
# Local Government Energy Audit Report

Lincoln Roosevelt Elementary School

August 28, 2023

| *Prepared for:* | *Prepared by:* |
|---|---|
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# Disclaimer

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

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

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

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

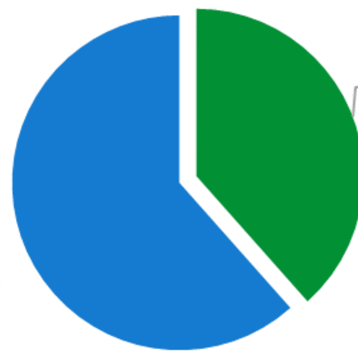
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

# Table of Contents

# 1 Executive Summary

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

**BUILDING PERFORMANCE REPORT**

| | | |
|---|---|---|
| Annual Utilities | Costs: $109,149<br>Electricity: 365,600 kWh<br>Natural Gas: 49,557 Therms |  |
| ENERGY STAR® Benchmarking Score | 58<br>*(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. |

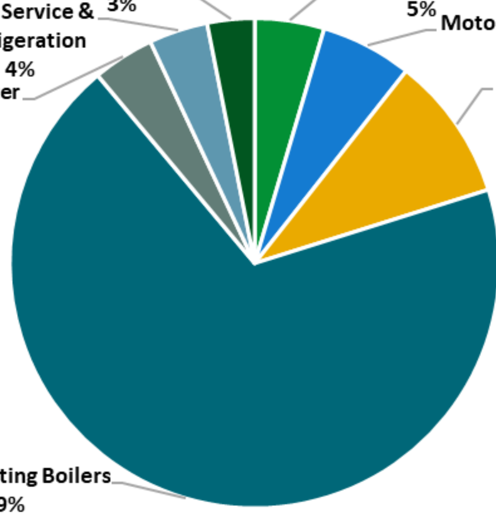


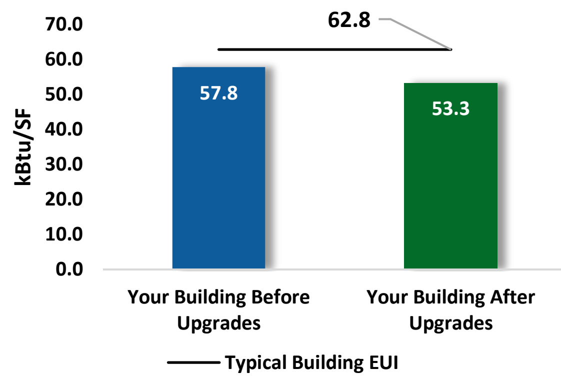

*Figure 1 - Energy Use by System*

## 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.

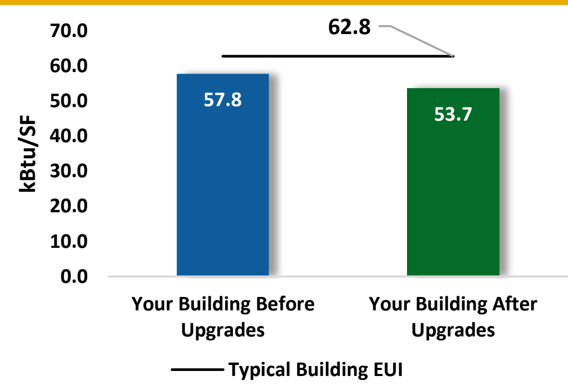
### Scenario 1: Full Package (All Evaluated Measures)

| | |
|---|---|
| Installation Cost | $182,811 |
| Potential Rebates & Incentives[1] | $13,646 |
| Annual Cost Savings | $10,329 |
| Annual Energy Savings | Electricity: 54,680 kWh<br>Natural Gas: 2,990 Therms |
| Greenhouse Gas Emission Savings | 45 Tons |
| Simple Payback | 16.4 Years |
| Site Energy Savings (All Utilities) | 8% |




### Scenario 2: Cost Effective Package[2]

| | |
|---|---|
| Installation Cost | $73,317 |
| Potential Rebates & Incentives | $9,048 |
| Annual Cost Savings | $9,212 |
| Annual Energy Savings | Electricity: 47,947 kWh<br>Natural Gas: 2,737 Therms |
| Greenhouse Gas Emission Savings | 40 Tons |
| Simple Payback | 7.0 Years |
| Site Energy Savings (all utilities) | 7% |




### On-site Generation Potential

| | |
|---|---|
| Photovoltaic | High |
| Combined Heat and Power | None |

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2$e Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **1,534** | **0.3** | **0** | **$172** | **$2,332** | **$288** | **$2,044** | **11.9** | **1,507** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 112 | 0.0 | 0 | $13 | $69 | $10 | $59 | 4.7 | 110 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 1,422 | 0.3 | 0 | $159 | $2,263 | $278 | $1,985 | 12.5 | 1,397 |
| **Lighting Control Measures** | | | **17,760** | **4.7** | **-4** | **$1,988** | **$15,836** | **$6,650** | **$9,186** | **4.6** | **17,449** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 17,760 | 4.7 | -4 | $1,988 | $15,836 | $6,650 | $9,186 | 4.6 | 17,449 |
| **Variable Frequency Drive (VFD) Measures** | | | **21,437** | **7.1** | **0** | **$2,460** | **$35,117** | **$1,975** | **$33,142** | **13.5** | **21,587** |
| ECM 4 | Install VFDs on Constant Volume (CV) Fans | Yes | 21,437 | 7.1 | 0 | $2,460 | $35,117 | $1,975 | $33,142 | 13.5 | 21,587 |
| **Unitary HVAC Measures** | | | **6,431** | **9.9** | **9** | **$856** | **$104,057** | **$4,598** | **$99,459** | **116.2** | **7,495** |
| ECM 5 | Install High Efficiency Air Conditioning Units | No | 6,431 | 9.9 | 9 | $856 | $104,057 | $4,598 | $99,459 | 116.2 | 7,495 |
| **HVAC System Improvements** | | | **303** | **0.0** | **19** | **$289** | **$5,485** | **$8** | **$5,477** | **18.9** | **2,504** |
| ECM 6 | Implement Demand Control Ventilation (DCV) | No | 303 | 0.0 | 17 | $260 | $5,438 | $0 | $5,438 | 20.9 | 2,253 |
| ECM 7 | Install Pipe Insulation | Yes | 0 | 0.0 | 2 | $29 | $48 | $8 | $40 | 1.4 | 251 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **40** | **$537** | **$258** | **$127** | **$131** | **0.2** | **4,640** |
| ECM 8 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 40 | $537 | $258 | $127 | $131 | 0.2 | 4,640 |
| **Custom Measures** | | | **7,216** | **0.0** | **236** | **$4,027** | **$19,726** | **$0** | **$19,726** | **4.9** | **34,894** |
| ECM 9 | Retro-Commissioning Study | Yes | 7,216 | 0.0 | 236 | $4,027 | $19,726 | $0 | $19,726 | 4.9 | 34,894 |
| **TOTALS (COST EFFECTIVE MEASURES)** | | | **47,947** | **12.1** | **274** | **$9,212** | **$73,317** | **$9,048** | **$64,268** | **7.0** | **80,328** |
| **TOTALS (ALL MEASURES)** | | | **54,680** | **21.9** | **299** | **$10,329** | **$182,811** | **$13,646** | **$169,165** | **16.4** | **90,075** |

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

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

*Figure 2 – Evaluated Energy Improvements*

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

## 1.1 Planning Your Project

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

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

### Pick Your Installation Approach

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

### Options from Your Utility Company

*Prescriptive and Custom Rebates*

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

*Direct Install*

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

*Engineered Solutions*

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

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

## Options from New Jersey’s Clean Energy Program

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

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

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

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

*Successor Solar Incentive Program (SuSI)*

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

*Ongoing Electric Savings with Demand Response*

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

*Large Energy User Program (LEUP)*

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

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

# 2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Lincoln Roosevelt Elementary School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

## 2.1 Site Overview

On March 8, 2023, TRC performed an energy audit at Lincoln Roosevelt Elementary School located in Succasunna, New Jersey. TRC met with Chris Banes to review the facility operations and help focus our investigation on specific energy-using systems.

