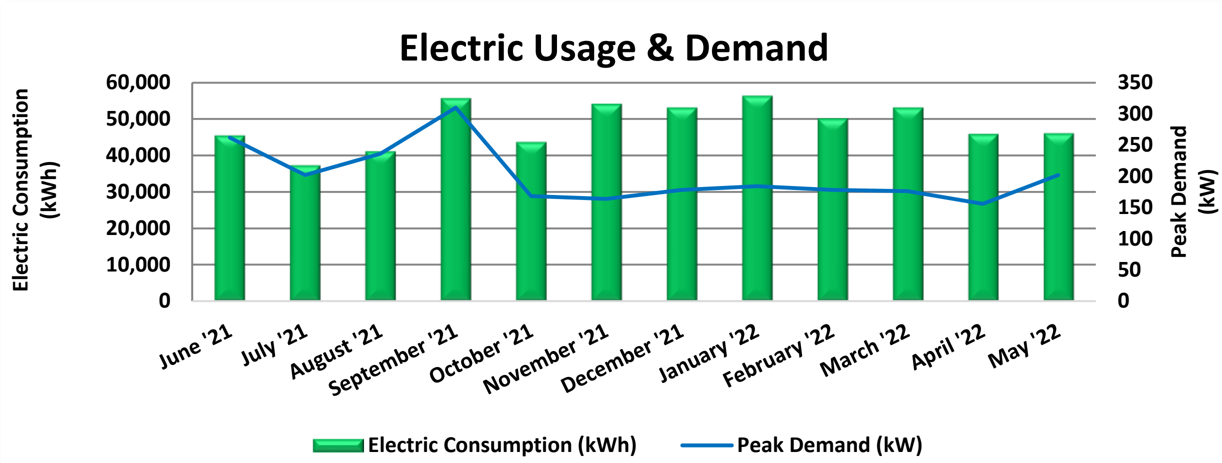


Figure 4 - Energy Balance

3.1 Electricity

Rockland Electric delivers electricity under rate class Small Commercial & Industrial Generation Service, with electric production provided by Constellation, a third-party supplier.



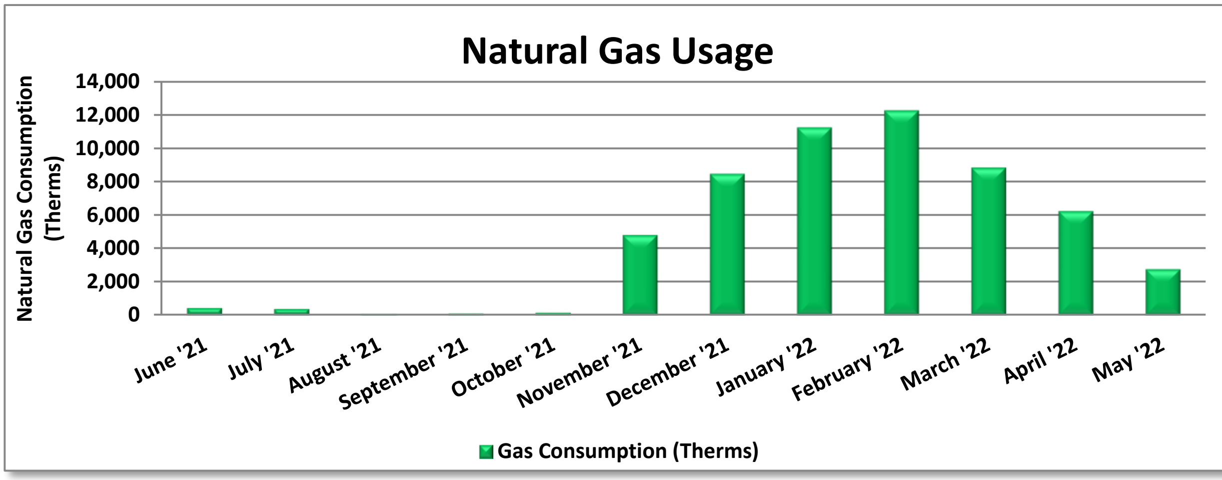
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
6/30/21	29	45,400	262	$1,575	$6,707
7/30/21	30	37,200	202	$1,213	$5,541
8/31/21	32	41,000	236	$1,419	$6,185
9/30/21	30	55,600	310	$1,868	$8,315
10/29/21	29	43,600	168	$1,097	$6,170
12/1/21	33	54,000	164	$1,097	$7,372
1/3/22	33	53,000	178	$1,132	$7,291
2/1/22	29	56,200	184	$1,473	$8,000
3/2/22	29	50,000	178	$1,473	$7,284
3/31/22	29	53,000	176	$1,473	$7,630
4/29/22	29	45,800	156	$1,473	$6,798
5/27/22	28	46,000	202	$1,473	$6,817
Totals	**360**	**580,800**	**310**	**$16,764**	**$84,109**
Annual	**365**	**588,867**	**310**	**$16,997**	**$85,277**

Notes:

- Peak demand of 310 kW occurred in September '21.
- Average demand over the past 12 months was 201 kW.
- The average electric cost over the past 12 months was $0.145/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

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



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/21/21	33	438	$392
7/21/21	30	384	$364
8/19/21	29	64	$192
9/20/21	32	96	$209
10/19/21	29	160	$245
11/17/21	29	4,807	$4,877
12/20/21	33	8,474	$7,268
1/20/22	31	11,236	$9,094
2/18/22	29	12,275	$9,897
3/22/22	32	8,837	$7,687
4/21/22	30	6,245	$4,147
5/20/22	29	2,761	$1,913
Totals	**366**	**55,777**	**$46,286**
Annual	**365**	**55,625**	**$46,159**

Notes:

- The average gas cost for the past 12 months is $0.830/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	65

This report contains suggestions about how to improve building performance and reduce energy costs.

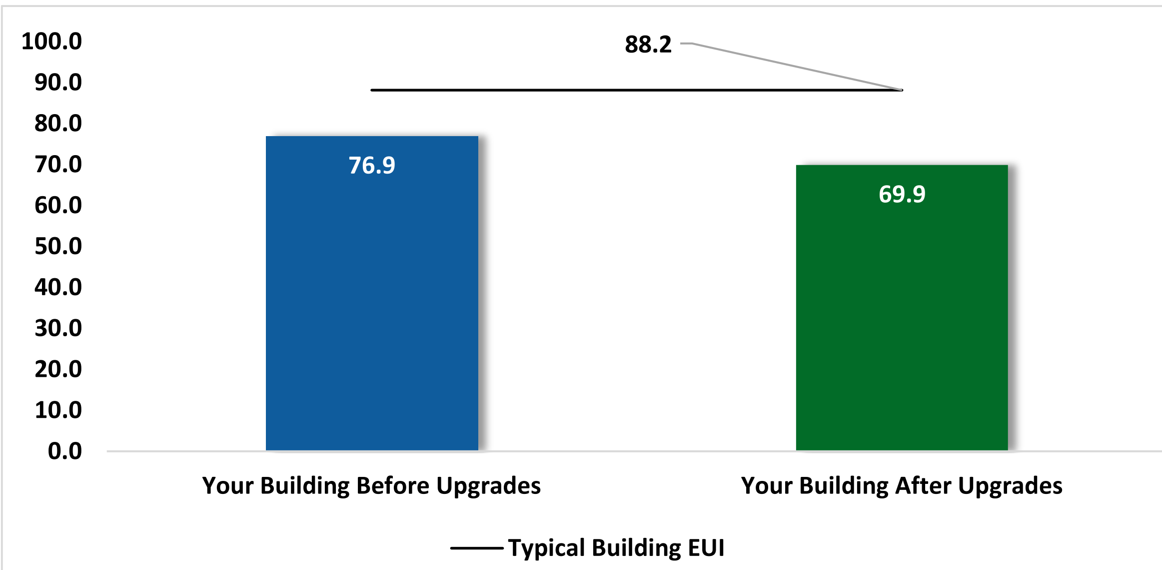


Figure 5 - Energy Use Intensity Comparison[3]

