Local Government Energy Audit Report

Roebling Elementary School

August 11, 2022

Prepared for:
Florence Township Board of Education
1330 Hornberger Avenue
Roebling, New Jersey 08554

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Disclaimer

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

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

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

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

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

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ENERGY EFFICIENCY INCENTIVE & REBATE TRANSITION

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

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

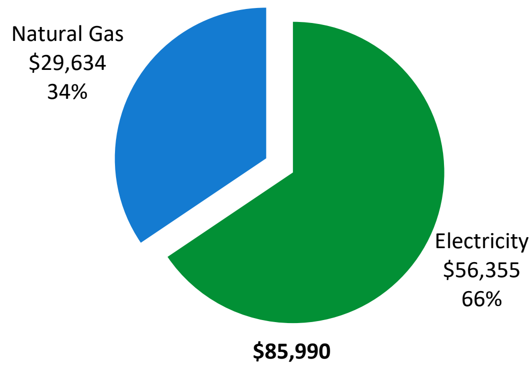
These next generation energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and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

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

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Roebling Elementary. 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: $85,990 Electricity: 392,985 kWh Natural Gas: 34,161 Therms	
ENERGY STAR® Benchmarking Score	56 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

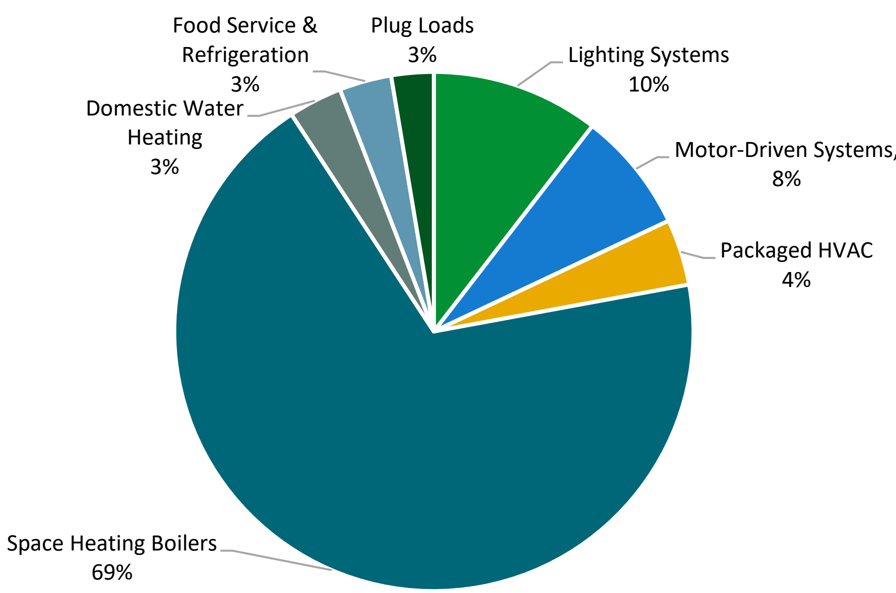


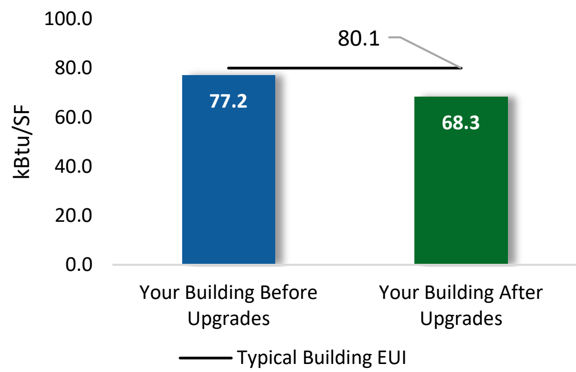
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

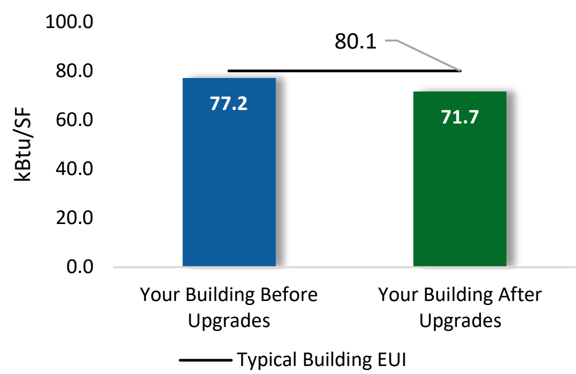
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$277,202
Potential Rebates & Incentives[1]	$22,345
Annual Cost Savings	$16,904
Annual Energy Savings	Electricity: 107,044 kWh Natural Gas: 1,791 Therms
Greenhouse Gas Emission Savings	64 Tons
Simple Payback	15.1 Years
Site Energy Savings (All Utilities)	11%



Scenario 2: Cost Effective Package[2]

Installation Cost	$77,240
Potential Rebates & Incentives	$18,911
Annual Cost Savings	$14,554
Annual Energy Savings	Electricity: 102,213 kWh Natural Gas: -120 Therms
Greenhouse Gas Emission Savings	51 Tons
Simple Payback	4.0 Years
Site Energy Savings (all utilities)	7%



On-site Generation Potential

Photovoltaic	Low
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			**69,953**	**16.4**	**-16**	**$9,892**	**$41,957**	**$11,270**	**$30,687**	**3.1**	**68,559**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	69,953	16.4	-16	$9,892	$41,957	$11,270	$30,687	3.1	68,559
Lighting Control Measures			**21,873**	**5.1**	**-5**	**$3,093**	**$21,540**	**$4,845**	**$16,695**	**5.4**	**21,437**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	19,440	4.5	-4	$2,749	$16,860	$2,045	$14,815	5.4	19,053
ECM 3	Install High/Low Lighting Controls	Yes	2,433	0.6	-1	$344	$4,680	$2,800	$1,880	5.5	2,384
Variable Frequency Drive (VFD) Measures			**10,191**	**2.6**	**0**	**$1,461**	**$13,310**	**$2,700**	**$10,610**	**7.3**	**10,262**
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	4,290	1.4	0	$615	$4,076	$900	$3,176	5.2	4,320
ECM 5	Install VFDs on Heating Water Pumps	Yes	5,901	1.1	0	$846	$9,234	$1,800	$7,434	8.8	5,942
Unitary HVAC Measures			**4,482**	**3.7**	**0**	**$643**	**$39,272**	**$3,359**	**$35,913**	**55.9**	**4,514**
ECM 6	Install High Efficiency Air Conditioning Units	No	4,482	3.7	0	$643	$39,272	$3,359	$35,913	55.9	4,514
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**191**	**$1,657**	**$159,016**	**$0**	**$159,016**	**95.9**	**22,371**
ECM 7	Install High Efficiency Hot Water Boilers	No	0	0.0	191	$1,657	$159,016	$0	$159,016	95.9	22,371
HVAC System Improvements			**0**	**0.0**	**4**	**$38**	**$58**	**$20**	**$38**	**1.0**	**514**
ECM 8	Install Pipe Insulation	Yes	0	0.0	4	$38	$58	$20	$38	1.0	514
Domestic Water Heating Upgrade			**0**	**0.0**	**5**	**$41**	**$72**	**$36**	**$36**	**0.9**	**556**
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	5	$41	$72	$36	$36	0.9	556
Food Service & Refrigeration Measures			**545**	**0.0**	**0**	**$78**	**$1,977**	**$115**	**$1,862**	**23.8**	**549**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	197	0.0	0	$28	$303	$40	$263	9.3	198
ECM 11	Refrigeration Controls	No	349	0.0	0	$50	$1,674	$75	$1,599	32.0	351
TOTALS (COST EFFECTIVE MEASURES)			**102,213**	**24.1**	**-12**	**$14,554**	**$77,240**	**$18,911**	**$58,329**	**4.0**	**101,525**
TOTALS (ALL MEASURES)			**107,044**	**27.8**	**179**	**$16,904**	**$277,202**	**$22,345**	**$254,857**	**15.1**	**128,760**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

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

Options from Around the State

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Roebling Elementary. 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 April 20, 2022, TRC performed an energy audit at Roebling Elementary School located in Roebling, New Jersey. TRC met with Luis Valencia to review the facility operations and help focus our investigation on specific energy-using systems.

The Roebling Elementary School is a two-story, 61,648 square foot public school located at 1330 Hornberger Avenue in Roebling, New Jersey. The original school building was built in 1914 and was expanded in 1993 to accommodate additional spaces. Spaces include classrooms, administrative offices, multipurpose room, hallways, kitchen, library, storage rooms, restrooms, basement, and mechanical spaces.