Lincoln Roosevelt Elementary School is a public-school that caters to fifth and sixth-grade students. The facility is comprised of a school building with two sides: Lincoln and Roosevelt. The school includes typical educational, administrative, assembly, and recreation spaces. The school is a two-story, 107,350 square foot building built in 1918 and expanded in 1938 to accommodate additional spaces. Spaces include classrooms, gymnasium, restrooms, storage rooms, closets, auditorium, media center, offices, cafeteria, corridors, lobbies, stairwells, basement, and mechanical spaces.

Most of the facility's lighting systems consist of LED linear tubes, while additional lighting includes LED lamps, LED fixtures, compact fluorescent lamps (CFL), halogen lamps, linear fluorescent T8 tubes, and linear fluorescent T12 tubes. The elementary school is heated by five condensing boilers and cooled by split-systems, roof top units (RTUs), and window AC units.

**Recent Improvements and Facility Concerns**

The facility has replaced most of its existing T8 fluorescent tubes and fixtures with LED technology.

Facility concerns include aging HVAC systems and the absence of HVAC systems in certain areas of the building.

## 2.2 Building Occupancy

The elementary school operates on a 10-months schedule. During a typical weekday, the elementary school are occupied by approximately 507 students and 84 staff. There are some after school programs. The elementary school is shut down around 11:00 PM after the cleaning process.

It should be noted that the energy and economic analysis for the facilities 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 |
|---|---|---|
| Lincoln Roosevelt Elementary School - General Operating Hours | Weekday | 5:00 AM - 11:00 PM |
| | Weekend | Closed |
| Lincoln Roosevelt Elementary School - Classes Hours | Weekday | 8:20 AM - 3:00 PM |
| | After School Program | 3:30 PM - 9:00 PM |

*Figure 3 - Building Occupancy Schedule*

## 2.3 Building Envelope

Building walls are concrete masonry units (CMU) block over structural steel with a brick façade, with gypsum drywall painted CMU interior finish. The level of exterior wall insulation is unknown. The building has both flat and pitched roof sections supported by steel trusses. The Roosevelt building has a pitched roof that is covered with asphalt shingles and in good condition. The Lincoln building roof is flat with gravel finish and in good condition.

Most of the windows are double pane and have aluminum frames with a thermal break. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors are mostly FRP (fiberglass-reinforced polymers) rated doors and are in good condition. Most of the exterior doors are brand new, only a handful need to be replaced. Degraded window and door seals increase drafts and outside air infiltration.


*Lincoln Roosevelt Building Walls*

*Flat Roof Section*

*Pitched Roof Section*

*Double Pane Windows*


*Exterior Doors*

## 2.4 Lighting Systems

The primary interior lighting system uses LED linear tubes and fixtures. Additionally, there are some compact fluorescent lamps (CFL), linear T8 fluorescent tubes, linear T12 fluorescent tubes, halogen lamps, and LED lamps. Fixture types include 1-lamp, 2-lamp, 3-lamp, or 4 lamp, 2-foot or 4-foot-long troffer, recessed, and surface mounted fixtures. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Spaces including the gymnasium, woodshop, kitchen, and some classrooms are lit with LED fixtures while spaces such as the cafeteria, corridors, stairs, most classrooms, media center, restrooms, and offices are illuminated with LED linear tubes. Building spaces including atrium hallway, first and second floor hallway, and Lincoln lower-level hallway are also lit by CFLs. There are halogen lamps in the Lincoln auditorium, linear fluorescent T12 lamps in the kitchen storage, and LED candelabra lamps in the first-floor hallway. The remaining spaces are lit by few linear fluorescent T8 lamps. All exit signs are LED.

Most fixtures are in good condition. Interior lighting levels were generally sufficient. Most lighting fixtures in the classrooms, kitchen, restrooms, hallways, stairs, and basement are controlled by wall switches, while occupancy sensors control some classrooms and offices.

Exterior fixtures consist of pole mounted fixtures with LED lamps, LED wall packs, and a handful of LED PAR screw-ins. They are controlled by timeclock.



*LED Linear Tubes and LED Fixtures*

*LED Fixture*

*2-Foot-long LED Lamps*

*Ceiling Mounted LED Fixture*

*LED Candelabras*

*CFL-PL Lamp*


*LED Exit Sign*


*Wall Switches*

*Occupancy Sensor*

*LED Wall Pack*

*Pole Fixture with LED Lamp*

*LED PAR Lamps*

## 2.5 Air Handling Systems

### Unit Ventilators

Unit ventilators (UVs) and cabinet heaters are equipped with supply fan motors and fan coil valves connected to the hot water distribution system. They provide heating and ventilation to classrooms and other spaces. The units are original to the building and have been updated to good operating conditions. During the site visit, a total of six new UVs in Lincoln auditorium were being installed, all of which will be equipped with direct expansion DX coils served by outdoor condensing units. The units are controlled by the building automation system (BAS).


*Typical Classroom Unit Ventilator*

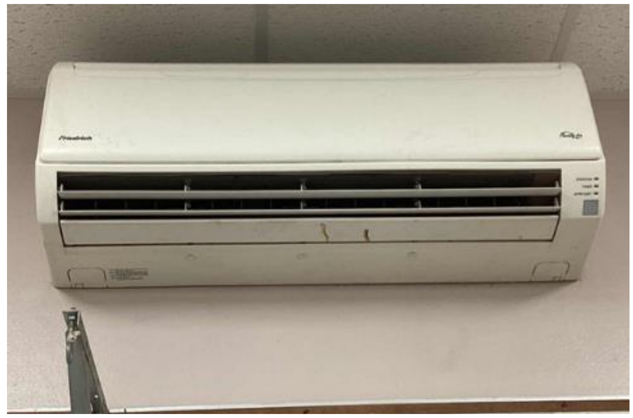

*BAS Screenshot - Unit Ventilator*

### Unitary Electric HVAC Equipment

Spaces including the media center, main office, nurse's office, principal's office, vice principal's office, and rooms 102 and 202, are cooled by eight split ACs that vary in size between 1 ton and 10 tons. They appear to be in fair condition and have been evaluated for replacement. The units are controlled by programmable thermostats.