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 have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**19,984**	**3.0**	**-3**	**$2,870**	**$8,082**	**$1,032**	**$7,050**	**2.5**	**19,779**
ECM 1	Install LED Fixtures	Yes	7,551	0.3	0	$1,091	$4,558	$465	$4,093	3.8	7,564
ECM 2	Retrofit Fixtures with LED Lamps	Yes	12,433	2.7	-3	$1,779	$3,524	$567	$2,957	1.7	12,215
Lighting Control Measures			**35,049**	**6.5**	**-7**	**$5,015**	**$31,535**	**$9,885**	**$21,650**	**4.3**	**34,436**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	25,332	4.8	-5	$3,625	$21,410	$2,640	$18,770	5.2	24,889
ECM 4	Install High/Low Lighting Controls	Yes	9,717	1.8	-2	$1,390	$10,125	$7,245	$2,880	2.1	9,547
Variable Frequency Drive (VFD) Measures			**62,626**	**16.6**	**0**	**$9,069**	**$76,472**	**$8,575**	**$67,897**	**7.5**	**63,063**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	44,445	13.9	0	$6,436	$54,527	$4,775	$49,752	7.7	44,756
ECM 6	Install VFDs on Heating Water Pumps	Yes	18,181	2.7	0	$2,633	$21,946	$3,800	$18,146	6.9	18,308
Unitary HVAC Measures			**18,619**	**20.9**	**8**	**$2,760**	**$265,413**	**$13,520**	**$251,894**	**91.3**	**19,653**
ECM 7	Install High Efficiency Air Conditioning Units	No	18,619	20.9	8	$2,760	$265,413	$13,520	$251,894	91.3	19,653
HVAC System Improvements			**1,651**	**0.0**	**25**	**$442**	**$983**	**$152**	**$831**	**1.9**	**4,531**
ECM 8	Install Pipe Insulation	Yes	1,651	0.0	25	$442	$983	$152	$831	1.9	4,531
Domestic Water Heating Upgrade			**1,668**	**0.0**	**29**	**$486**	**$265**	**$133**	**$133**	**0.3**	**5,124**
ECM 9	Install Low-Flow DHW Devices	Yes	1,668	0.0	29	$486	$265	$133	$133	0.3	5,124
Food Service & Refrigeration Measures			**1,117**	**0.1**	**0**	**$162**	**$2,281**	**$155**	**$2,126**	**13.1**	**1,125**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	517	0.1	0	$75	$607	$80	$527	7.0	520
ECM 11	Refrigeration Controls	Yes	600	0.0	0	$87	$1,674	$75	$1,599	18.4	605
Custom Measures			**-16,824**	**0.0**	**245**	**-$402**	**$8,121**	**$0**	**$8,121**	**-20.2**	**11,745**
ECM 12	Replace Electric Water Heater with Heat Pump Water Heater	Yes	6,154	0.0	0	$892	$4,766	$0	$4,766	5.3	6,197
ECM 13	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-22,978	0.0	245	-$1,294	$3,354	$0	$3,354	-2.6	5,548
TOTALS			**123,890**	**47.1**	**296**	**$20,402**	**$393,152**	**$33,451**	**$359,701**	**17.6**	**159,456**

* - 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).

*** - Negative Payback explained in section 4.8.

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		**19,984**	**3.0**	**-3**	**$2,870**	**$8,082**	**$1,032**	**$7,050**	**2.5**	**19,779**
ECM 1	Install LED Fixtures	7,551	0.3	0	$1,091	$4,558	$465	$4,093	3.8	7,564
ECM 2	Retrofit Fixtures with LED Lamps	12,433	2.7	-3	$1,779	$3,524	$567	$2,957	1.7	12,215
Lighting Control Measures		**35,049**	**6.5**	**-7**	**$5,015**	**$31,535**	**$9,885**	**$21,650**	**4.3**	**34,436**
ECM 3	Install Occupancy Sensor Lighting Controls	25,332	4.8	-5	$3,625	$21,410	$2,640	$18,770	5.2	24,889
ECM 4	Install High/Low Lighting Controls	9,717	1.8	-2	$1,390	$10,125	$7,245	$2,880	2.1	9,547
Variable Frequency Drive (VFD) Measures		**62,626**	**16.6**	**0**	**$9,069**	**$76,472**	**$8,575**	**$67,897**	**7.5**	**63,063**
ECM 5	Install VFDs on Constant Volume (CV) Fans	44,445	13.9	0	$6,436	$54,527	$4,775	$49,752	7.7	44,756
ECM 6	Install VFDs on Heating Water Pumps	18,181	2.7	0	$2,633	$21,946	$3,800	$18,146	6.9	18,308
HVAC System Improvements		**1,651**	**0.0**	**25**	**$442**	**$983**	**$152**	**$831**	**1.9**	**4,531**
ECM 8	Install Pipe Insulation	1,651	0.0	25	$442	$983	$152	$831	1.9	4,531
Domestic Water Heating Upgrade		**1,668**	**0.0**	**29**	**$486**	**$265**	**$133**	**$133**	**0.3**	**5,124**
ECM 9	Install Low-Flow DHW Devices	1,668	0.0	29	$486	$265	$133	$133	0.3	5,124
Food Service & Refrigeration Measures		**1,117**	**0.1**	**0**	**$162**	**$2,281**	**$155**	**$2,126**	**13.1**	**1,125**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	517	0.1	0	$75	$607	$80	$527	7.0	520
ECM 11	Refrigeration Controls	600	0.0	0	$87	$1,674	$75	$1,599	18.4	605
Custom Measures		**6,154**	**0.0**	**0**	**$892**	**$4,766**	**$0**	**$4,766**	**5.3**	**6,197**
ECM 12	Replace Electric Water Heater with Heat Pump Water Heater	6,154	0.0	0	$892	$4,766	$0	$4,766	5.3	6,197
TOTALS		**128,248**	**26.2**	**44**	**$18,935**	**$124,385**	**$19,932**	**$104,453**	**5.5**	**134,256**

* - 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		**19,984**	**3.0**	**-3**	**$2,870**	**$8,082**	**$1,032**	**$7,050**	**2.5**	**19,779**
ECM 1	Install LED Fixtures	7,551	0.3	0	$1,091	$4,558	$465	$4,093	3.8	7,564
ECM 2	Retrofit Fixtures with LED Lamps	12,433	2.7	-3	$1,779	$3,524	$567	$2,957	1.7	12,215

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 the right amount of light is delivered where needed. If conversion to LED light sources is proposed, we suggest converting all of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing metal halide and high-pressure sodium lamps with new LED light fixtures. This measure saves energy by installing LEDs, which use less power than other technologies with a comparable light output.

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

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

Affected Building Areas: exterior wall and pole mounted fixtures

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent T5, and CFL 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: T5 in some classrooms, CFLs in cafeteria, library, and TV studio

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		**35,049**	**6.5**	**-7**	**$5,015**	**$31,535**	**$9,885**	**$21,650**	**4.3**	**34,436**
ECM 3	Install Occupancy Sensor Lighting Controls	25,332	4.8	-5	$3,625	$21,410	$2,640	$18,770	5.2	24,889
ECM 4	Install High/Low Lighting Controls	9,717	1.8	-2	$1,390	$10,125	$7,245	$2,880	2.1	9,547

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

ECM 4: Install High/Low Lighting Controls

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

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety 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: corridors, stairs, and lobbies

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		**62,626**	**16.6**	**0**	**$9,069**	**$76,472**	**$8,575**	**$67,897**	**7.5**	**63,063**
ECM 5	Install VFDs on Constant Volume (CV) Fans	44,445	13.9	0	$6,436	$54,527	$4,775	$49,752	7.7	44,756
ECM 6	Install VFDs on Heating Water Pumps	18,181	2.7	0	$2,633	$21,946	$3,800	$18,146	6.9	18,308

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 5: Install VFDs on Constant Volume (CV) Fans

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

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

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. 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 Units: RTUs, AHUs, and exhaust fans as indication in Appendix A

ECM 6: Install VFDs on Heating Water Pumps

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

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

Affected Pumps: 5 and 7.5 hp hot water pumps

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		**18,619**	**20.9**	**8**	**$2,760**	**$265,413**	**$13,520**	**$251,894**	**91.3**	**19,653**
ECM 7	Install High Efficiency Air Conditioning Units	18,619	20.9	8	$2,760	$265,413	$13,520	$251,894	91.3	19,653

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

ECM 7: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency condensing and packaged air conditioning units with high efficiency condensing and packaged air conditioning units. Some of the replacement units will incorporate efficient gas furnaces. Also recommended for replacement is a 1.5-ton window air conditioning unit. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling and heating load, and the estimated annual operating hours.

Affected Units: various condensing and packaged air conditioning units as noted in Appendix A.

4.5 HVAC Improvements

#	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)
HVAC System Improvements		**1,651**	**0.0**	**25**	**$442**	**$983**	**$152**	**$831**	**1.9**	**4,531**
ECM 8	Install Pipe Insulation	1,651	0.0	25	$442	$983	$152	$831	1.9	4,531

ECM 8: Install Pipe Insulation

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

Affected Systems: domestic hot water piping for main and kitchen units.