Facility lighting consists primarily of 32-Watt T8 fluorescent fixtures. The building is heated by two non-condensing hot water boilers. It is cooled by air handling units with direct expansion coils and window air conditioning units.

2.2 Building Occupancy

The school operates on a 10-month schedule, from September to June. There are some weekend classes and after school programs. The entire facility is shut down around 10:00 PM after the cleaning process.

During a typical day, the facility is occupied by 319 students and 78 staff. It should be noted that the energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary based on changes to building use patterns.

Building Name	Weekday/Weekend	Operating Schedule
Roebling Elementary - General Operating Hours	Weekday	6:00 AM - 10:00 PM
	Weekend	8:00 AM - 2:00 PM
Elementary School - Classes	Weekday	8:00 AM - 3:30 PM
	Weekend	8:00 AM - 2:00 PM
Elementary School - After School Programs	Weekday	8:00 AM - 5:00 PM
	Weekend	Closed
Elementary School - All purpose room and library	Weekday	3:00 PM - 5:00 PM
	Weekend	Closed

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete masonry units (CMU) over structural steel with a brick façade, with gypsum drywall painted CMU interior finish. The level of exterior wall insulation is unknown. The flat roof sections are supported with steel trusses and a reinforced concrete deck and finished with an insulated layer and a covering of black membrane.

Windows throughout the facility are double paned with aluminum frames. The glass-to-frame seals are in good condition. The window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition. Overall, the building envelope appears in good condition.

Building Wall

Building Wall

Building Wall

Roof

Windows

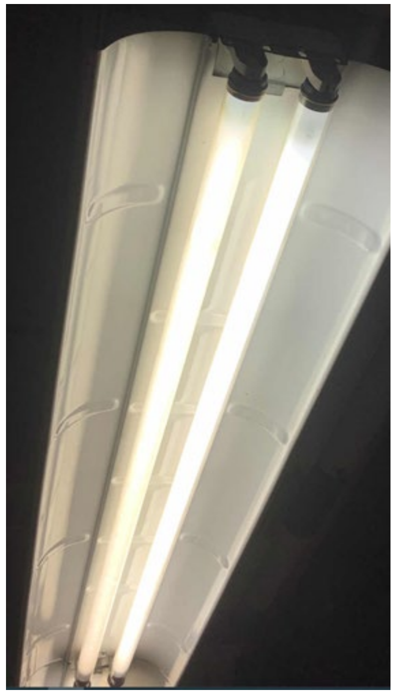
Exterior Doors

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several LED general purpose lights and linear fluorescent T5 lamps. Additionally, there are some compact fluorescent lamps (CFL) and an incandescent lamp. Fixture types include 2-lamp, 3-lamp, or 4-lamp, 4-foot-long troffer, recessed, surface mounted fixtures. Spaces including most hallways, classrooms, teacher lounge, offices, restrooms, storage rooms and stairs are lit with linear fluorescent T8 lamps. The multipurpose room is primarily lit with linear fluorescent T5 lamps. Linear fixtures in the main office and the main entrance have been retrofit to operate LED tubes. There are eight CFL lamps in the multipurpose room. Most fixtures are in good condition. All exit signs are LED units. Interior lighting levels were generally sufficient. Lighting fixtures in space are controlled by wall switches except the third-floor closet that has occupancy sensor.

Exterior lighting is mostly provided by wall, recessed and pole mounted LED fixtures. They are controlled with photocells.

Linear Fluorescent T8 and T8 Fixtures

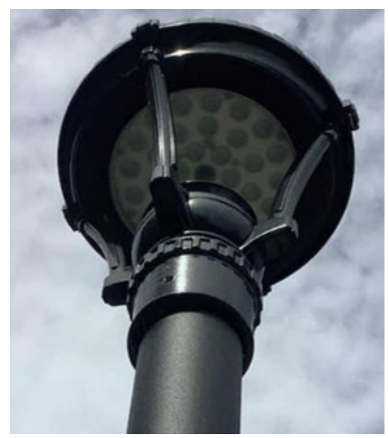


Linear Fluorescent T8 and T8 Fixtures

Linear Fluorescent T8 and T8 Fixtures

Exterior LED Fixtures

Exterior LED Fixtures



Exterior LED Fixtures

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators provide heating and ventilation to classrooms. They are equipped with supply fan motors and pneumatically controlled outside air dampers and are connected to the hot water distribution system. This system is in good operating condition.

Classroom Unit Ventilator

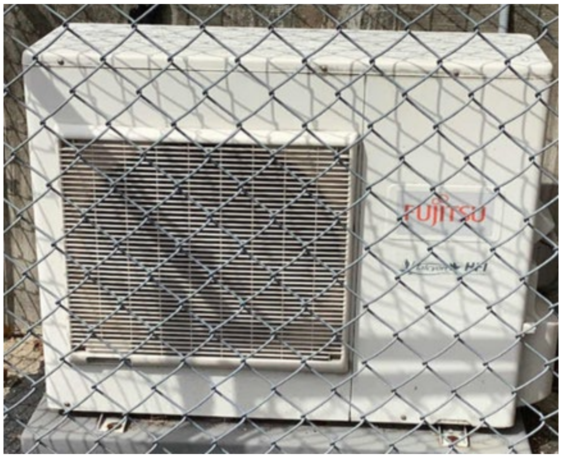
Classroom Unit Ventilator

Unitary Electric HVAC Equipment

The teachers' lounge and classroom 212 are both conditioned by 2-ton ductless split heat pumps with 25 MBh heating capacities. The units are in good condition. Part of the main office is conditioned by a 1.5-ton Mitsubishi split AC unit that is in good condition. The heat pumps and the split AC are controlled by programmable thermostats.

Classroom cooling is provided by 28 window ACs that vary in cooling capacity between 0.7 tons to 1-ton, and three portable AC units. They are in good condition.

Large spaces, including the basement, computer lab, main office, and multipurpose room, are cooled by six outdoor condensing units connected to indoor air handling unit cooling coils. These vary in cooling capacity between 3.5 tons and 20-tons. The units serving the computer lab and main office are in good condition while the remaining four units have reached or are near their useful life. They have been evaluated for replacement.



Split System Air Source Heat Pump Unit


Split System Air Source Heat Pump Unit

Outdoor Condensing Unit

Outdoor Condensing Unit

Air Handling Units (AHUs)

The building is conditioned by six air handling units. Each unit is equipped with a supply fan motor, hot water heating coil, and refrigerant coil for cooling connected to outdoor condensing units that vary in size. The heating coil is supplied by the hot water boilers, described in the following section. The supply fan motor data has been estimated for units that were not fully accessible during the audit. The AHUs are pneumatically controlled using a 2 hp air compressor. Space heating temperatures are controlled by local thermostats. The AHUs appear in acceptable condition.

Unit ID	Location	Areas Served	Supply Fan (HP)	Hot Water Coil	DX Cooling Capacity (Ton)	DX Condensing Unit Condition
AHU-1 & AHU-2	Overhead – Multipurpose Room	Multipurpose Room	1.5*	Yes	7.5	Fair
AHU-3	Multipurpose Room	Multipurpose Room	5.0*	Yes	20.0	Fair
AHU-4	Basement	Basement Spaces	1.5	Yes	6.0	Fair
AHU-5	Storage Room	Computer Lab	1.5*	Yes	5.0	Good
AHU-6	Storage Room	Main Office	0.8*	Yes	3.5	Good

(*) horsepower (hp) is estimated

AHU-1

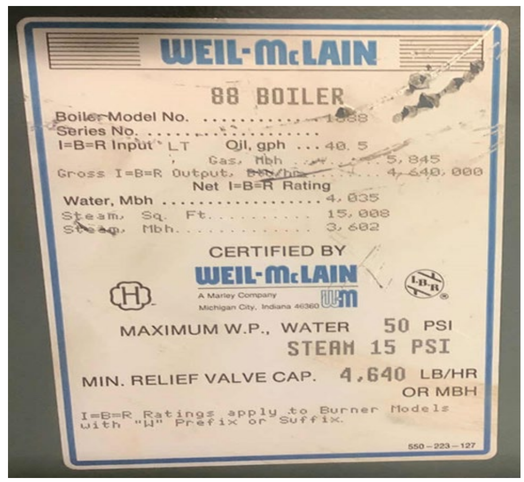
AHU-4

2.6 Heating Hot Water Systems

Two Weil McLain 4,640 MBh hot water boilers serve the building heating load. The burners are non-modulating with a nominal efficiency of 80%. Installed in 1993, the boilers have reached their useful life and appear in fair condition. They have been evaluated for replacement. The boilers are configured in a manual lead-lag control scheme. Only one boiler is required under high load condition

The hydronic distribution system is a two-pipe, heating-only system. Hot water is distributed to AHUs, hydronic baseboards, and unit ventilators by two, 5 hp and four, 0.5 hp constant flow hot water pumps. The heating system is controlled by the pneumatic control system described above. The space heating temperature setpoint is 72°F.