Additionally, six window ACs provide cooling to some classrooms and offices. Two of the window ACs appear in poor condition and have been evaluated for replacement.


Outdoor Condensing Unit



Evaporator


Outdoor Condensing Unit


Label


Window AC


Label

## Unitary Heating Equipment

The Roosevelt second floor closet and small vestibule are conditioned by an electric forced air furnace. The furnace has a heating output capacity of 19.11 MBh. The system is controlled by local thermostat and is in fair condition.

The basement is heated by suspended hydronic unit heaters. The system is controlled by local thermostats and are in good condition.


*Electric Forced Air Furnace*

*Electric Resistance Heat*

*Suspended Hydronic Unit Heater*

## Packaged Units

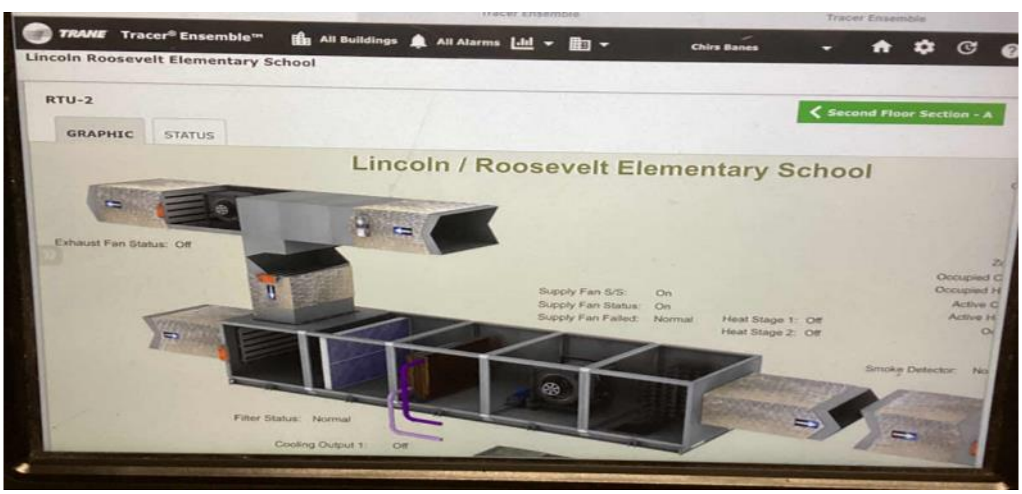
Heating and cooling for larger occupied spaces including Lincoln cafeteria, atrium, and a few classrooms are conditioned by three packaged rooftop units (RTUs) with economizers connected to ducted distribution systems. They provide cooling through direct expansion (DX) coils, and all are equipped with gas-fired sections for heating. These units vary in cooling capacity between 6 tons and 10 tons with heating capacities between 96 MBh to 202 MBh. All the units are constant volume systems equipped with supply fans.

They appear in fair condition.  They have been evaluated for replacement. The RTUs are controlled by the BAS. Please refer to the table below the photos and diagrams for system details.

| Location | Unit ID | Areas Served | Cooling capacity (Tons) | Heating Capacity (MBh) | Supply Fan (hp) | Return Fan (hp) | Condition |
|---|---|---|---|---|---|---|---|
| Exterior Ground | Packaged Unit | Lincoln Cafeteria | 6.25 | 96.00 | 1.00 | None | Poor |
| Roof | RTU-1 | Classrooms | 10.00 | 202.00 | 2.00 | None | Poor |
| Roof | RTU-2 | Atrium | 6.00 | 121.00 | 5.00 | 2.00 | Poor |

*RTU*

*Exterior Ground Packaged Unit*




*BAS Screenshot – RTU*

**Air Handling Units (AHUs)**

The Roosevelt gym is conditioned by two air handling units (AHUs) located in the ceiling. The units are equipped with supply fan motors and hot water heating coils. These units were difficult to access, and the fan capacities have been estimated. The AHU are all constant volume units and appear to be original to the building. They are in fair condition and controlled by the BAS.

Air distribution is provided to supply air registers ducts mounted on the ceiling. The heating air distribution setpoints are 68°F when occupied and 55°F when unoccupied.


*AHU – Gym*

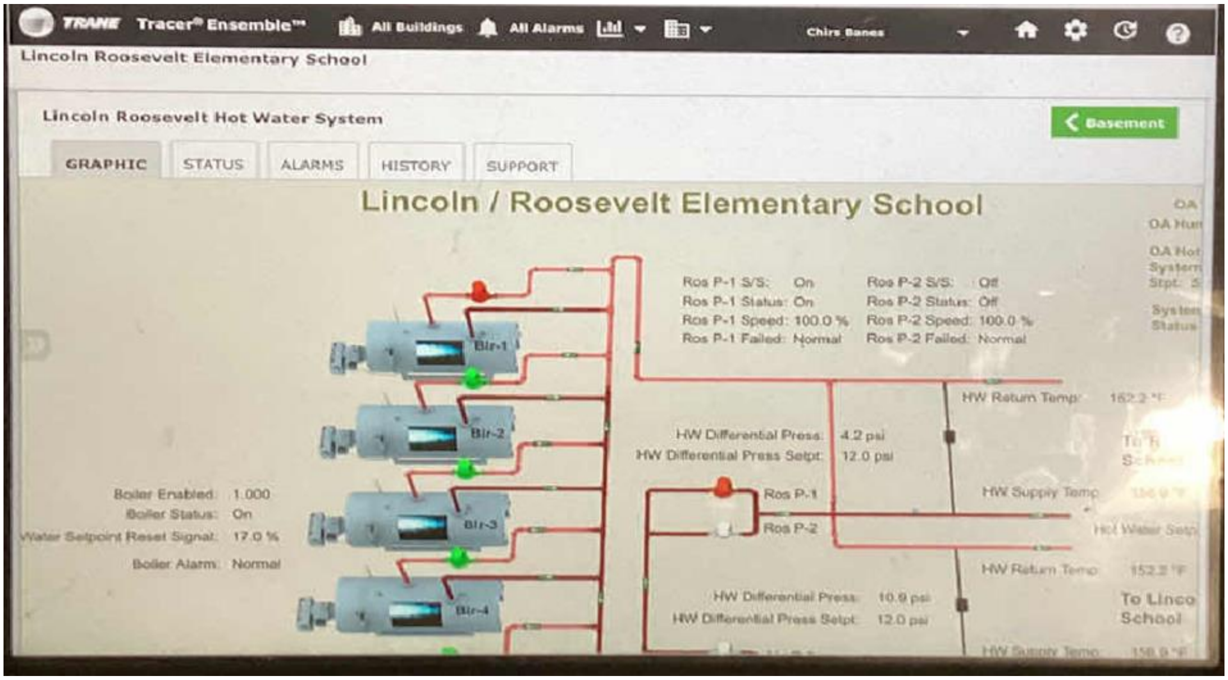
## 2.6 Heating Hot Water Systems

Lincoln Roosevelt Elementary School has five AERCO 1,770 MBh output capacity condensing hot water boilers serving the building's heating load. The burners are fully modulating with a nominal efficiency of 88.5 %. The boilers are configured in an automated sequence, and they all run together to modulate the load and stage based on the outside air temperature. Installed in 2005, the boilers are in good condition. The hydronic distribution system is a two-pipe heating-only system. Two, 15 hp and two, 7.5 hp variable speed pumps distribute heating hot water to AHUs, hydronic baseboards, UVs, and hydronic unit heaters.