4.6 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**1,668**	**0.0**	**29**	**$486**	**$265**	**$133**	**$133**	**0.3**	**5,124**
ECM 9	Install Low-Flow DHW Devices	1,668	0.0	29	$486	$265	$133	$133	0.3	5,124

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
Pre-rinse spray valve (kitchen)	1.28 gpm

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

4.7 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		**1,117**	**0.1**	**0**	**$162**	**$2,281**	**$155**	**$2,126**	**13.1**	**1,125**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	517	0.1	0	$75	$607	$80	$527	7.0	520
ECM 11	Refrigeration Controls	600	0.0	0	$87	$1,674	$75	$1,599	18.4	605

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

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

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

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

4.8 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		**-16,824**	**0.0**	**245**	**-$402**	**$8,121**	**$0**	**$8,121**	**-20.2**	**11,745**
ECM 12	Replace Electric Water Heater with Heat Pump Water Heater	6,154	0.0	0	$892	$4,766	$0	$4,766	5.3	6,197
ECM 13	Replace Gas Fired Water Heater with Heat Pump Water Heater	-22,978	0.0	245	-$1,294	$3,354	$0	$3,354	-2.6	5,548

ECM 12: Replace Electric Water Heater with Heat Pump Water Heater

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

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

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

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

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

ECM 13: Replace Gas Fired Water Heater with Heat Pump Water Heater

A gas fired water heater uses a burner to heat water. Air source heat pump water heaters (HPWH) use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. Water heater efficiency is rated by the uniform energy factor (UEF). For a relative comparison of water heater UEFs, the criteria for certifying a water heater in the ENERGY STAR program are provided below. These values indicate that HPWH heaters are significantly more efficient than gas fired water heaters.

There are two types of HPWH: those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The measure considers an integrated HPWH.

ENERGY STAR Uniform Energy Factor (UEF) Criteria for Certified Water Heaters *

Water Heater Type	Minimum UEF	Other
Integrated HPWH	3.3	
Integrated HPWH	2.2	120 Volt, 15 Amp circuit
Split System HPWH	2.2	
Gas Fired Storage	0.64	≤ 55 gal, Medium Draw Pattern
Gas Fired Storage	0.68	≤ 55 gal, High Draw Pattern
Gas Fired Storage	0.78	> 55 gal, Medium Draw Pattern
Gas Fired Storage	0.80	> 55 gal, High Draw Pattern
Gas Fired Storage	0.80	Residential Duty
Gas Fired Instantaneous	0.87	

** Note: Uniform Energy Factor (UEF): The newest measure of water heater overall efficiency. The higher the UEF value is, the more efficient the water heater. UEF is determined by the Department of Energy's test method outlined in 10 CFR Part 430, Subpart B, Appendix E.*[5]

[5] https://www.energy.gov/sites/prod/files/2014/06/f17/rwh_tp_final_rule.pdf

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation[6]. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room. The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

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

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

Switching from a gas fired water heater to a HPWH has the potential to reduce the sites overall greenhouse gas emissions. If the electricity for the HPWH is provided by an on-site photovoltaic (PV) system then there are essentially no greenhouse gas (GHG) emissions. A 2016 study conducted at Cornell University [7]calculated the kg of methane (CH_4) and carbon dioxide (CO_2) produced per GJ of water heated. The study compared HPWH to gas and electric fired, storage and tankless water heaters. The study also considered electricity produced from natural gas and coal fired electric plants. In all cases the study found that HPWHs produced less methane than all the other water heaters. The study also found that HPWH produced less carbon dioxide than electric resistance water heaters but more carbon dioxide than tankless gas water heaters and about the same amount of carbon dioxide as storage gas water heaters. The summary tables provide the reduction in CO2 equivalent emissions based on the typical New Jersey electric utility.

This measure has a negative simple payback due to the relative cost of electricity to natural gas. At this site the cost per Btu for natural gas is significantly lower than for electricity. Therefore, even though this measure will result in a net Btu energy savings at this site, it will increase the overall cost for providing domestic hot water.

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

[7] Greenhouse gas emissions from domestic hot water: Heat pumps compared to most commonly used systems. Bongghi Hong, Robert W. Howarth. Department of Ecology and Evolutionary Biology, Cornell University. Energy Science and Engineering 2016.

4.9 Measures for Future Consideration

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

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

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

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

Retro-Commissioning Study

Facility staff expressed an interest in consolidating the building automation systems. A recommended first step would be to gain a thorough understanding of both control systems and the operating equipment they control.

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, even for facilities equipped with a single control system. In cases with multiple control systems, it is even more likely that building system control overall is not optimized. There are indications at this site that systems may not be operating correctly or as efficiently as they could be. One important tool available to building operators to ensure proper system operation is retro-commissioning.

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

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

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

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

5 ENERGY EFFICIENT BEST PRACTICES

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs.

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

You may already be doing some of these things—see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR Portfolio Manager

You've heard it before—you cannot manage what you do not measure. ENERGY STAR Portfolio Manager is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[8] . 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.

[8] 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.

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.

Label HVAC Equipment

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

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

Optimize HVAC Equipment Schedules

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

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

Water Heater Maintenance

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

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

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

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[9] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[10] 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.

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

[10] 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.

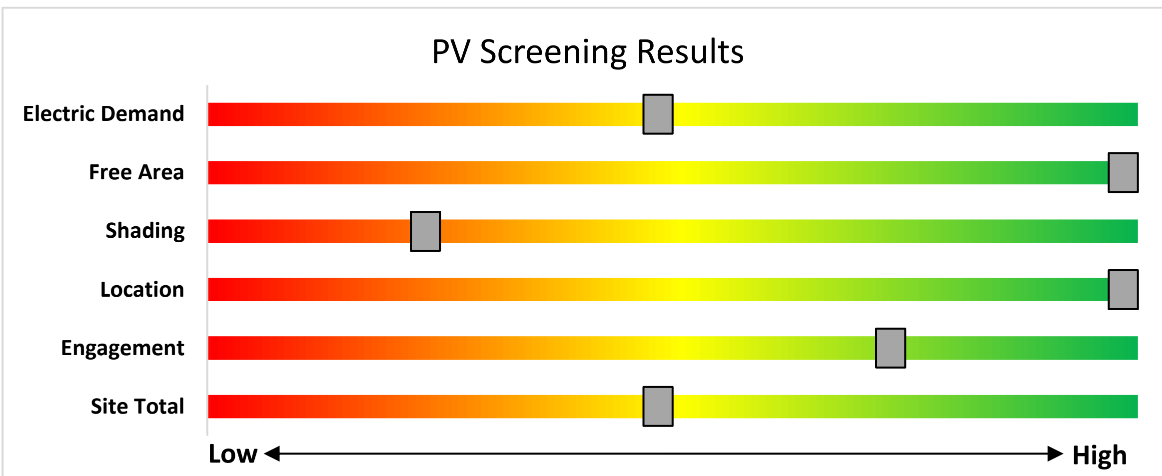
6.1 Solar Photovoltaic

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 medium potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the medium 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	Medium	
System Potential	201	kW DC STC
Electric Generation	151,241	kWh/yr
Displaced Cost	$21,900	/yr
Installed Cost	$522,600	

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.

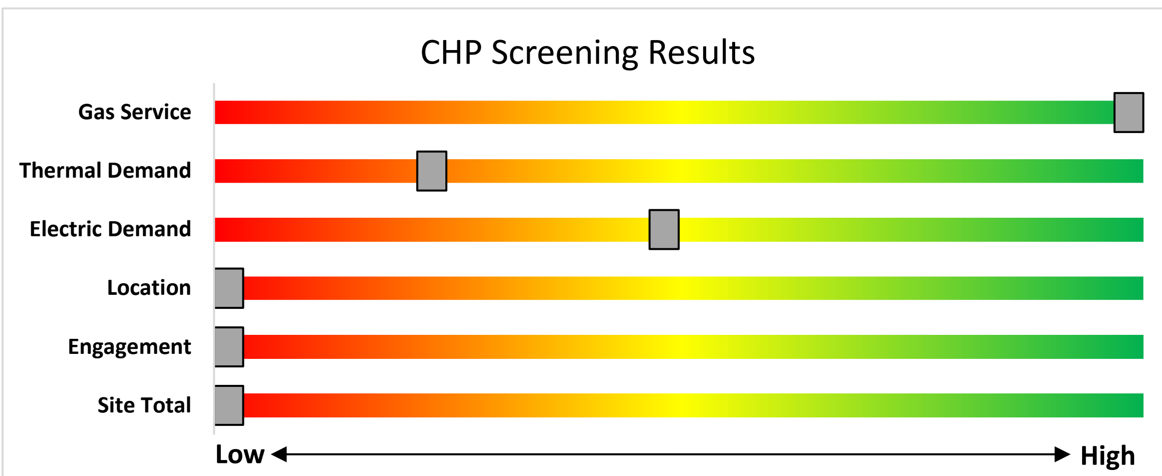


Figure 9 - Combined Heat and Power Screening

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 Electric Vehicles (EV)