Hot Water Boiler



Label

5 hp Hot Water Pumps

Label

2.7 Domestic Hot Water

The building has four storage tank water heaters. The main water heater is a 40 gallon, 40 MBh water heater with an efficiency rating of 80%. It serves the restrooms throughout the building. The gymnasium is served by a 15-gallon, 1.5 kW electric water heater located in the gymnasium storage room. The kitchen has two dedicated 80-gallon, 199.99 MBh water heaters with an efficiency rating of 80%. They are located in the multipurpose room. The kitchen domestic hot water pipes are partially insulated. Domestic hot water heaters are in good condition.

Gymnasium (Electric) Storage Tank Water Heaters


Multipurpose Room (Gas) Storage Tank Water Heaters

2.8 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. Some bulk prepared foods are held in a full-size electric holding cabinet. Equipment is standard efficiency and is in good condition.

The dishwasher is a non-ENERGY STAR® high temperature, door type unit equipped with a 12-kW booster heater.

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

Gas Convection Oven

Electric Food Holding Cabinet

2.9 Refrigeration

The kitchen has two stand-up refrigerators and two stand-up freezers with a mix of solid and glass doors. There are two refrigerator chests. All equipment is standard efficiency and in good condition.

The walk-in cooler has an estimated 0.5-ton compressor located on the exterior ground and a one fan evaporator.

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

Stand-Up Solid & Glass Doors Refrigerators

Stand-Up Solid & Glass Doors Refrigerators

2.10 Plug Load and Vending Machines

There are 26 computer workstations throughout the facility. Plug loads include general café and school building equipment.

There are two residential-style refrigerators. There are also typical office loads such as copiers, small printers, televisions, projectors, microwaves, coffee machines, and portable floor fans. The building plug load equipment accounts for approximately 3% of the building's total electric consumption.

Scanner/Copier

Residential-Style Refrigerators

2.11 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.

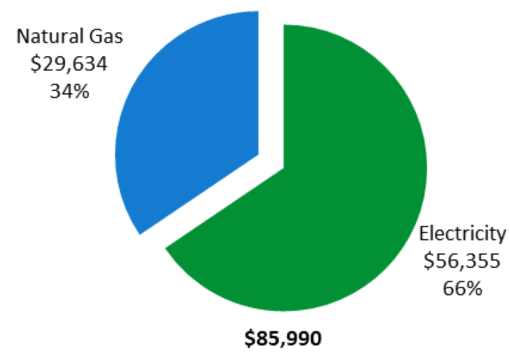
Typical Restroom Sink

Typical Restroom Sink

3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	392,985 kWh	$56,355
Natural Gas	34,161 Therms	$29,634
Total		**$85,990**



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.

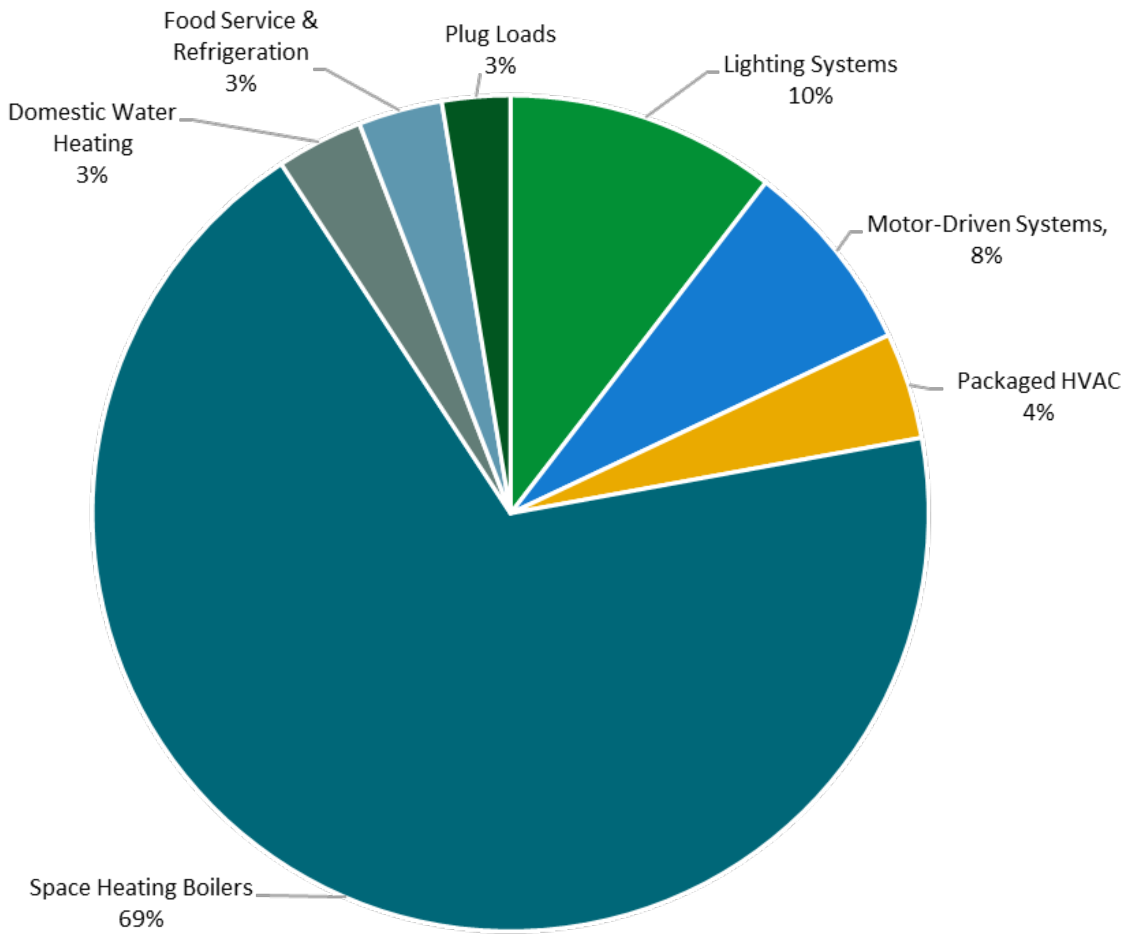
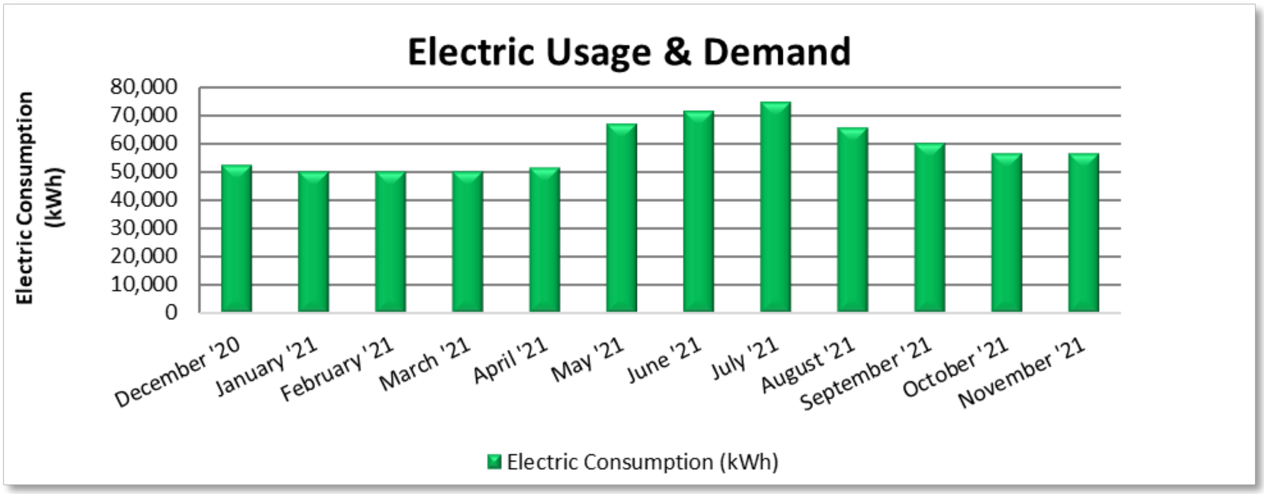


Figure 4 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class General Lighting & Power (GLP), with electric production provided by Constellation Energy, a third-party supplier.