The boilers and the hot water loop are controlled by the BAS. The building occupied heating setpoint is 72°F, and the unoccupied heating setpoint is 62°F.


*Condensing Boilers*

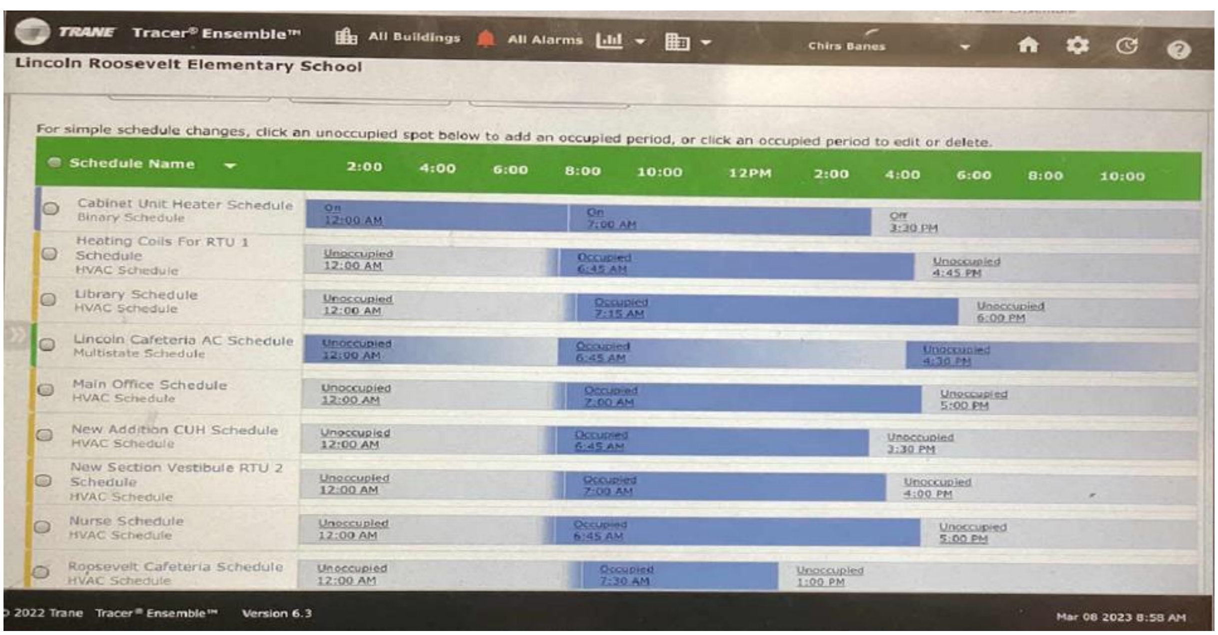

*7.5 hp Hot Water Pumps*




*BAS Screenshot – Benchmark Boilers*

## 2.7 Building Automation System (BAS)

A Trane tracer ensemble version 6.3 BAS controls the HVAC equipment, unit ventilator units (UVs), AHUs, and RTUs. The BAS provides equipment scheduling control, monitors and controls space temperatures, supply air temperatures, humidity, and hot water loop temperatures.

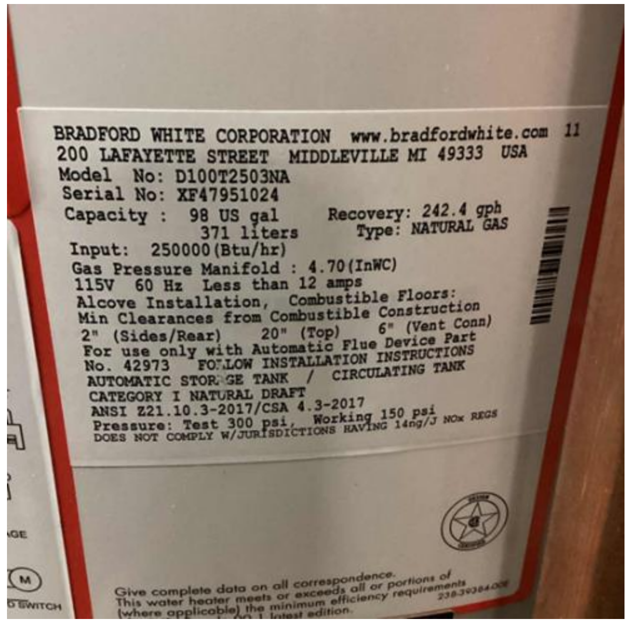



*BAS Schedule*

## 2.8 Domestic Hot Water

Hot water is produced by a 98 gallon, 250 MBh gas-fired storage water heater with an efficiency of 80%. The heater features an automatic motorized flue damper and electronic direct-spark ignition system. Located in the basement, this unit is in good condition.

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




*Gas-Fired Hot Water Heater*

## 2.9 Food Service Equipment

The kitchen has all electric equipment that is used to prepare breakfast and lunch for students and staff. Most cooking is done using electric convection oven. Bulk prepared foods are held in several electric holding cabinets. Most of the kitchen equipment is standard efficiency and is in fair condition. There is one Energy Star rated double solid door freezer.

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


Electric Convection Oven


Electric Food Holding Cabinet

## 2.10 Refrigeration

The kitchen has six stand-up refrigerators with solid doors and four stand-up freezers with solid doors. Two stand-up freezers are Energy Star equipment. There are three refrigerator chests and two freezer chests. All equipment is in good condition.

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


ENERGY STAR Stand-Up Solid Door Freezer

Refrigerator Chest

## 2.11 Plug Load and Vending Machines

There are 59 computer workstations throughout the facility. Plug loads included general café and office equipment. There are classroom typical loads such as projectors, smartboards, and small printers.

Workshops and STEM classrooms have plug loads that include 3D printers and wood shop equipment.

There are several residential-style refrigerators and mini refrigerators throughout the facilities. These vary in condition and efficiency.

There is one refrigerated beverage vending machine. Vending machine is not equipped with occupancy-based control.

*Copier/Scanner*

*Residential-Style Refrigerator*

## 2.12 Water-Using Systems

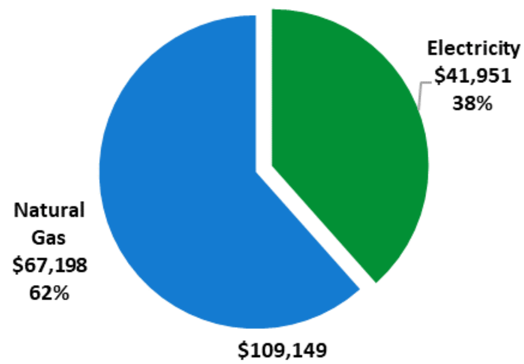
There are 33 restrooms with toilets, urinals, and sinks throughout the facility. Faucet flow rates are at 0.5 gallons per minutes (gpm) or higher. Girls and Boys locker rooms are frequently in used.