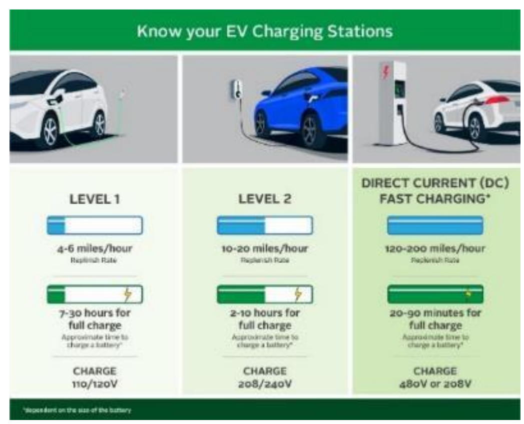
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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

7.1 Electric Vehicle Charging

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

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



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

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

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

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

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

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

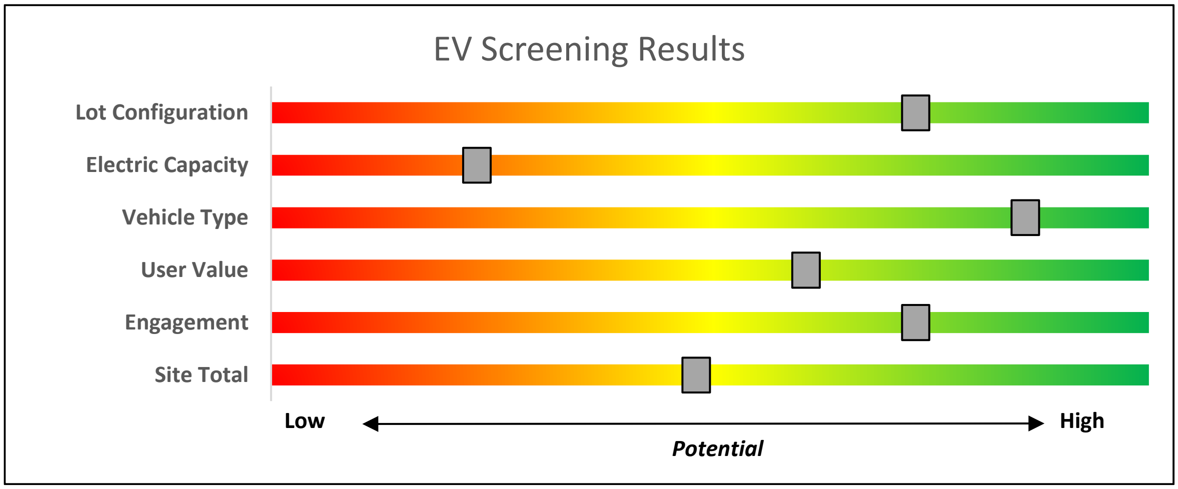


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

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

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

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

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

8 Project Funding and Incentives

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

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

The Prescriptive and Custom rebate program through your utility provider offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

Equipment Examples

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

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

Direct Install

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

Incentives

The program pays up to 70% of the total installed cost of eligible measures.

How to Participate

To participate in Direct Install, you will work with a participating contractor. The contractor will be paid the measure incentives directly by the program, which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the Direct Install program, subject to program rules and eligibility, while the remaining % of the cost is paid to the contractor by the customer.

Engineered Solutions

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

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

8.2 New Jersey's Clean Energy Programs

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

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

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

Competitive Solar Incentive Program

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

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 Project Development

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

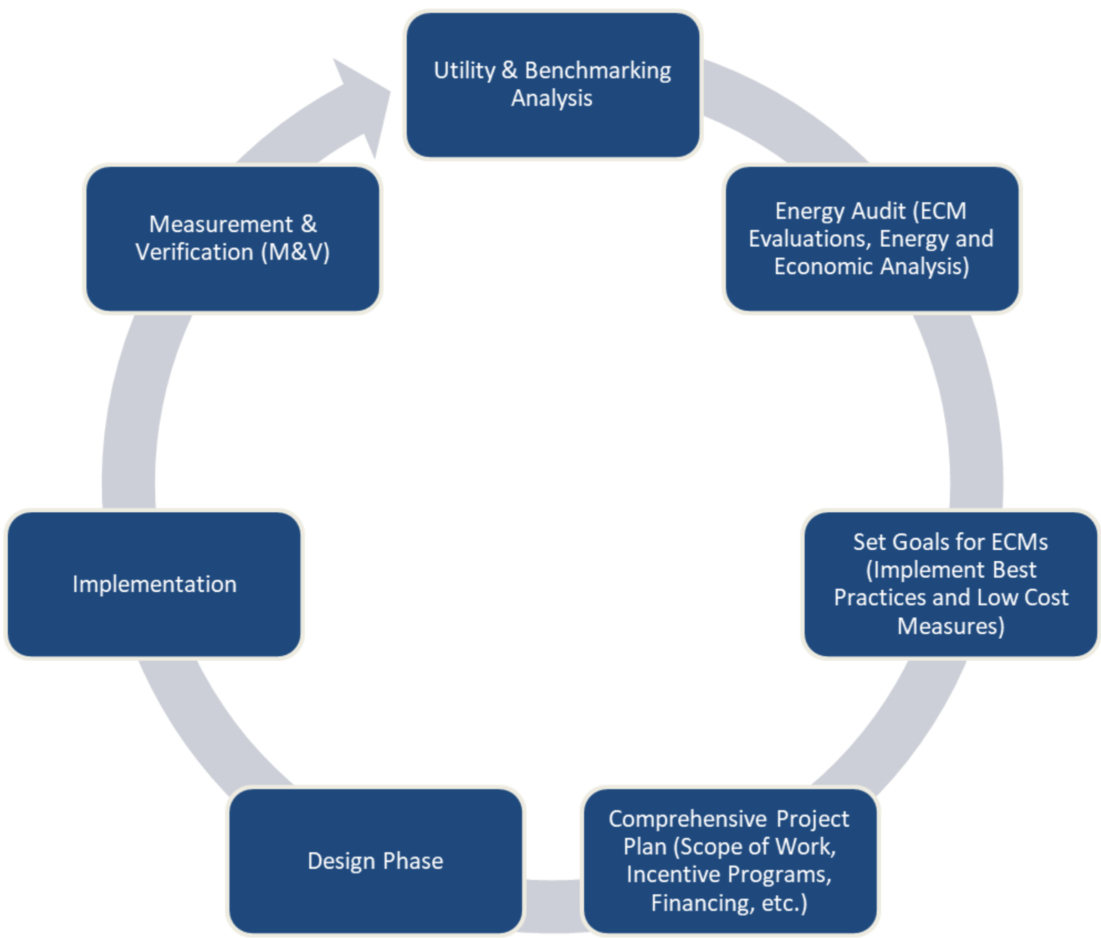


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. Though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website[11].

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[12].