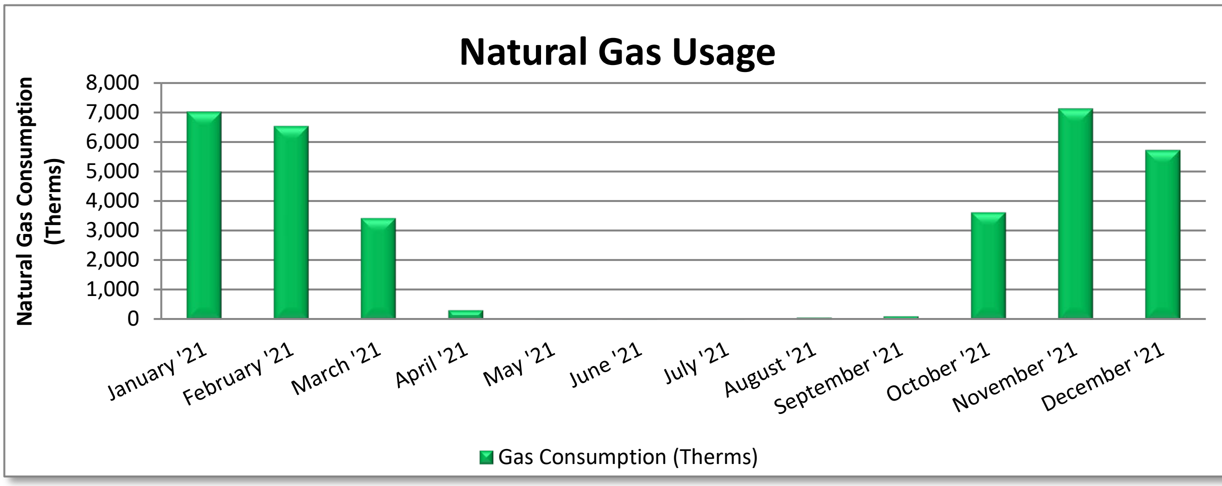
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
2/9/21	29	30,285	0	$418	$4,006
3/11/21	30	28,700	0	$418	$3,782
4/10/21	30	32,334	0	$418	$4,276
5/11/21	31	33,387	238	$836	$4,389
6/10/21	30	37,067	0	$785	$6,007
7/12/21	32	39,567	0	$785	$6,411
8/10/21	29	42,654	0	$785	$6,865
9/9/21	30	34,875	137	$785	$5,591
10/8/21	29	30,346	0	$418	$4,027
11/8/21	31	28,167	0	$418	$3,749
12/9/21	31	29,233	0	$418	$3,800
1/11/22	33	26,370	0	$418	$3,452
Totals	**365**	**392,985**	**238**	**$6,899**	**$56,355**
Annual	**365**	**392,985**	**238**	**$6,899**	**$56,355**

Notes:

- Peak demand of 238 kW as available in the billing data occurred in April 2021.
- Demand data was not readily available for most of the billing periods we analyzed, therefore, we do not have an accurate record of average demand.
- The average electric cost over the past 12 months was $0.143/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 UGI Energy Services, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
2/9/21	29	7,045	$5,274
3/11/21	30	6,554	$5,013
4/10/21	30	3,434	$3,159
5/11/21	31	313	$332
6/10/21	30	39	$174
7/12/21	32	33	$174
8/10/21	29	29	$172
9/9/21	30	72	$66
10/8/21	29	115	$377
11/8/21	31	3,632	$3,341
12/9/21	31	7,149	$6,927
1/11/22	33	5,747	$4,625
Totals	**365**	**34,161**	**$29,634**
Annual	**365**	**34,161**	**$29,634**

Notes:

- The average gas cost for the past 12 months is $0.867/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	56

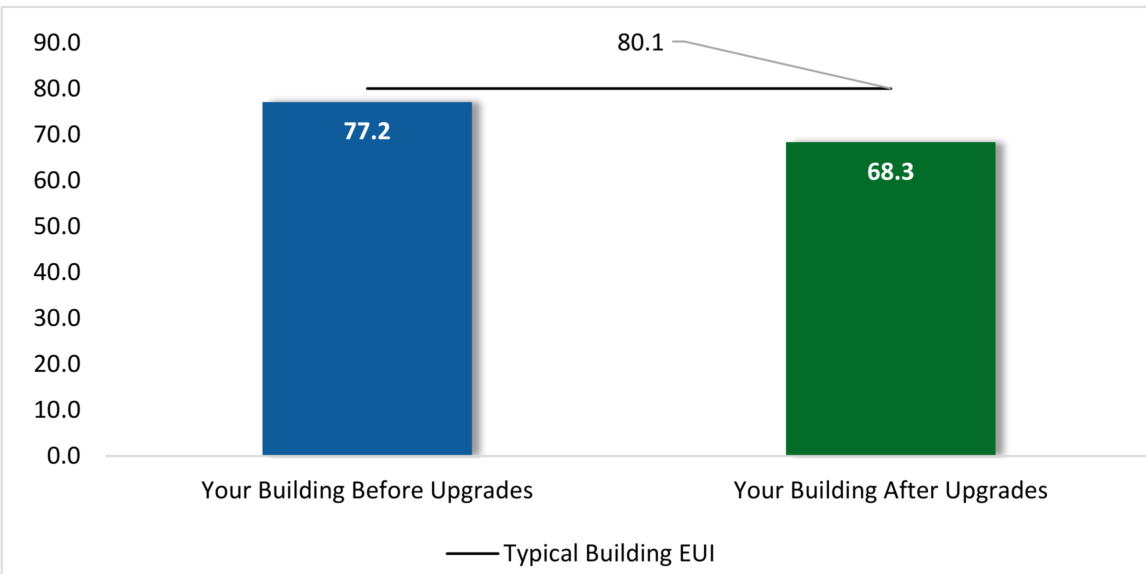


Figure 5 - Energy Use Intensity Comparison[3]

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

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**69,953**	**16.4**	**-16**	**$9,892**	**$41,957**	**$11,270**	**$30,687**	**3.1**	**68,559**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	69,953	16.4	-16	$9,892	$41,957	$11,270	$30,687	3.1	68,559
Lighting Control Measures			**21,873**	**5.1**	**-5**	**$3,093**	**$21,540**	**$4,845**	**$16,695**	**5.4**	**21,437**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	19,440	4.5	-4	$2,749	$16,860	$2,045	$14,815	5.4	19,053
ECM 3	Install High/Low Lighting Controls	Yes	2,433	0.6	-1	$344	$4,680	$2,800	$1,880	5.5	2,384
Variable Frequency Drive (VFD) Measures			**10,191**	**2.6**	**0**	**$1,461**	**$13,310**	**$2,700**	**$10,610**	**7.3**	**10,262**
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	4,290	1.4	0	$615	$4,076	$900	$3,176	5.2	4,320
ECM 5	Install VFDs on Heating Water Pumps	Yes	5,901	1.1	0	$846	$9,234	$1,800	$7,434	8.8	5,942
Unitary HVAC Measures			**4,482**	**3.7**	**0**	**$643**	**$39,272**	**$3,359**	**$35,913**	**55.9**	**4,514**
ECM 6	Install High Efficiency Air Conditioning Units	No	4,482	3.7	0	$643	$39,272	$3,359	$35,913	55.9	4,514
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**191**	**$1,657**	**$159,016**	**$0**	**$159,016**	**95.9**	**22,371**
ECM 7	Install High Efficiency Hot Water Boilers	No	0	0.0	191	$1,657	$159,016	$0	$159,016	95.9	22,371
HVAC System Improvements			**0**	**0.0**	**4**	**$38**	**$58**	**$20**	**$38**	**1.0**	**514**
ECM 8	Install Pipe Insulation	Yes	0	0.0	4	$38	$58	$20	$38	1.0	514
Domestic Water Heating Upgrade			**0**	**0.0**	**5**	**$41**	**$72**	**$36**	**$36**	**0.9**	**556**
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	5	$41	$72	$36	$36	0.9	556
Food Service & Refrigeration Measures			**545**	**0.0**	**0**	**$78**	**$1,977**	**$115**	**$1,862**	**23.8**	**549**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	197	0.0	0	$28	$303	$40	$263	9.3	198
ECM 11	Refrigeration Controls	No	349	0.0	0	$50	$1,674	$75	$1,599	32.0	351
TOTALS			**107,044**	**27.8**	**179**	**$16,904**	**$277,202**	**$22,345**	**$254,857**	**15.1**	**128,760**