*Lavatory Sinks*

# 3 Energy Use and Costs

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

| Utility Summary | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 365,600 kWh | $41,951 |
| Natural Gas | 49,557 Therms | $67,198 |
| **Total** | | **$109,149** |




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

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

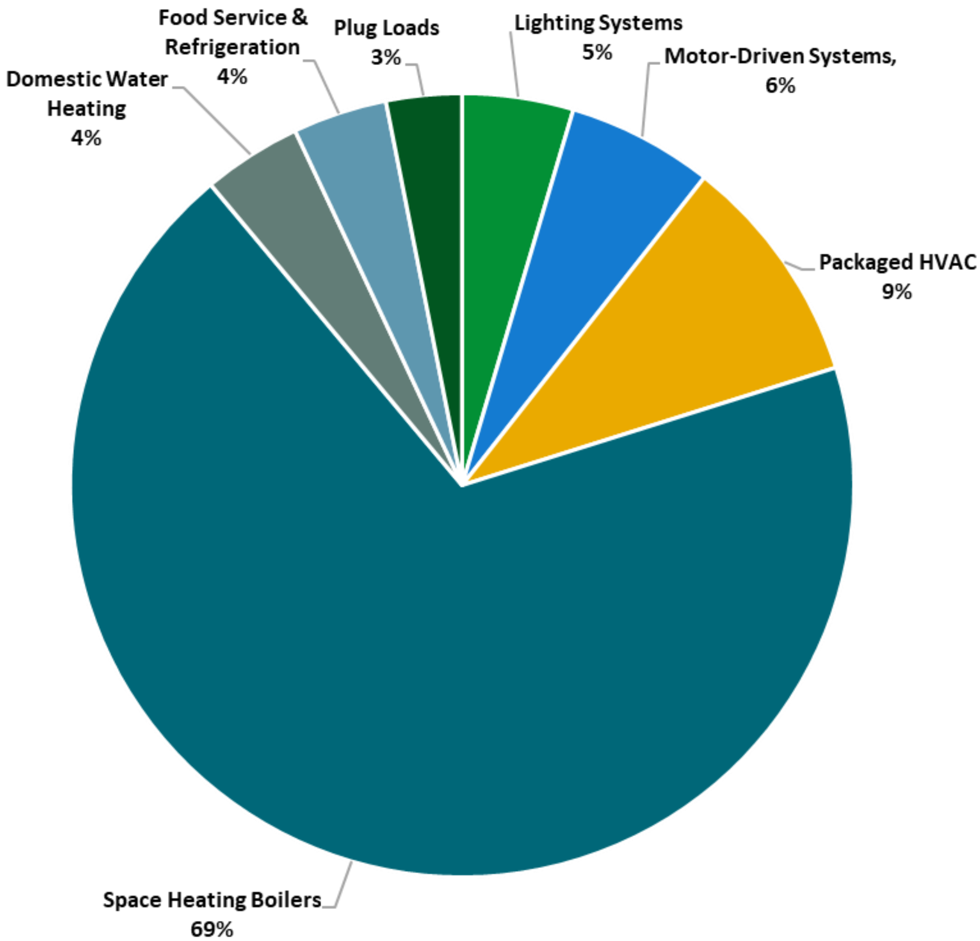
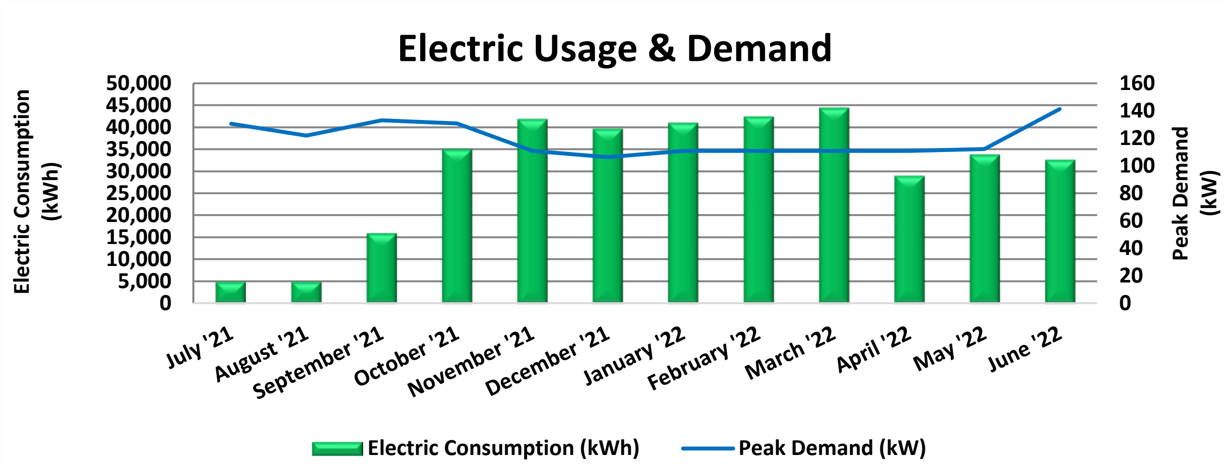



*Figure 4 - Energy Balance*

## 3.1 Electricity

JCP&L delivers electricity under rate class General Service Secondary JC_GS3_01D, with electric production provided by Freepoint Energy Solutions, a third-party supplier.