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

[12] 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
Auditorium	7	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Auditorium	60	LED Lamps: (1) 14W PAR38 Screw-In Lamp	Wall Switch	S	14	3,630	3	None	Yes	60	LED Lamps: (1) 14W PAR38 Screw-In Lamp	Occupancy Sensor	14	2,505	0.2	1,040	0	$149	$1,080	$140	6.3
Auditorium Stage	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	S	234	3,630	2	Relamp	No	6	LED - Linear Tubes: (4) 4' T5HO (25W) Lamps	Wall Switch	102	3,630	0.6	3,162	-1	$452	$634	$120	1.1
Auditorium Stage storage	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	16	0	$2	$116	$0	49.5
Auditorium stairs	1	Compact Fluorescent: (1) 14W A19 Screw-In Lamp	Wall Switch	S	14	3,630	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	3,630	0.0	16	0	$2	$17	$1	7.1
Auditorium stairs	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,630		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,630	0.0	0	0	$0	$0	$0	0.0
Auditorium stairs	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	30	2,505	0.0	74	0	$11	$225	$70	14.6
Auditorium storage	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	16	0	$2	$116	$0	49.5
Auditorium Storage Room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	30	800	0.0	0	0	$0	$0	$0	0.0
Band room	30	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	30	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.3	1,671	0	$239	$540	$70	2.0
Band room entrance	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	74	0	$11	$116	$20	9.0
Band room entrance	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Bathroom	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,630		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,630	0.0	0	0	$0	$0	$0	0.0
Boiler Room	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,000	3	None	Yes	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,380	0.0	41	0	$6	$270	$35	40.1
Boys Locker Room	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.0	223	0	$32	$270	$35	7.4
Boys Locker Room / office (1)	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
Boys Locker Room Foyer (1)	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
Break room	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	223	0	$32	$270	$35	7.4
Break Room Superintendent	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	45	3,630	0.0	0	0	$0	$0	$0	0.0
Cafeteria	3	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	3,630	2, 3	Relamp	Yes	3	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	2,505	0.0	154	0	$22	$38	$3	1.6
Cafeteria	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
Cafeteria	23	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	23	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.2	854	0	$122	$540	$70	3.8
Cafeteria Annex	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
Cafeteria Annex	10	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	S	16	2,505		None	No	10	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	16	2,505	0.0	0	0	$0	$0	$0	0.0
Cafeteria Annex	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	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
Choral room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Choral room	19	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	706	0	$101	$540	$70	4.7
Classroom # 8	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	334	0	$48	$270	$35	4.9
Classroom 10	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 101	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	371	0	$53	$270	$35	4.4
Classroom 102	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	520	0	$74	$270	$35	3.2
Classroom 103	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	520	0	$74	$270	$35	3.2
Classroom 105	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	520	0	$74	$270	$35	3.2
Classroom 106	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	520	0	$74	$270	$35	3.2
Classroom 107	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	520	0	$74	$270	$35	3.2
Classroom 11	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	60	2,505		None	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 12	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	60	2,505		None	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 13	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	60	2,505		None	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 14	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	60	2,505		None	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 15	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 17	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	30	2,505		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 18	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 18	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 20	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	60	2,505		None	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 21	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 22	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 23	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 23 - Backroom	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	334	0	$48	$270	$35	4.9
Classroom 24	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 25	12	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	S	234	2,505	2	Relamp	No	12	LED - Linear Tubes: (4) 4' T5HO (25W) Lamps	Occupancy Sensor	102	2,505	1.1	4,364	-1	$624	$1,267	$240	1.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 26	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	557	0	$80	$270	$35	2.9
Classroom 27	13	LED - Fixtures: Ambient 1x4 Fixture	Wall Switch	S	40	3,630	3	None	Yes	13	LED - Fixtures: Ambient 1x4 Fixture	Occupancy Sensor	40	2,505	0.1	644	0	$92	$270	$35	2.6
Classroom 29	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	30	2,505		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 29	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 32	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 33	12	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	668	0	$96	$270	$35	2.5
Classroom 36	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 36 storage	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	800		None	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	60	800	0.0	0	0	$0	$0	$0	0.0
Classroom 37	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 38	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Classroom 40	21	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	21	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.2	910	0	$130	$540	$70	3.6
Classroom 44	11	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	11	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	477	0	$68	$270	$35	3.4
Classroom 45	11	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	11	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	477	0	$68	$270	$35	3.4
Classroom 46	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	390	0	$56	$270	$35	4.2
Classroom 46	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	S	62	3,630	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' T5HO (25W) Lamp	Occupancy Sensor	26	2,505	0.1	532	0	$76	$368	$50	4.2
Classroom 47	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	390	0	$56	$270	$35	4.2
Classroom 47	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	S	62	3,630	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' T5HO (25W) Lamp	Occupancy Sensor	26	2,505	0.1	532	0	$76	$368	$50	4.2
Classroom 48	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	390	0	$56	$270	$35	4.2
Classroom 48	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	S	62	3,630	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' T5HO (25W) Lamp	Occupancy Sensor	26	2,505	0.1	532	0	$76	$368	$50	4.2
Classroom 49	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	390	0	$56	$270	$35	4.2
Classroom 49	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	S	62	3,630	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' T5HO (25W) Lamp	Occupancy Sensor	26	2,505	0.1	532	0	$76	$368	$50	4.2
Classroom 52	12	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	12	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.1	520	0	$74	$270	$35	3.2
Classroom 52	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	S	62	3,630	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' T5HO (25W) Lamp	Occupancy Sensor	26	2,505	0.1	532	0	$76	$368	$50	4.2
Classroom 9	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Closet	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	800		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	800	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
Closet	1	Compact Fluorescent: (1) 14W A19 Screw-In Lamp	Wall Switch	S	14	800	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	800	0.0	4	0	$1	$17	$1	32.2
Closet	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	800		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	800	0.0	0	0	$0	$0	$0	0.0
Copy room 2nd floor	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
Copy room 2nd floor	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	111	0	$16	$116	$20	6.0
Corridor/ 4th grade	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
Corridor/ 4th grade	13	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	4	None	Yes	13	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	45	2,505	0.1	724	0	$104	$675	$455	2.1
Corridor/ 5th grade	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor/ 5th grade	26	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	4	None	Yes	26	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	30	2,505	0.2	966	0	$138	$1,125	$910	1.6
Corridor/ 7th 8th grade	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor/ 7th 8th grade	22	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	4	None	Yes	22	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	45	2,505	0.2	1,225	0	$175	$900	$770	0.7
Corridor/ Auditorium	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
Corridor/ Auditorium	10	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	4	None	Yes	10	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	45	2,505	0.1	557	0	$80	$450	$350	1.3
Corridor/ Auditorium	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
Corridor/ Auditorium	17	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	4	None	Yes	17	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	45	2,505	0.2	947	0	$135	$675	$595	0.6
Corridor/ Auditorium	2	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	S	51	3,630	4	None	Yes	2	LED - Linear Tubes: (3) 2' Lamps	High/Low Control	51	2,505	0.0	126	0	$18	$225	$70	8.6
Corridor/ Auditorium	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	4	None	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	30	2,505	0.0	37	0	$5	$0	$0	0.0
Corridor/ Band Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor/ Band Room	22	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	4	None	Yes	22	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	45	2,505	0.2	1,225	0	$175	$900	$770	0.7
Corridor/ Band Room	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	4	None	Yes	1	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	60	2,505	0.0	74	0	$11	$0	$0	0.0
Corridor/ Gym	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
Corridor/ Gym	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	4	None	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	30	2,505	0.1	334	0	$48	$450	$315	2.8
Corridor/ Gym	6	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	S	51	3,630	4	None	Yes	6	LED - Linear Tubes: (3) 2' Lamps	High/Low Control	51	2,505	0.1	379	0	$54	$225	$210	0.3
Corridor/ Locker Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor/ Locker Room	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	4	None	Yes	15	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	30	2,505	0.1	557	0	$80	$675	$525	1.9
Corridor 2nd floor	16	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	4	None	Yes	16	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	45	2,505	0.2	891	0	$128	$675	$560	0.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor Main office	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
Corridor Main office	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,630	4	None	Yes	1	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	32	2,505	0.0	40	0	$6	$0	$0	0.0
Corridor Main office	7	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,630	4	None	Yes	7	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,505	0.1	347	0	$50	$450	$245	4.1
Electrical room	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	800		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	800	0.0	0	0	$0	$0	$0	0.0
Electrical Room	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	49	0	$7	$270	$35	33.4
Elevator Lobby	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	45	3,630	0.0	0	0	$0	$0	$0	0.0
Elevator Room	1	Exit Signs: LED - 2 W Lamp	None		6	800		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	800	0.0	0	0	$0	$0	$0	0.0
Elevator Room	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	800		None	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	34	800	0.0	0	0	$0	$0	$0	0.0
Exterior Parking Lot	11	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock		100	4,380		None	No	11	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Parking Lot	3	Metal Halide: (1) 250W Lamp	Timeclock		295	4,380	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	75	4,380	0.0	2,891	0	$419	$1,336	$300	2.5
Exterior Recessed	15	LED Lamps: (1) 10W A19 Screw-In Lamp	Timeclock		10	4,380		None	No	15	LED Lamps: (1) 10W A19 Screw-In Lamp	Timeclock	10	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed	3	Metal Halide: (1) 100W Lamp	Timeclock		128	4,380	1	Fixture Replacement	No	3	LED - Fixtures: Downlight Recessed	Timeclock	30	4,380	0.0	1,288	0	$186	$455	$15	2.4
Exterior Roof	4	LED Lamps: (1) 14W PAR38 Screw-In Lamp	Photocell		14	4,380		None	No	4	LED Lamps: (1) 14W PAR38 Screw-In Lamp	Photocell	14	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	2	LED Lamps: (1) 23W A21 Screw-In Lamp	Photocell		23	4,380		None	No	2	LED Lamps: (1) 23W A21 Screw-In Lamp	Photocell	23	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	3	LED - Fixtures: Flood Fixture	Photocell		38	4,380		None	No	3	LED - Fixtures: Flood Fixture	Photocell	38	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		25	4,380		None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	25	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		30	4,380		None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	30	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		34	4,380		None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	34	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		45	4,380		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		50	4,380		None	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	50	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	2	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.0	1,270	0	$184	$692	$100	3.2
Exterior Wall Pack	1	High-Pressure Sodium: (1) 100W Lamp	Photocell		138	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	30	4,380	0.0	473	0	$69	$263	$50	3.1
Exterior Wall Pack	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		13	4,380		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	13	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		29	4,380		None	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	29	4,380	0.0	0	0	$0	$0	$0	0.0
Fitness Room 51	9	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.1	668	0	$96	$270	$35	2.5