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

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**69,953**	**16.4**	**-16**	**$9,892**	**$41,957**	**$11,270**	**$30,687**	**3.1**	**68,559**
ECM 1	Retrofit Fixtures with LED Lamps	69,953	16.4	-16	$9,892	$41,957	$11,270	$30,687	3.1	68,559
Lighting Control Measures		**21,873**	**5.1**	**-5**	**$3,093**	**$21,540**	**$4,845**	**$16,695**	**5.4**	**21,437**
ECM 2	Install Occupancy Sensor Lighting Controls	19,440	4.5	-4	$2,749	$16,860	$2,045	$14,815	5.4	19,053
ECM 3	Install High/Low Lighting Controls	2,433	0.6	-1	$344	$4,680	$2,800	$1,880	5.5	2,384
Variable Frequency Drive (VFD) Measures		**10,191**	**2.6**	**0**	**$1,461**	**$13,310**	**$2,700**	**$10,610**	**7.3**	**10,262**
ECM 4	Install VFDs on Constant Volume (CV) Fans	4,290	1.4	0	$615	$4,076	$900	$3,176	5.2	4,320
ECM 5	Install VFDs on Heating Water Pumps	5,901	1.1	0	$846	$9,234	$1,800	$7,434	8.8	5,942
HVAC System Improvements		**0**	**0.0**	**4**	**$38**	**$58**	**$20**	**$38**	**1.0**	**514**
ECM 8	Install Pipe Insulation	0	0.0	4	$38	$58	$20	$38	1.0	514
Domestic Water Heating Upgrade		**0**	**0.0**	**5**	**$41**	**$72**	**$36**	**$36**	**0.9**	**556**
ECM 9	Install Low-Flow DHW Devices	0	0.0	5	$41	$72	$36	$36	0.9	556
Food Service & Refrigeration Measures		**197**	**0.0**	**0**	**$28**	**$303**	**$40**	**$263**	**9.3**	**198**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	197	0.0	0	$28	$303	$40	$263	9.3	198
TOTALS		**102,213**	**24.1**	**-12**	**$14,554**	**$77,240**	**$18,911**	**$58,329**	**4.0**	**101,525**

* - 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		**69,953**	**16.4**	**-16**	**$9,892**	**$41,957**	**$11,270**	**$30,687**	**3.1**	**68,559**
ECM 1	Retrofit Fixtures with LED Lamps	69,953	16.4	-16	$9,892	$41,957	$11,270	$30,687	3.1	68,559

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources is proposed, we suggest converting all of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Retrofit Fixtures with LED Lamps

Replace fluorescent T5 and T8, CFL and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

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

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes, T5 and CFLs in the multipurpose room, and exterior compact fluorescent lamps.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**21,873**	**5.1**	**-5**	**$3,093**	**$21,540**	**$4,845**	**$16,695**	**5.4**	**21,437**
ECM 2	Install Occupancy Sensor Lighting Controls	19,440	4.5	-4	$2,749	$16,860	$2,045	$14,815	5.4	19,053
ECM 3	Install High/Low Lighting Controls	2,433	0.6	-1	$344	$4,680	$2,800	$1,880	5.5	2,384

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 2: 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, restrooms, multipurpose room, library, restrooms, and storage rooms.

ECM 3: Install High/Low Lighting Controls

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

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

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

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as occupants approach the area.

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

Affected Building Areas: hallways and stairs

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		**10,191**	**2.6**	**0**	**$1,461**	**$13,310**	**$2,700**	**$10,610**	**7.3**	**10,262**
ECM 4	Install VFDs on Constant Volume (CV) Fans	4,290	1.4	0	$615	$4,076	$900	$3,176	5.2	4,320
ECM 5	Install VFDs on Heating Water Pumps	5,901	1.1	0	$846	$9,234	$1,800	$7,434	8.8	5,942

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 4: 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 Air Handlers: AHU-3.

ECM 5: 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 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		**4,482**	**3.7**	**0**	**$643**	**$39,272**	**$3,359**	**$35,913**	**55.9**	**4,514**
ECM 6	Install High Efficiency Air Conditioning Units	4,482	3.7	0	$643	$39,272	$3,359	$35,913	55.9	4,514

Replacing the outdoor condensing 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 outdoor condensing units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 6: Install High Efficiency Air Conditioning Units

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

Affected Units: 6-ton, 7.5-ton, and 20-ton condensing units (associated with AHUs 1-4).

4.5 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**191**	**$1,657**	**$159,016**	**$0**	**$159,016**	**95.9**	**22,371**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	191	$1,657	$159,016	$0	$159,016	95.9	22,371

ECM 7: Install High Efficiency Hot Water Boilers

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

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

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

4.6 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		**0**	**0.0**	**4**	**$38**	**$58**	**$20**	**$38**	**1.0**	**514**
ECM 8	Install Pipe Insulation	0	0.0	4	$38	$58	$20	$38	1.0	514

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 (kitchen water heater system).

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**5**	**$41**	**$72**	**$36**	**$36**	**0.9**	**556**
ECM 9	Install Low-Flow DHW Devices	0	0.0	5	$41	$72	$36	$36	0.9	556

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.

4.8 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**545**	**0.0**	**0**	**$78**	**$1,977**	**$115**	**$1,862**	**23.8**	**549**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	197	0.0	0	$28	$303	$40	$263	9.3	198
ECM 11	Refrigeration Controls	349	0.0	0	$50	$1,674	$75	$1,599	32.0	351

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

We evaluated Installing additional controls to optimize the operation of a walk-in cooler.

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.

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.

4.9 Measures for Future Consideration

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

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

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

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

VRF Systems

Variable refrigerant flow (VRF) systems use direct expansion (DX) heat pumps to transport heat between an outdoor condensing unit and a network of indoor evaporators, located near or within the conditioned space, through refrigerant piping installed in the building. Attributes that distinguish VRF from other DX system types are:

- Multiple indoor units connected to a common outdoor unit
- Scalability
- Variable capacity
- Distributed control
- Simultaneous heating and cooling capability

VRF provides flexibility by allowing for many different indoor units (with different capacities and configurations), individual zone control, the unique ability to offer simultaneous heating and cooling in separate zones on a common refrigerant circuit, and heat recovery from one zone to another. VRF systems are equipped with at least one variable-speed and/or variable-capacity compressor.

To match the building's load profiles, energy is transferred from one indoor space to another through the refrigerant line, and only one energy source is necessary to provide both heating and cooling. VRF systems also operate efficiently at part load because of the compressor's variable capacity control. VRF systems are ideal for applications with varying loads or where zoning is required. Some other advantages of VRF systems include consistent comfort, quiet operation, energy efficiency, installation flexibility, zoned heating and cooling, state-of-the-art controls, and reliability.

VRF systems are more expensive than conventional heat pump systems; however, the higher initial cost can be offset by improved cooling efficiency during part load operation—a SEER (cooling) rating of 18.0 is not uncommon for small packaged VRF-equipped heat pumps.

When you are replacing packaged HVAC equipment, we recommend a comprehensive approach. Work with your contractor or design engineer to make sure your systems are sized and zoned according to current space configurations and occupancy. Select high efficiency equipment and controls that match your heating and cooling needs. Commission the system and controls to ensure proper operation, comfort, ventilation, and energy use.

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

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. Materials used may include caulk, polyurethane foam, and other weather-stripping materials. There is an energy savings opportunity by reducing the uncontrolled air exchange between the outside and inside of the building. Blower door assisted comprehensive building air sealing will reduce the amount of air exchange, which will in turn reduce the load on the buildings heating and cooling equipment, providing energy savings and increased occupant comfort.

Doors and Windows

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

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

Lighting Maintenance

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

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

Lighting Controls

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

Motor Controls

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

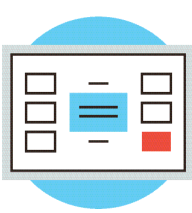
Motor Maintenance

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

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.

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 EMS building equipment list. Use weatherproof or heatproof labeling or stickers for permanence, but do not cover over original equipment nameplates, which should be kept clean and readable whenever possible. Besides equipment, label piping for service and direction of flow when possible. Ideally, maintain a log of HVAC equipment, including nameplate information, asset tag designation, areas served, installation year, service dates, and other pertinent information.