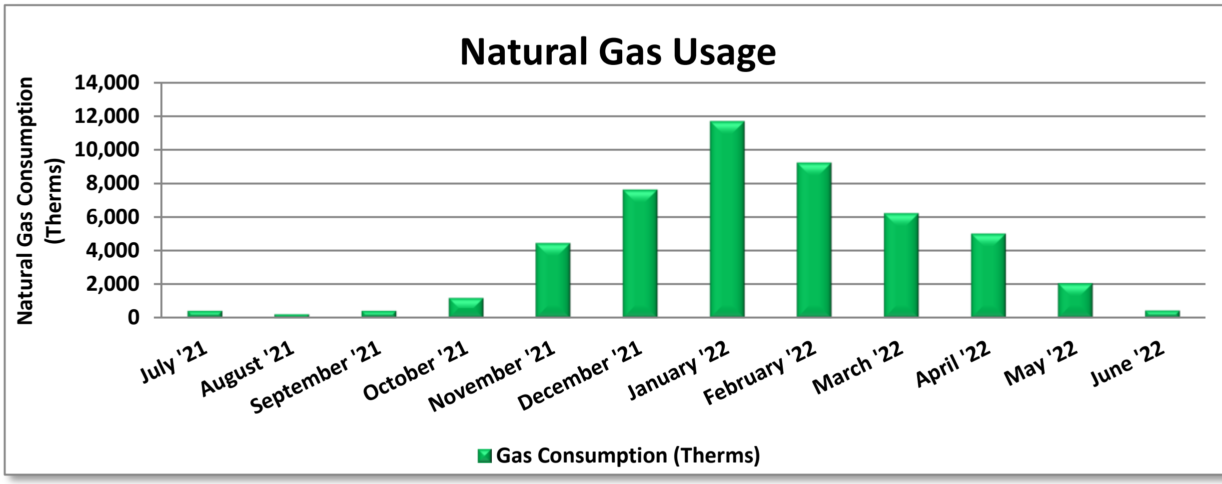

| Electric Billing Data | | | | | |
|---|---|---|---|---|---|
| **Period Ending** | **Days in Period** | **Electric Usage (kWh)** | **Demand (kW)** | **Demand Cost** | **Total Electric Cost** |
| 7/20/21 | 30 | 5,000 | 131 | $1,241 | $858 |
| 8/20/21 | 31 | 5,000 | 122 | $1,159 | $1,238 |
| 9/20/21 | 31 | 16,000 | 133 | $890 | $2,256 |
| 10/20/21 | 30 | 35,000 | 131 | $878 | $3,851 |
| 11/23/21 | 34 | 41,800 | 111 | $710 | $4,427 |
| 12/23/21 | 30 | 39,600 | 106 | $729 | $4,235 |
| 1/23/22 | 31 | 41,000 | 111 | $748 | $4,391 |
| 2/25/22 | 33 | 42,400 | 111 | $741 | $4,574 |
| 3/25/22 | 28 | 44,400 | 111 | $741 | $4,777 |
| 4/25/22 | 31 | 29,000 | 111 | $744 | $3,437 |
| 5/20/22 | 25 | 33,800 | 112 | $1,066 | $3,862 |
| 6/20/22 | 31 | 32,600 | 141 | $1,341 | $4,045 |
| **Totals** | **365** | **365,600** | **141** | **$10,987** | **$41,951** |
| **Annual** | **365** | **365,600** | **141** | **$10,987** | **$41,951** |

Notes:

- Peak demand of 141 kW occurred in June '22.
- Average demand over the past 12 months was 119 kW.
- The average electric cost over the past 12 months was $0.115/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

## 3.2 Natural Gas

NJ Natural Gas delivers natural gas under rate class GSL, with natural gas supply provided by USI, a third-party supplier.




| Gas Billing Data | | | |
|---|---|---|---|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 7/27/21 | 32 | 436 | $1,601 |
| 8/25/21 | 29 | 227 | $1,400 |
| 9/24/21 | 30 | 426 | $1,591 |
| 10/26/21 | 32 | 1,200 | $2,343 |
| 11/22/21 | 27 | 4,472 | $5,455 |
| 12/23/21 | 31 | 7,639 | $9,233 |
| 1/26/22 | 34 | 11,709 | $13,591 |
| 2/22/22 | 27 | 9,237 | $11,065 |
| 3/23/22 | 29 | 6,230 | $7,968 |
| 4/25/22 | 33 | 5,033 | $6,720 |
| 5/25/22 | 30 | 2,082 | $3,675 |
| 6/22/22 | 28 | 459 | $2,004 |
| **Totals** | **362** | **49,150** | **$66,646** |
| **Annual** | **365** | **49,557** | **$67,198** |

Notes:

- The average gas cost for the past 12 months is $1.356/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** | **58** |
|---|---|

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.

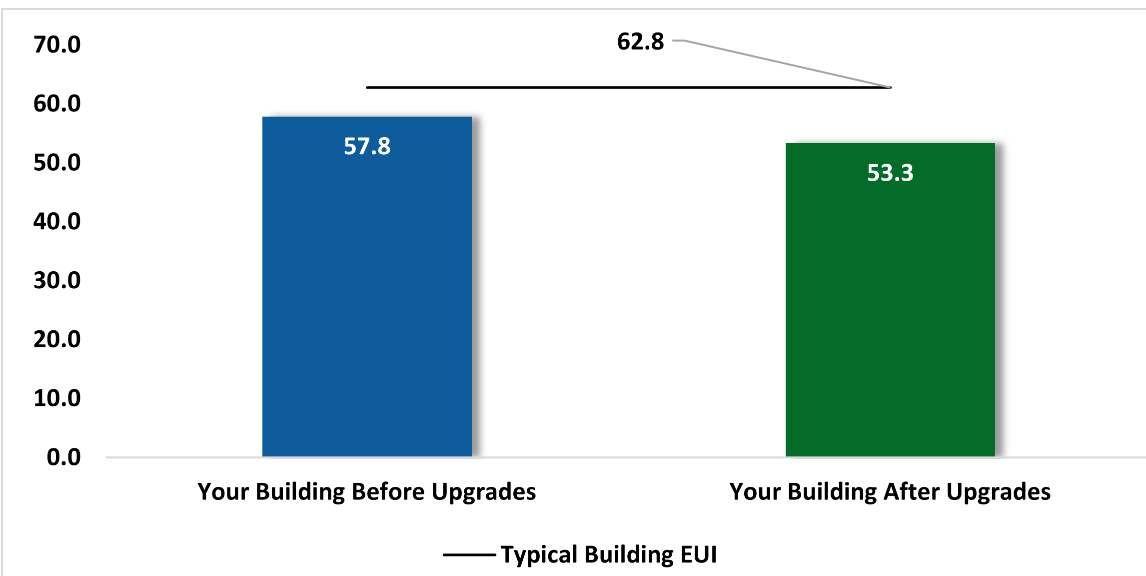



*Figure 5 - Energy Use Intensity Comparison[3]*

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

[3] Based on all evaluated ECMs

## Tracking Your Energy Performance

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

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

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

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

# 4 Energy Conservation Measures

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

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

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **1,534** | **0.3** | **0** | **$172** | **$2,332** | **$288** | **$2,044** | **11.9** | **1,507** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 112 | 0.0 | 0 | $13 | $69 | $10 | $59 | 4.7 | 110 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 1,422 | 0.3 | 0 | $159 | $2,263 | $278 | $1,985 | 12.5 | 1,397 |
| **Lighting Control Measures** | | | **17,760** | **4.7** | **-4** | **$1,988** | **$15,836** | **$6,650** | **$9,186** | **4.6** | **17,449** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 17,760 | 4.7 | -4 | $1,988 | $15,836 | $6,650 | $9,186 | 4.6 | 17,449 |
| **Variable Frequency Drive (VFD) Measures** | | | **21,437** | **7.1** | **0** | **$2,460** | **$35,117** | **$1,975** | **$33,142** | **13.5** | **21,587** |
| ECM 4 | Install VFDs on Constant Volume (CV) Fans | Yes | 21,437 | 7.1 | 0 | $2,460 | $35,117 | $1,975 | $33,142 | 13.5 | 21,587 |
| **Unitary HVAC Measures** | | | **6,431** | **9.9** | **9** | **$856** | **$104,057** | **$4,598** | **$99,459** | **116.2** | **7,495** |
| ECM 5 | Install High Efficiency Air Conditioning Units | No | 6,431 | 9.9 | 9 | $856 | $104,057 | $4,598 | $99,459 | 116.2 | 7,495 |
| **HVAC System Improvements** | | | **303** | **0.0** | **19** | **$289** | **$5,485** | **$8** | **$5,477** | **18.9** | **2,504** |
| ECM 6 | Implement Demand Control Ventilation (DCV) | No | 303 | 0.0 | 17 | $260 | $5,438 | $0 | $5,438 | 20.9 | 2,253 |
| ECM 7 | Install Pipe Insulation | Yes | 0 | 0.0 | 2 | $29 | $48 | $8 | $40 | 1.4 | 251 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **40** | **$537** | **$258** | **$127** | **$131** | **0.2** | **4,640** |
| ECM 8 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 40 | $537 | $258 | $127 | $131 | 0.2 | 4,640 |
| **Custom Measures** | | | **7,216** | **0.0** | **236** | **$4,027** | **$19,726** | **$0** | **$19,726** | **4.9** | **34,894** |
| ECM 9 | Retro-Commissioning Study | Yes | 7,216 | 0.0 | 236 | $4,027 | $19,726 | $0 | $19,726 | 4.9 | 34,894 |
| **TOTALS** | | | **54,680** | **21.9** | **299** | **$10,329** | **$182,811** | **$13,646** | **$169,165** | **16.4** | **90,075** |