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Fitness Room 52	9	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.1	668	0	$96	$270	$35	2.5
Girl Locker Room / office	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
Girls Locker Room 2	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.0	223	0	$32	$270	$35	7.4
Girls Locker Room Foyer	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
Gymnasium	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Gymnasium	24	LED - Fixtures: High-Bay	Wall Switch	S	26	3,630	3	None	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	26	2,505	0.1	772	0	$111	$540	$70	4.3
Gymnasium Storage	7	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	800	3	None	Yes	7	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	552	0.0	57	0	$8	$270	$0	32.9
IT foyer	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,630		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	32	3,630	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	334	0	$48	$270	$35	4.9
Kitchen office	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
Kitchen Refrigerator Room	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	800	3	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	552	0.0	33	0	$5	$116	$20	20.5
Kitchen Serving Area	5	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,630	3	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,505	0.0	248	0	$35	$270	$35	6.6
Library	17	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Occupancy Sensor	S	26	2,505	2	Relamp	No	17	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	2,505	0.1	328	0	$47	$213	$17	4.2
Library	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
Library	26	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	35	2,505		None	No	26	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.0	0	0	$0	$0	$0	0.0
Library	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	11	2,505		None	No	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,505	0.0	0	0	$0	$0	$0	0.0
Library	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Library entrance	4	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	S	16	3,630	4	None	Yes	4	LED - Fixtures: Downlight Solid State Retrofit	High/Low Control	16	2,505	0.0	77	0	$11	$225	$140	7.7
Lobby/ library	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
Lobby/ library	12	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	S	16	3,630	4	None	Yes	12	LED - Fixtures: Downlight Solid State Retrofit	High/Low Control	16	2,505	0.0	230	0	$33	$450	$420	0.9
Lobby/ library	16	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	S	30	3,630	2, 4	Relamp	Yes	16	LED - Linear Tubes: (1) 4' T5 (14.5W) Lamp	High/Low Control	15	2,505	0.2	1,255	0	$180	$1,200	$640	3.1
Lobby Exhibition lights	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	30	2,505	0.0	74	0	$11	$225	$70	14.6
Lobby Exit 4	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
Lobby Exit 4	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,630	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,505	0.0	99	0	$14	$225	$70	10.9
Lobby Main Area	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

	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
Lobby Main Area	1	LED - Fixtures: Ambient 1x4 Fixture	Wall Switch	S	32	3,630	4	None	Yes	1	LED - Fixtures: Ambient 1x4 Fixture	High/Low Control	32	2,505	0.0	40	0	$6	$0	$0	0.0
Lobby Main Area	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,630	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,505	0.0	99	0	$14	$225	$70	10.9
Main Office	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	297	0	$43	$270	$35	5.5
Maintenance room	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	49	0	$7	$270	$35	33.4
Mechanical Basement	1	Compact Fluorescent: (1) 14W A19 Screw-In Lamp	Wall Switch	S	14	800	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	800	0.0	4	0	$1	$17	$1	32.2
Mechanical Basement	1	Incandescent: (1) 150W A19 Screw-In Lamp	Wall Switch	S	150	800	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	23	800	0.1	112	0	$16	$17	$1	1.0
Mechanical Basement	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800		None	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	30	800	0.0	0	0	$0	$0	$0	0.0
Mechanical Basement	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,630	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,630	0.0	132	0	$19	$37	$10	1.4
Mens restroom	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
New electrical panel room	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	30	800		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	800	0.0	0	0	$0	$0	$0	0.0
Nurse bathroom	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,630		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,630	0.0	0	0	$0	$0	$0	0.0
Nurse closet	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	800		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	800	0.0	0	0	$0	$0	$0	0.0
Nurse closet 2	1	Compact Fluorescent: (1) 23W A19 Screw-In Lamp	Wall Switch	S	23	800	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	17	800	0.0	5	0	$1	$17	$1	21.5
Nurse examination	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	45	3,630	0.0	0	0	$0	$0	$0	0.0
Nurse office	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Nurse office entrance	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,630		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,630	0.0	0	0	$0	$0	$0	0.0
Office - Library	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	279	0	$40	$270	$35	5.9
Office # 5	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	186	0	$27	$270	$35	8.8
Office # 7	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	167	0	$24	$270	$35	9.8
Office - Band room	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Office - IT 2nd floor	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.0	173	0	$25	$270	$35	9.5
Office - IT 2nd floor 2	5	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630	3	None	Yes	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	35	2,505	0.0	217	0	$31	$270	$35	7.6
Office #6	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
Office #6	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	390	0	$56	$270	$35	4.2
Office 6 storage	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	30	800	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
Office Carlea dries	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Office Jennifer Goodall	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Office Kate Arena	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	74	0	$11	$116	$20	9.0
Office Kristina	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	2,505		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	2,505	0.0	0	0	$0	$0	$0	0.0
Office Lauren Bergrin	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Office Maria	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	S	30	2,505		None	No	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.0	0	0	$0	$0	$0	0.0
Office Mr Bruce	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	2,505		None	No	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	2,505	0.0	0	0	$0	$0	$0	0.0
Office Superintendent Main	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Office Superintendent Main	11	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	11	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.1	408	0	$58	$270	$35	4.0
Office Superintendent Sec	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	45	2,505		None	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	0	0	$0	$0	$0	0.0
Office Tedi Webber	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	2,505		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	2,505	0.0	0	0	$0	$0	$0	0.0
Pottery room - classroom 27	1	Compact Fluorescent: (1) 23W A19 Screw-In Lamp	Wall Switch	S	23	3,630	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	17	3,630	0.0	24	0	$3	$17	$1	4.7
Pottery room - classroom 27	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,630		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,630	0.0	0	0	$0	$0	$0	0.0
Storage Room	5	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	800	3	None	Yes	5	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	552	0.0	41	0	$6	$270	$0	46.1
Restroom - Boys	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	3,630		None	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	34	3,630	0.0	0	0	$0	$0	$0	0.0
Restroom - Boys	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	3,630	3	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	34	2,505	0.0	84	0	$12	$116	$20	8.0
Restroom - Boys	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	223	0	$32	$270	$35	7.4
Restroom - Boys	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	167	0	$24	$270	$35	9.8
Restroom - Boys (2)	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	223	0	$32	$270	$35	7.4
Restroom - Boys (1)	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	223	0	$32	$270	$35	7.4
Restroom - Female	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	3,630	3	None	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	34	2,505	0.0	126	0	$18	$270	$35	13.0
Restroom - Female 1	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	3,630	3	None	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	34	2,505	0.0	126	0	$18	$270	$35	13.0
Restroom - Girls	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	45	3,630	0.0	0	0	$0	$0	$0	0.0
Restroom - Girls	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.0	167	0	$24	$270	$35	9.8
Restroom - Girls 2nd floor	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	3,630	3	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	34	2,505	0.0	84	0	$12	$270	$35	19.5