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

Optimize HVAC Equipment Schedules

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

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

Water Heater Maintenance

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

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

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

Refrigeration Equipment Maintenance

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

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

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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense™ website[5] or download a copy of EPA's "WaterSense™ at Work: Best Management Practices for Commercial and Institutional Facilities"[6] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

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

[6] https://www.epa.gov/watersense/watersense-work-0.

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions, and reduced customer electricity purchases, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

6.1 Solar Photovoltaic

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

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

This facility does not appear to meet the minimum criteria for a cost-effective solar PV installation. To be cost-effective, a solar PV array needs certain minimum criteria, such as sufficient and sustained electric demand and sufficient flat or south-facing rooftop or other unshaded space on which to place the PV panels.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

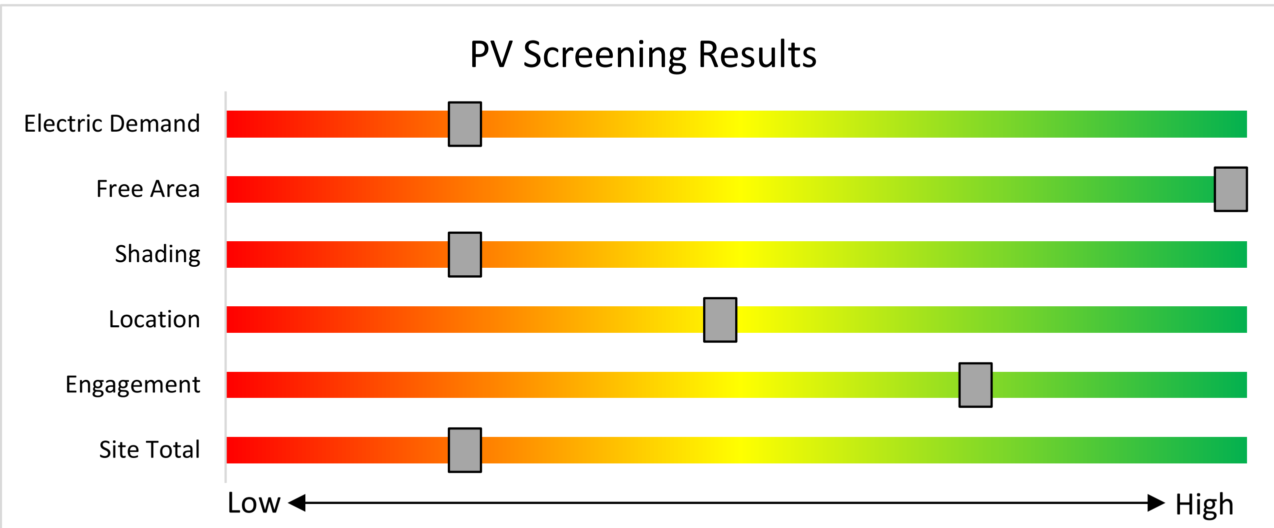

Figure 8 - Photovoltaic Screening

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 lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

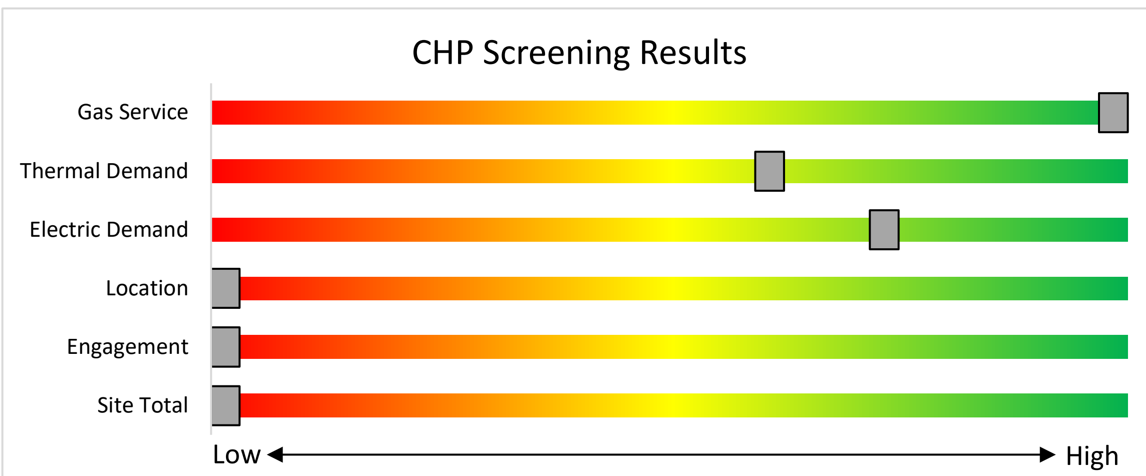

Figure 9 - Combined Heat and Power Screening

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

7 Project Funding and Incentives

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

7.1 Utility Energy Efficiency Programs

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

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

https://www.njcleanenergy.com/transition

8 New Jersey's Clean Energy Programs

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

8.1 Large Energy Users

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

Incentives

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

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

How to Participate

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

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

8.2 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

8.3 Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

The ADI Program online portal is now open to new registrations effective August 28, 2021.

Competitive Solar Incentive Program

The Competitive Solar Incentive (CSI) Program will provide competitively set incentives for grid supply projects and net metered non-residential projects greater than 5MW. The program is currently under development with the goal of holding the first solicitation by early-to-mid 2022. For updates, please continue to check the Solar Proceedings page on the New Jersey's Clean Energy Program website.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan. If you are considering installing solar photovoltaics on your building, visit the following link for more information: https://njcleanenergy.com/renewable-energy/programs/susi-program.

8.4 Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program 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.

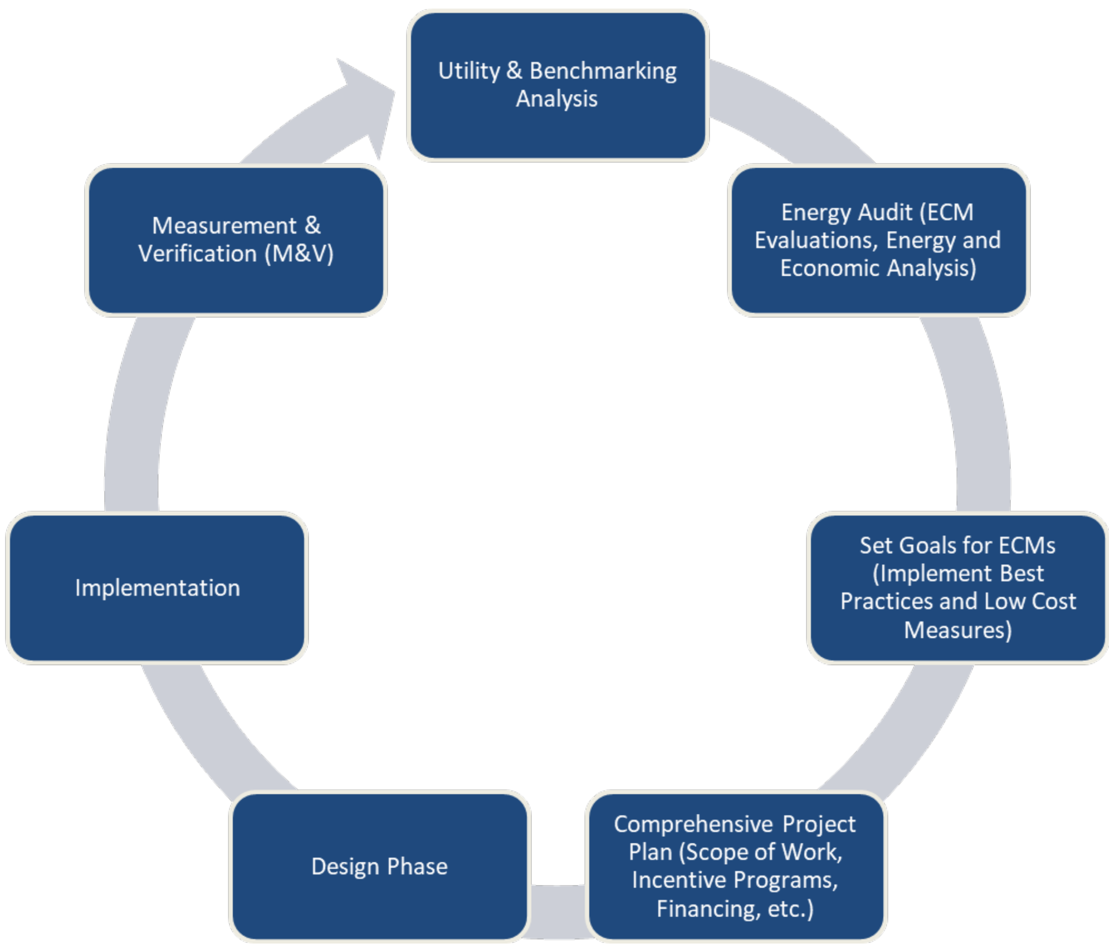

Figure 10 – Project Development Cycle

10 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

10.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[7].