* - 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** | | **1,534** | **0.3** | **0** | **$172** | **$2,332** | **$288** | **$2,044** | **11.9** | **1,507** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 112 | 0.0 | 0 | $13 | $69 | $10 | $59 | 4.7 | 110 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 1,422 | 0.3 | 0 | $159 | $2,263 | $278 | $1,985 | 12.5 | 1,397 |
| **Lighting Control Measures** | | **17,760** | **4.7** | **-4** | **$1,988** | **$15,836** | **$6,650** | **$9,186** | **4.6** | **17,449** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 17,760 | 4.7 | -4 | $1,988 | $15,836 | $6,650 | $9,186 | 4.6 | 17,449 |
| **Variable Frequency Drive (VFD) Measures** | | **21,437** | **7.1** | **0** | **$2,460** | **$35,117** | **$1,975** | **$33,142** | **13.5** | **21,587** |
| ECM 4 | Install VFDs on Constant Volume (CV) Fans | 21,437 | 7.1 | 0 | $2,460 | $35,117 | $1,975 | $33,142 | 13.5 | 21,587 |
| **HVAC System Improvements** | | **0** | **0.0** | **2** | **$29** | **$48** | **$8** | **$40** | **1.4** | **251** |
| ECM 7 | Install Pipe Insulation | 0 | 0.0 | 2 | $29 | $48 | $8 | $40 | 1.4 | 251 |
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **40** | **$537** | **$258** | **$127** | **$131** | **0.2** | **4,640** |
| ECM 8 | Install Low-Flow DHW Devices | 0 | 0.0 | 40 | $537 | $258 | $127 | $131 | 0.2 | 4,640 |
| **Custom Measures** | | **7,216** | **0.0** | **236** | **$4,027** | **$19,726** | **$0** | **$19,726** | **4.9** | **34,894** |
| ECM 9 | Retro-Commissioning Study | 7,216 | 0.0 | 236 | $4,027 | $19,726 | $0 | $19,726 | 4.9 | 34,894 |
| **TOTALS** | | **47,947** | **12.1** | **274** | **$9,212** | **$73,317** | **$9,048** | **$64,268** | **7.0** | **80,328** |

* - 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** | | **1,534** | **0.3** | **0** | **$172** | **$2,332** | **$288** | **$2,044** | **11.9** | **1,507** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 112 | 0.0 | 0 | $13 | $69 | $10 | $59 | 4.7 | 110 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 1,422 | 0.3 | 0 | $159 | $2,263 | $278 | $1,985 | 12.5 | 1,397 |

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 Fluorescent Fixtures with LED Lamps and Drivers

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

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

**Affected Building Areas**: Lincoln kitchen storage

### ECM 2: Retrofit Fixtures with LED Lamps

Replace existing fluorescent T8, CFLs, and halogens 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:** Atrium hallway, first and second floor hallways, Lincoln auditorium, Lincoln lower-level hallway, basement open area, basement restroom, and basement storage

## 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** | | **17,760** | **4.7** | **-4** | **$1,988** | **$15,836** | **$6,650** | **$9,186** | **4.6** | **17,449** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 17,760 | 4.7 | -4 | $1,988 | $15,836 | $6,650 | $9,186 | 4.6 | 17,449 |

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

### ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

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

**Affected Building Areas:** Lincoln media center, Roosevelt basement canary, Roosevelt cafeteria 1 and 2, six classrooms, Lincoln auditorium, Lincoln custodial room, Roosevelt woodshop, Lincoln custodial and faculty room, Lincoln media center, Lincoln kitchen, Lincoln nurse's office, and Lincoln principal's office

## 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** | | **21,437** | **7.1** | **0** | **$2,460** | **$35,117** | **$1,975** | **$33,142** | **13.5** | **21,587** |
| ECM 4 | Install VFDs on Constant Volume (CV) Fans | 21,437 | 7.1 | 0 | $2,460 | $35,117 | $1,975 | $33,142 | 13.5 | 21,587 |

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:** AHUs, RTUs, and large exhaust fans as indicated in Appendix A

# 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** | | **6,431** | **9.9** | **9** | **$856** | **$104,057** | **$4,598** | **$99,459** | **116.2** | **7,495** |
| ECM 5 | Install High Efficiency Air Conditioning Units | 6,431 | 9.9 | 9 | $856 | $104,057 | $4,598 | $99,459 | 116.2 | 7,495 |

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

## ECM 5: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged, split and window air conditioning units with high efficiency packaged, split and window air conditioning units. The packaged replacement units will incorporate efficient gas furnaces. 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:** eight split ACs, two window Acs, and three packaged units (RTU-1, RTU-2 and RTU serving the cafeteria)

## 4.5 HVAC Improvements

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **HVAC System Improvements** | | **303** | **0.0** | **19** | **$289** | **$5,485** | **$8** | **$5,477** | **18.9** | **2,504** |
| ECM 6 | Implement Demand Control Ventilation (DCV) | 303 | 0.0 | 17 | $260 | $5,438 | $0 | $5,438 | 20.9 | 2,253 |
| ECM 7 | Install Pipe Insulation | 0 | 0.0 | 2 | $29 | $48 | $8 | $40 | 1.4 | 251 |

### ECM 6: Implement Demand Control Ventilation (DCV)

Demand control ventilation (DCV) is a control strategy that monitors the indoor air's carbon dioxide ($CO_2$) content to measure room occupancy. This data is used to regulate the amount of outdoor air provided to the space for ventilation.

Standard ventilation systems often provide outside air based on a space's estimated maximum occupancy but not actual occupancy. During low occupancy periods, the space may then be over ventilated. This wastes energy through heating and cooling the excess outside air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels. DCV is most suited for facilities where occupancy levels vary significantly from hour to hour and day to day.

Energy savings associated with DCV are based on hours of operation, space occupancy, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning. Implementation of this measure is dependent upon having a building automation system (BAS) or other smart building control system connected to the space conditioning equipment serving the noted areas.