	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
Restroom - Men	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630		None	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	60	3,630	0.0	0	0	$0	$0	$0	0.0
Restroom - Men (1)	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	186	0	$27	$270	$35	8.8
Restroom boys 2nd floor	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	34	3,630	3	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	34	2,505	0.0	84	0	$12	$270	$35	19.5
Restroom IT 2nd floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	35	3,630		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	35	3,630	0.0	0	0	$0	$0	$0	0.0
Roof	8	High-Pressure Sodium: (1) 50W Lamp	Wall Switch	S	66	3,630	1	Fixture Replacement	No	8	LED - Fixtures: Wall Sconces	Wall Switch	15	3,630	0.3	1,629	0	$233	$1,813	$0	7.8
Roof Storage	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	800		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	800	0.0	0	0	$0	$0	$0	0.0
Roof Storage	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	16	0	$2	$116	$0	49.5
Room 2 BOE	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.1	557	0	$80	$270	$35	2.9
Room 2 BOE	5	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	5	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.0	186	0	$27	$270	$35	8.8
Server room	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	3	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	60	2,505	0.0	149	0	$21	$116	$20	4.5
Stairs exit 6	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	4	None	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	30	2,505	0.0	37	0	$5	$0	$0	0.0
Stairs exit 6	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	4	None	Yes	1	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	60	2,505	0.0	74	0	$11	$225	$35	17.9
Stairs exit 6	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	4	None	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	30	2,505	0.0	37	0	$5	$0	$0	0.0
Stairs Main Lobby	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	4	None	Yes	1	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	30	2,505	0.0	37	0	$5	$0	$0	0.0
Stairs Main Lobby	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	60	3,630	4	None	Yes	1	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	60	2,505	0.0	74	0	$11	$225	$35	17.9
Stairs Main Lobby	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	4	None	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	30	2,505	0.0	37	0	$5	$0	$0	0.0
Storage	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	16	0	$2	$116	$0	49.5
storage	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	800	3	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	552	0.0	33	0	$5	$270	$0	57.6
Teacher lounge	10	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	10	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.1	371	0	$53	$270	$35	4.4
Teacher lounge	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630	3	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	186	0	$27	$270	$35	8.8
Tv control room	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	334	0	$48	$270	$35	4.9
Tv studio	2	Compact Fluorescent: (2) 55W Biaxial Plug-In Lamps	Wall Switch	S	110	3,630	2, 3	Relamp	Yes	2	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	77	2,505	0.1	454	0	$65	$54	$4	0.8
Tv studio	3	Compact Fluorescent: (4) 55W Double Biaxial Plug-In Lamps	Wall Switch	S	220	3,630	2, 3	Relamp	Yes	3	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	154	2,505	0.2	1,362	0	$195	$162	$12	0.8
Tv studio	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	45	3,630	3	None	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	45	2,505	0.1	613	0	$88	$270	$35	2.7
Tv studio	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	30	3,630	3	None	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	30	2,505	0.0	111	0	$16	$270	$35	14.7

	Existing Conditions							Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Utility room	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	800		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	800	0.0	0	0	$0	$0	$0	0.0
Women's restroom	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	30	3,630		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	30	3,630	0.0	0	0	$0	$0	$0	0.0
Womens bathroom	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	30	2,505		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	30	2,505	0.0	0	0	$0	$0	$0	0.0

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	**Motor Quantity**	**Motor Application**	**HP Per Motor**	**Full Load Efficiency**	**VFD Control?**	**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	Classroom 27-RTU	1	Supply Fan	2.0	82.0%	No			W	2,745	5	No	86.5%	Yes	1	0.6	2,048	0	$297	$4,182	$100	13.8
Roof	Faculty Room	1	Supply Fan	0.5	70.0%	No			W	3,000		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Auditorium	1	Supply Fan	15.0	92.4%	No			W	3,000	5	No	93.0%	Yes	1	4.3	13,780	0	$1,996	$9,177	$1,200	4.0
Roof	Auditorium	1	Return Fan	7.5	91.7%	No			W	3,000	5	No	91.7%	Yes	1	2.2	6,863	0	$994	$5,945	$1,000	5.0
Roof	Auditorium	1	Combustion Air Fan	0.3	65.0%	No			W	1,170		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Main Office	1	Supply Fan	5.0	89.5%	No			W	3,000	5	No	89.5%	Yes	1	1.4	4,688	0	$679	$5,028	$900	6.1
Roof	Learning Common	1	Supply Fan	5.0	89.5%	No			W	2,745	5	No	89.5%	Yes	1	1.4	4,290	0	$621	$5,028	$900	6.6
Classrooms & Other Spaces	Classrooms & Other Spaces	53	Fan Coil Unit	0.3	65.0%	No			W	3,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hydronic Pumps - P7 & P8	2	Heating Hot Water Pump	7.5	87.5%	Yes			W	2,555		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hydronic Pumps - P3 & P4	2	Heating Hot Water Pump	0.5	70.0%	No			W	5,110		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hydronic Pumps - P5 & P6	2	Heating Hot Water Pump	7.5	88.5%	No			W	2,555	6	No	91.0%	Yes	2	1.6	12,714	0	$1,841	$11,890	$2,000	5.4
Boiler Room	Hydronic Pumps - P & P2	2	Heating Hot Water Pump	5.0	87.5%	No			W	2,555	6	No	89.5%	Yes	2	1.1	8,497	0	$1,231	$10,055	$1,800	6.7
Boiler Room	Domestic Hot Water Circulation Pump	1	DHW Circulation Pump	0.1	65.0%	No			W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various Building Spaces	8	Exhaust Fan	0.2	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various Building Spaces	8	Exhaust Fan	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various Building Spaces	13	Exhaust Fan	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various Building Spaces	5	Exhaust Fan	0.5	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various Building Spaces	2	Exhaust Fan	0.8	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Boiler room	1	Exhaust Fan	1.0	80.0%	No			W	2,745		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen	1	Exhaust Fan	2.0	82.0%	No			W	2,745	5	No	86.5%	Yes	1	0.6	2,048	0	$297	$4,182	$100	13.8

		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	Brookside School	1	Exhaust Fan	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen Hood	1	Kitchen Hood Exhaust Fan	0.5	70.0%	No			W	3,413		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Auditorium Stage Storage	Hydronic Unit Heater	1	Fan Coil Unit	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Hydraulic Elevator Pump Motor	1	Other	25.0	80.0%	No			W	150		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space	Sump Pump	1	Other	0.3	65.0%	No			W	400		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 25 & Band Room	2	Supply Fan	2.0	82.0%	No			W	2,745	5	No	86.5%	Yes	2	1.2	4,097	0	$593	$8,363	$200	13.8
Roof	Board Office - RTU	1	Supply Fan	1.5	82.0%	No			W	2,745	5	No	86.5%	Yes	1	0.5	1,536	0	$222	$3,887	$75	17.1
Gymnasium	AHU-2 - Gymnasium	1	Supply Fan	3.0	84.0%	No			W	2,745	5	No	89.5%	Yes	1	0.9	3,046	0	$441	$4,555	$200	9.9
Locker Room	AHU-3 - Locker Rooms	1	Supply Fan	2.0	82.0%	No			W	2,745	5	No	86.5%	Yes	1	0.6	2,048	0	$297	$4,182	$100	13.8

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
Court Yard Ground	Classroom 32	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9
Roof	Classroom 38	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 52	1	Split-System	3.50		12.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 26	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 47	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 50	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 106	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 14	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 107	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 9	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 35	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 13	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 36	1	Split-System	2.50		12.00		Trane	2TTB3030A	B	7	Yes	1	Split-System	2.50		16.00		0.3	278	0	$40	$4,634	$263	108.5
Roof	Classroom 48	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 40	1	Split-System	2.50		13.00		Trane	2TTB3030A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	BOE Office	2	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	2	Split-System	2.00		16.00		0.5	445	0	$64	$8,079	$420	118.9
Roof	Classroom 105	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 7	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9
Roof	Classroom 12	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9

		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	Classroom 49	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 104	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9
Roof	Classroom 51	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 8	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9
Roof	Classroom 10	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 107	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 46	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 44	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 103	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 45	1	Split-System	3.50		13.00		Trane	2TTB3042A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 33	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 34	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9
Roof	Classroom 11	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 37	1	Split-System	3.50		12.00		Trane	2TTB3042A	B	7	Yes	1	Split-System	3.50		16.00		0.4	389	0	$56	$6,399	$368	107.0
Roof	Classroom 101	1	Split-System	2.00		12.00		Trane	2TTB3024A	B	7	Yes	1	Split-System	2.00		16.00		0.3	223	0	$32	$4,040	$210	118.9
Court yard ground	BOE office	1	Ductless Mini-Split AC	1.00		9.50		LG	HMC012KD	B	7	Yes	1	Ductless Mini-Split AC	1.00		18.00		0.3	265	0	$38	$2,543	$0	66.2
Roof	Classroom 21	1	Ductless Mini-Split AC	2.50		16.50		Fujitsu	AOU30CLX1	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Cafeteria serving area	1	Ductless Mini-Split AC	3.00		14.00		Mitsubishi	PUY-A36NHA6	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 17	1	Ductless Mini-Split AC	2.50		16.50		Fujitsu	AOU30CLX1	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	BOE Office	1	Ductless Mini-Split AC	2.00		9.00		LG	HMC024KD	B	7	Yes	1	Ductless Mini-Split AC	2.00		18.00		0.7	593	0	$86	$3,922	$0	45.6