10.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market based and fluctuate monthly. The utility provides basic gas supply service to customers who choose not to buy from a third-party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier typically depends on whether a customer prefers budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third-party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website[8].

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

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

TRC

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
1914 Section - 2nd Floor Hallway	3	Exit Signs: LED - 2 W Lamp	None	S	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
1915 Section - 2nd Floor Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 3	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,518	0.3	1,386	0	$196	$1,223	$675	2.8
1914 Section - Main Floor Hallway	3	Exit Signs: LED - 2 W Lamp	None	S	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
1914 Section - Main Floor Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 3	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,518	0.3	1,386	0	$196	$1,223	$675	2.8
1924 Section - 2nd Floor Hallway	3	Exit Signs: LED - 2 W Lamp	None	S	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
1924 Section - 2nd Floor Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,518	0.3	1,293	0	$183	$1,186	$630	3.0
1924 Section - 2nd Floor Hallway	3	Exit Signs: LED - 2 W Lamp	None	S	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
1924 Section - 2nd Floor Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,518	0.3	1,293	0	$183	$1,186	$630	3.0
Art Room storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$189	$20	6.5
B1 Art Room	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.6	2,604	-1	$368	$1,708	$390	3.6
B2 Group Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.2	977	0	$138	$708	$155	4.0
B3 Counselor Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.2	977	0	$138	$708	$155	4.0
B4 Book Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	73	0	$10	$37	$10	2.6
B5 ESL	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.1	488	0	$69	$489	$95	5.7
B6	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.1	651	0	$92	$562	$115	4.9
Basement Hallway	3	Exit Signs: LED - 2 W Lamp	None	S	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
Basement Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 3	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,518	0.3	1,386	0	$196	$1,088	$220	4.4
Bathroom Classroom 102	1	LED Lamps: (1) 13W A20 Screw-In Lamp	None	S	13	2,200		None	No	1	LED Lamps: (1) 13W A20 Screw-In Lamp	None	13	2,200	0.0	0	0	$0	$0	$0	0.0
Bathroom Classroom 102	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,200	0.0	123	0	$17	$73	$20	3.0
Bathroom Classroom 104	1	LED Lamps: (1) 13W A20 Screw-In Lamp	None	S	13	2,200		None	No	1	LED Lamps: (1) 13W A20 Screw-In Lamp	None	13	2,200	0.0	0	0	$0	$0	$0	0.0
Boiler Room	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.2	924	0	$131	$635	$135	3.8
Classroom 100	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 103	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 104	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,790	0	$253	$1,073	$255	3.2
Classroom 105	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.7	2,930	-1	$414	$1,855	$430	3.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 106	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 107	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 108	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 109	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 110	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 111	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 200	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 201	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 2010 Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$189	$40	5.7
Classroom 202	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 203	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 204	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 205	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 206	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 207	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 208	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 209	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 210	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 211	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 211 Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$189	$40	5.7
Classroom 212	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom 213	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom B11	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.3	1,465	0	$207	$927	$215	3.4
Classroom B12	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom B7	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom B8	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Classroom B9 Teachers Lounge	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.4	1,953	0	$276	$1,146	$275	3.2
Closet - 3rd Floor	2	LED Lamps: (1) 10W A20 Screw-In Lamp	Occupancy Sensor	S	10	440		None	No	2	LED Lamps: (1) 10W A20 Screw-In Lamp	Occupancy Sensor	10	440	0.0	0	0	$0	$0	$0	0.0
Counselor office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$189	$40	5.7
Elevator bank	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	73	0	$10	$37	$10	2.6
Elevator machine room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	15	0	$2	$37	$10	12.9
Elevator ramp	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Elevator ramp	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$189	$40	5.7
Elevator bank (1)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	73	0	$10	$37	$10	2.6
Exterior Recessed	1	Compact Fluorescent: (1) 32W A20 Screw-In Lamp	Wall Switch	S	32	2,200	1	Relamp	No	1	LED Lamps: LED Lamp	Wall Switch	23	2,200	0.0	20	0	$3	$35	$1	12.0
Exterior Pole	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	S	75	4,380		None	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	75	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed	4	LED Lamps: (1) 21W A20 Screw-In Lamp	Photocell	S	21	4,380		None	No	4	LED Lamps: (1) 21W A20 Screw-In Lamp	Photocell	21	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	S	65	4,380		None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	65	4,380	0.0	0	0	$0	$0	$0	0.0
Girls bathroom - 2nd Floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1, 2	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	416	0	$59	$434	$80	6.0
Girls bathroom - Basement	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1, 2	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.2	831	0	$118	$599	$125	4.0
Gym storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	277	0	$39	$380	$30	8.9
Kitchen - 1st Floor	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Kitchen - 1st Floor	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.3	1,109	0	$157	$708	$155	3.5
Library B10	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	27	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	1.0	4,394	-1	$621	$2,512	$610	3.1
Library hallway	3	Exit Signs: LED - 2 W Lamp	None	S	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
Library hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,518	0.3	1,293	0	$183	$1,051	$210	4.6
Library storage	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.1	92	0	$13	$453	$85	28.1
Main Entrance	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Entrance	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	2,200	2	None	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.0	59	0	$8	$116	$20	11.4
Main office	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,200	2	None	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.1	237	0	$34	$270	$35	7.0

	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
Main office closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$40	28.5
Multipurpose Room - 1st Floor	8	Compact Fluorescent: (1) 32W A20 Screw-In Lamp	Wall Switch	S	32	2,200	1, 2	Relamp	Yes	8	LED Lamps: LED Lamp	Occupancy Sensor	23	1,518	0.1	284	0	$40	$408	$43	9.1
Multipurpose Room - 1st Floor	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Multipurpose Room - 1st Floor	20	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	S	120	2,200	1, 2	Relamp	Yes	20	LED - Linear Tubes: (4) 4' T5 (14.5W) Lamps	Occupancy Sensor	60	1,518	0.8	3,458	-1	$489	$2,652	$470	4.5
Multipurpose Room - 1st Floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	277	0	$39	$380	$65	8.0
Multipurpose Room - Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$343	$55	11.0
Multipurpose Room - Entrance	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Multipurpose Room - Entrance	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	277	0	$39	$380	$65	8.0
Multipurpose Room - Girls Restroom (1)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.0	185	0	$26	$343	$55	11.0
Nurse office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 2	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,518	0.1	651	0	$92	$562	$115	4.9
Nurse Office bathroom	1	Incandescent: (1) 60W A20 Screw-In Lamp	Wall Switch	S	60	2,200	1	Relamp	No	1	LED Lamps: LED Lamp	Wall Switch	9	2,200	0.0	112	0	$16	$17	$1	1.0
Principal Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1, 2	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.2	831	0	$118	$599	$125	4.0
Restroom - Male basement	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1, 2	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.2	831	0	$118	$599	$125	4.0
Restroom - Male main floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1, 2	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	416	0	$59	$434	$80	6.0
Restroom - Unisex faculty	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,200	0.0	109	0	$15	$55	$15	2.6
Restroom - Unisex faculty Basement	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,200	0.0	109	0	$15	$55	$15	2.6
Stairs - 1st Floor	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs - 1st Floor	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 3	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,518	0.2	814	0	$115	$590	$275	2.7
Stairs - 2nd Floor	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs - 2nd Floor	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 3	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,518	0.2	814	0	$115	$590	$275	2.7
Stairs - 3rd Floor	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs - 3rd Floor	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 3	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,518	0.2	814	0	$115	$590	$275	2.7
Stairs - 4th Floor	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs - 4th Floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,518	0.1	488	0	$69	$444	$165	4.0
Stairs 7	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,200	1	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,200	0.1	246	0	$35	$146	$40	3.0

	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
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	15	0	$2	$37	$10	12.9
Storage Room - 108	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Storage Room - 109	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Storage Room - 110	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Storage Room - 111	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Storage Room - B12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Storage bathroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.0	37	0	$5	$189	$20	32.3
Teachers storage room	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Teachers storage room	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	1, 2	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.3	277	0	$39	$664	$150	13.1

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
Teachers storage room	Pneumtaic Controls	1	Air Compressor	2.0	88.5%	No	Baldor	EM3157T	W	1,320		No	88.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Exhaust Fan	1	Exhaust Fan	0.3	70.5%	No	A.O. Smith		W	2,745		No	70.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Pump	1	Heating Hot Water Pump	5.0	84.0%	No	Baldor	M5309T	W	1,680	5	No	89.5%	Yes	1	0.6	3,107	0	$446	$4,617	$900	8.3
Boiler Room	Hot Water Pump	1	Heating Hot Water Pump	5.0	87.5%	No	Baldor	M3309T	W	1,680	5	No	89.5%	Yes	1	0.5	2,794	0	$401	$4,617	$900	9.3
Boiler Room	Domestic Hot Water Circulation Pump	1	DHW Circulation Pump	0.2	65.0%	No	N/A		W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Pump (P4)	1	Heating Hot Water Pump	0.5	73.4%	No	N/A	CNV	W	2,745		No	73.4%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Hydraulic Elevator	1	Other	30.0	80.0%	No			W	770		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Heating Hot Water Recirculation Pumps	3	Heating Hot Water Pump	0.5	73.4%	No	N/A	N/A	W	1,680		No	73.4%	No		0.0	0	0	$0	$0	$0	0.0
Storage	Basement Spaces - AHU-4	1	Supply Fan	1.5	86.5%	No	N/A	N/A	B	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Inside	Computer Lab - AHU-5	1	Supply Fan	1.0	85.5%	No	N/A	N/A	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Inside	Main Office - AHU-6	1	Supply Fan	0.8	85.5%	No	N/A	N/A	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Inside	Multistorage Room - AHU-1 & AHU-2	2	Supply Fan	1.5	86.5%	No	N/A	N/A	B	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Inside	Multipurpose Room - AHU-3	1	Supply Fan	5.0	89.5%	No	N/A	N/A	B	2,745	4	No	89.5%	Yes	1	1.4	4,290	0	$615	$4,076	$900	5.2
Various Areas	Hydronic Unit Heaters	5	Other	0.1	66.6%	No	N/A	N/A	W	500		No	66.6%	No		0.0	0	0	$0	$0	$0	0.0
Various Areas	Various Areas - Unit Ventilarors	66	Fan Coil Unit	0.3	70.5%	No	N/A	N/A	W	2,745		No	70.5%	No		0.0	0	0	$0	$0	$0	0.0
Various Areas	Various Areas - Exhaust Fans	4	Exhaust Fan	0.3	70.5%	No	N/A	N/A	W	2,745		No	70.5%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classrooms	Various Classrooms	17	Window AC	0.70		10.00						No							0.0	0	0	$0	$0	$0	0.0
Exterior	AHU-3 - Multipurpose Room	1	Split-System	20.00		11.00		Trane	TTA240B300FA	B	6	Yes	1	Split-System	20.00		12.50		1.3	1,571	0	$225	$21,107	$1,700	86.1
Exterior	Main Office	1	Ductless Mini-Split AC	1.60		20.00		Mitsubishi	MXZ-2C20NA2	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	Portable AC Units - Various Classrooms	11	Window AC	1.00		10.20		Electrolux	FFPA1422U1	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 200	Portable AC Unit - Classroom 200	1	Window AC	1.00		10.20				W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 201	Portable AC Unit - Classroom 201	1	Window AC	1.00		10.20		Dayton	39EY96B	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 208	Portable AC Unit - Classroom 208	1	Window AC	1.00		10.20		Frigidaire		W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	AHU-4 - Basement Rooms	1	Split-System	6.00		10.00		Trane	TTA072C300A0	B	6	Yes	1	Split-System	6.00		14.00		1.0	1,234	0	$177	$6,391	$474	33.4
Exterior	AHU-5 - Computer Lab	1	Split-System	5.00		14.00		York	YCJF60S41S2A	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Teacher's Lounge	1	Ductless Mini-Split HP	2.00	25.00	19.50	7.7 HSPF	Fujitsu	AOU24RLXFW	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	AHU-6 - Main Office	1	Split-System	3.50		14.00		York	YCJF42S41S1A	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	AHU-1 & AHU-2 - Multipurpose Room	2	Split-System	7.50		11.50		Lennox	HS29-090-3Y	B	6	Yes	2	Split-System	7.50		14.00		1.4	1,677	0	$240	$11,774	$1,185	44.0
Exterior	Classroom 212	1	Ductless Mini-Split AC	2.00	25.00	19.50	7.7 HSPF	Fujitsu	AOU24RLXFW	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	Entire Building	2	Non-Condensing Hot Water Boiler	4,640	Weil McLain	Series 88	W	7	Yes	2	Non-Condensing Hot Water Boiler	4,640	85.00%	Ec	0.0	0	191	$1,657	$159,016	$0	95.9

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Multipurpose Room	Kitchen - Doemstic Hot Water	8	10	1.00	0.0	0	4	$38	$58	$20	1.0

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions: System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	Proposed Conditions: ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Domestic Hot Water System	1	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	Hydrojet RG240S6N	W		No						0.0	0	0	$0	$0	$0	0.0
Gym Storage Room	Gym	1	Storage Tank Water Heater (≤ 50 Gal)	A.O. Smith		W		No						0.0	0	0	$0	$0	$0	0.0
Multipurpose Room	Kitchen	2	Storage Tank Water Heater (> 50 Gal)	Bradford White	D80T1993N	W		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Electric Booster Hot Water Heater	1	Booster Water Heater			W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

Location	Recommendation Inputs: ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	9	10	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	5	$41	$72	$36	0.9

Walk-In Cooler/Freezer Inventory & Recommendations

Location	Existing Conditions: Cooler/ Freezer Quantity	Case Type/Temperature	Manufacturer	Model	Proposed Conditions: ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior	1	Cooler (35F to 55F)	Carroll Coolers Inc.	PLP600-A	10, 11	Yes	No	Yes	0.0	545	0	$78	$1,977	$115	23.8

Commercial Refrigerator/Freezer Inventory & Recommendations

Location	Existing Conditions: Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	Proposed Conditions: ECM #	Install ENERGY STAR Equipment?	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Unknown	Unknown	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Refrigerator Chest	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Refrigerator Chest	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Turbo Air	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Freezer, Solid Door (>50 cu. ft.)	Turbo Air	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

Location	Existing Conditions: Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	Proposed Conditions: ECM #	Install High Efficiency Equipment?	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Convection Oven (Full Size)	Dual Flow	Blodgett	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	CresCor	CNV	No		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

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

Plug Load Inventory

Location	Existing Conditions: Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Various Areas	26	Desktop	270	No		
Various Areas	27	Fan (Portable)	100	No		
Various Areas	39	Projector	320	No		
Various Areas	17	Television	320	No		
Various Areas	6	Microwave	1,000	No		
Various Areas	9	Printer (Medium/Small)	240	No		
Various Areas	3	Printer/Copier (Large)	600	No		
Various Areas	3	Refrigerator (Mini)	126	No		
Various Areas	13	Coffee Machine	600	No		
Various Areas	2	Refrigerator (Residential)	572	No		
Various Areas	1	Clothes Washer	1,200	No		
Kitchen	1	Dishwasher (Undercounter)	1,000	No		
Kitchen	1	Other (Pop corn machine)	1,500	No		
Nurse Office	1	Toaster	1,000	No		
B1 Art Room	1	Kiln	11,000	No		
Outside	1	Garaventa Lift	1,650	No		
Kitchen	1	Electric Table - Food Warmer	500	No		

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom B9 Teachers lounge	1	Refrigerated	N/A	No	0.0	0	0	$0	$0	$0	0.0

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Roebling Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 61,648
Built: 1914

For Year Ending: December 31, 2021
Date Generated: June 15, 2022

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
Roebling Elementary School 1330 Hornberger Avenue Roebling, New Jersey 08554	Florence Township Board of Education 201 Cedar Street Florence, NJ 08518 (609) 499-4600	Luis Valenci 201 Cedar Street Florence, NJ 08518 (609) 499-4600 Ext. 1007 lvalencia@florence.k12.nj.us

Property ID: 20596702

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
74.9 kBtu/ft²

Source EUI
111.6 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	3,460,628 (75%)
Electric - Grid (kBtu)	1,158,790 (25%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	80.1
National Median Source EUI (kBtu/ft²)	119.3
% Diff from National Median Source EUI	-6%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	291

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

____ _________
,
(____)____-______
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Professional Engineer or Registered Architect Stamp
(if applicable)

APPENDIX C: GLOSSARY

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

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

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