		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	Classroom 23	1	Split-System	3.00		12.00		Fujitsu	AOU36CLX	B	7	Yes	1	Split-System	3.00		16.00		0.4	334	0	$48	$5,517	$315	107.6
Roof	Classroom 19	1	Ductless Mini-Split AC	2.00		9.00		LG	HMC024KD	B	7	Yes	1	Ductless Mini-Split AC	2.00		18.00		0.7	593	0	$86	$3,922	$0	45.6
Roof	Classroom 18	1	Ductless Mini-Split AC	2.00		9.00		LG	HMC024KD	B	7	Yes	1	Ductless Mini-Split AC	2.00		18.00		0.7	593	0	$86	$3,922	$0	45.6
Roof	Classroom 18 - 2	1	Ductless Mini-Split AC	2.50		16.50		Fujitsu	AOU30CLX1	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 20	1	Ductless Mini-Split AC	2.50		11.00		Fujitsu	AOU3001	B	7	Yes	1	Ductless Mini-Split AC	2.50		18.00		0.5	472	0	$68	$4,044	$0	59.2
Roof	Classroom 22	1	Split-System Air-Source HP	3.00	36.60	12.50	11.2 HSPF	Daikin	K36NMVJUA	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 15	1	Split-System Air-Source HP	3.00	37.00	10.50	11.5 HSPF	Fujitsu	AOU36RLXB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom	1	Ductless Mini-Split AC	2.00		10.00		Fujitsu	AOU24CL1	B	7	Yes	1	Ductless Mini-Split AC	2.00		18.00		0.5	475	0	$69	$3,922	$0	57.1
Window	Choral Room	1	Window AC	1.50		10.30				W		No							0.0	0	0	$0	$0	$0	0.0
Window	Classroom 24	1	Window AC	1.50		10.30				W		No							0.0	0	0	$0	$0	$0	0.0
Window	Classroom 27	1	Window AC	1.50		9.50				B	7	Yes	1	Window AC	1.50		12.00		0.2	176	0	$25	$1,094	$0	43.0
Roof	Classroom 27	1	Package Unit	7.50		10.30		Trane	TCD086C30CBC	B	7	Yes	1	Package Unit	7.50		14.00		1.2	1,028	0	$149	$9,791	$593	61.8
Roof	Faculty Room	1	Package Unit	3.00	79.00	10.10	0.79 AFUE	York	D7CG036N07925A	B	7	Yes	1	Package Unit	3.00	79.00	16.00	0.82 AFUE	0.7	585	2	$102	$8,875	$309	83.6
Roof	Auditorium	1	Package Unit	26.00	437.00	11.00	0.809259259259259 AFUE	AAON	RN02680BA043A9	B	7	Yes	1	Package Unit	26.00	437.00	12.50	0.82 Et	1.7	1,515	4	$254	$37,926	$2,210	140.8
Roof	Main Office	1	Package Unit	12.50	203.00	10.30	0.812 AFUE	Trane	YCD151C3HCBB	B	7	Yes	1	Package Unit	12.50	203.00	14.00	0.82 Et	1.9	1,713	1	$260	$19,265	$1,113	69.9
Roof	Learning Common	1	Package Unit	12.50		11.30		Trane	TZD150F3R0B07P	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 25	1	Package Unit	6.00		10.10		Trane	TCD074C30	B	7	Yes	1	Package Unit	6.00		14.00		1.0	884	0	$128	$8,645	$474	63.8
Roof	Band Room	1	Package Unit	6.00		10.10		Trane	TCD074C30	B	7	Yes	1	Package Unit	6.00		14.00		1.0	884	0	$128	$8,645	$474	63.8
Roof	Brookside Elementary School	1	Package Unit	15.00		12.00		Trane	OALD180A3	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Office - IT Room	1	Split-System Air-Source HP	1.00	16.40	19.00	9 HSPF	Daikin	RX12QMVJU	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
Elevator Room	Elevator Room	1	Electric Resistance Heat		10.24		1 COP			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	4	Condensing Hot Water Boiler	1,900	Aerco	Benchmark 2.0	W		No						0.0	0	0	$0	$0	$0	0.0

Pipe Insulation Recommendations

Location	Area(s)/System(s) Affected	Recommendation Inputs			Energy Impact & Financial Analysis						
		ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	DHW System	8	55	2.00	0.0	0	25	$203	$733	$110	3.1
Kitchen	DHW System	8	21	0.75	0.0	1,651	0	$239	$251	$42	0.9

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
		System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Main Domestic Water Heater	1	Storage Tank Water Heater (> 50 Gal)	A O Smith	BTR199 118	W		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Kitchen Domestic Water Heater	1	Storage Tank Water Heater (≤ 50 Gal)	GE	GE50M06AAG	W		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Kitchen Domestic Water Heater	1	Storage Tank Water Heater (≤ 50 Gal)	Rheem	82V52-2	W		No						0.0	0	0	$0	$0	$0	0.0
Storage Room	7th & 8th Grade Domestic Water Heater	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	M280RDS6	W		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Booster Heater	1	Booster Water Heater			W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

Location	Recommedation Inputs					Energy Impact & Financial Analysis						
	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	31	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	29	$244	$222	$111	0.5
Restrooms	9	6	Faucet Aerator (Lavatory)	2.20	0.50	0.0	1,668	0	$242	$43	$22	0.1

Walk-In Cooler/Freezer Inventory & Recommendations

Location	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
	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 Refrigerator Room	1	Cooler (35F to 55F)	Unknown	Unknown	10, 11	Yes	No	Yes	0.1	1,117	0	$162	$2,281	$155	13.1

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
Kitchen 1	1	Freezer Chest	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	2	Refrigerator Chest	TRUE	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen Serving Area	1	Refrigerator Chest	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	1	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	TRUE	TAC48-G8	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	2	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen	G22010	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	TRUE	Unknown	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)	Vukcan		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Convection Oven (Full Size)	Southbend		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Vukcan	VHFA18	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	1	Door Type (High Temp)	ADS	AF-3D	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
Brookside Elementary School	8	Coffee Machine	900	No		
Brookside Elementary School	2	Dehumidifier	480	No		
Brookside Elementary School	49	Desktop	191	No		
Brookside Elementary School	22	Fan (Ceiling)	50	No		
Brookside Elementary School	1	Kiln	15,600	No		
Brookside Elementary School	16	Laptop	75	No		
Brookside Elementary School	9	Microwave	1,000	No		
Brookside Elementary School	5	Paper Shredder	150	No		
Brookside Elementary School	14	Printer (Medium/Small)	192	No		
Brookside Elementary School	8	Printer/Copier (Large)	600	No		
Brookside Elementary School	3	Projector	200	No		
Brookside Elementary School	8	Refrigerator (Mini)	207	No		
Brookside Elementary School	3	Refrigerator (Residential)	199	No		
Brookside Elementary School	44	Smart Board	150	No		
Brookside Elementary School	7	Television	120	No		
Brookside Elementary School	1	Toaster Oven	850	No		
Brookside Elementary School	1	Water Cooler	500	No		
Brookside Elementary School	1	Kitchen Equipment	1,800	No		
Brookside Elementary School	1	Kitchen Equipment	1,440	No		
Brookside Elementary School	1	Electric Stove	1,500	No		

Custom (High Level) Measure Analysis

Electric Tank Water Heater to HPWH

NOTE: HPWH calculation should not be used for existing water heaters with a storage capacity greater than 120 gal.

Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	SF of Area Served	Fuel Type	Input Capacity per Unit (kW)	Tank Capacity per Unit (Gal)	Description	COP	Tank Capacity per Unit (Gal)	Estimated Unit Cost	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Payback w/ Incentives in Years
Storage Tank Water Heater (≤50 Gal)	Kitchen Domestic Water Heater	2,500	Electric	4.5	50	Heat Pump Water Heater	2.5	50	$2,383.17	0.00	3,077	0	$446	$2,383	$0	$0	$0	$2,383	5.34	5.34
Storage Tank Water Heater (≤50 Gal)	Kitchen Domestic Water Heater	2,500	Electric	4.5	50	Heat Pump Water Heater	2.5	50	$2,383.17	0.00	3,077	0	$446	$2,383	$0	$0	$0	$2,383	5.34	5.34
			Electric																	

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

65

ENERGY STAR® Score[1]

Brookside Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 98,416
Built: 1928

For Year Ending: April 30, 2022
Date Generated: January 25, 2023

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Brookside Middle School 100 Brookside Avenue Allendale, New Jersey 07401	Allendale BOE 100 Brookside Avenue Allendale, NJ 07401 (201) 327-2020	Maria Engeleit 100 Brookside Avenue Allendale, NJ 07401 (201) 327-2020

Property ID: 23383535

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
75.8 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	1,974,414 (26%)
Natural Gas (kBtu)	5,484,289 (74%)

Source EUI
114.7 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	88.2
National Median Source EUI (kBtu/ft²)	133.5
% Diff from National Median Source EUI	-14%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	463

Signature & Stamp of Verifying Professional

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

LP Signature: ______________________ Date: ___________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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