**Affected Building Areas:** atrium and cafeteria

### ECM 7: 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:** approximately 4 feet of 1.25-inch of domestic hot water piping

## 4.6 Domestic Water Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **40** | **$537** | **$258** | **$127** | **$131** | **0.2** | **4,640** |
| ECM 8 | Install Low-Flow DHW Devices | 0 | 0.0 | 40 | $537 | $258 | $127 | $131 | 0.2 | 4,640 |

### ECM 8: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low-flow devices are recommended to reduce hot water usage:

| Device | Flow Rate |
|---|---|
| Faucet aerators (lavatory) | 0.5 gpm |
| Faucet aerator (kitchen) | 1.5 gpm |
| Showerhead | 2.0 gpm |
| Pre-rinse spray valve (kitchen) | 1.28 gpm |

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

## 4.7 Custom Measures

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Custom Measures** | | **7,216** | **0.0** | **236** | **$4,027** | **$19,726** | **$0** | **$19,726** | **4.9** | **34,894** |
| ECM 9 | Retro-Commissioning Study | 7,216 | 0.0 | 236 | $4,027 | $19,726 | $0 | $19,726 | 4.9 | 34,894 |

### ECM 9: Retro-Commissioning Study

Due to the complexity of today's HVAC systems and controls a thorough analysis and rebalance of heating, ventilation, and cooling systems should periodically be conducted. There are indications at this site that systems may not be operating correctly or as efficiently as they could be. One important tool available to building operators to ensure proper system operation is retro commissioning.

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

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

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

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

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in HVAC control improvements. Based on industry standards and previous project experience, the potential energy savings may be up to 15% of existing HVAC energy use. We estimate the cost of retro-commissioning studies and control improvements of $0.30 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to perform the study. For the purposes of this report, we have conservatively estimated savings to be 5.0% of the HVAC energy consumption baseline.

# 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.

## Thermostat Schedules and Temperature Resets

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

## Economizer Maintenance

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

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

## AC System Evaporator/Condenser Coil Cleaning

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

## HVAC Filter Cleaning and Replacement

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

## Ductwork Maintenance

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

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

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

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

## Boiler Maintenance

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

## Label HVAC Equipment

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

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

## Optimize HVAC Equipment Schedules

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

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

## Water Heater Maintenance

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

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

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

## 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

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

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

foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

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

## Procurement Strategies

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

# 6 On-site Generation

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

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

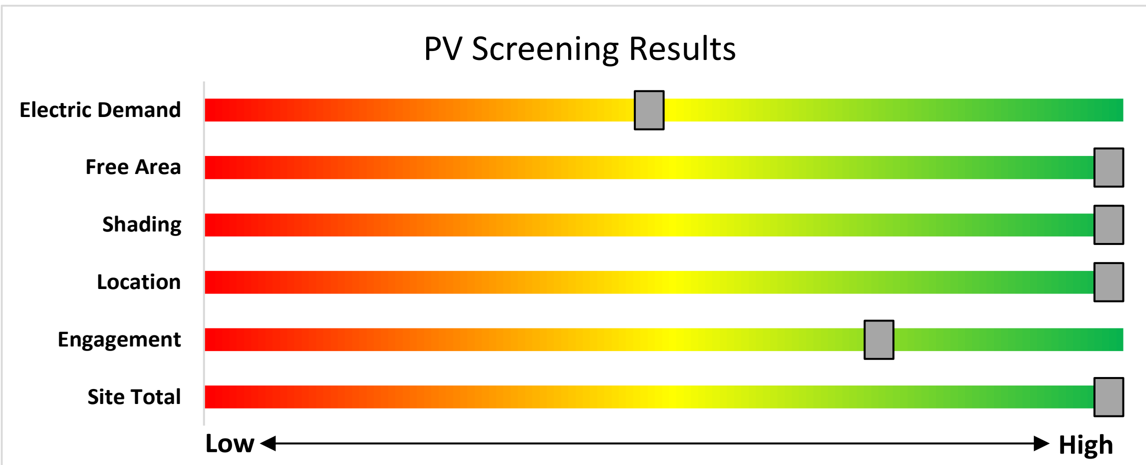
## 6.1 Solar Photovoltaic

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

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

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

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




| | | |
|---|---|---|
| **Potential** | High | |
| **System Potential** | 109 | kW DC STC |
| **Electric Generation** | 129,859 | kWh/yr |
| **Displaced Cost** | $14,900 | /yr |
| **Installed Cost** | $283,400 | |

*Figure 8 - Photovoltaic Screening*

**Successor Solar Incentive Program (SuSI)**

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

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

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

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs.
- **Approved Solar Installers in the NJ Market**: www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

## 6.2 Combined Heat and Power

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

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

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

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

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

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

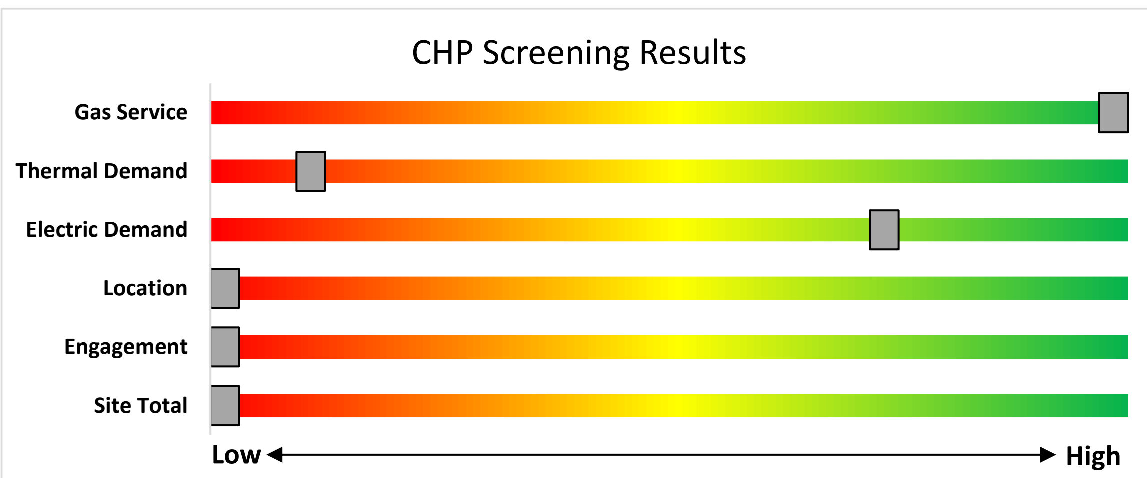



*Figure 9 - Combined Heat and Power Screening*

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

# 7 Electric Vehicles (EV)

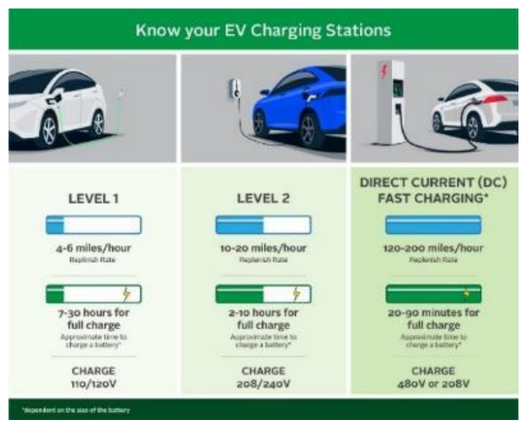
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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

## 7.1 Electric Vehicle Charging

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

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




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

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

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

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

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

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

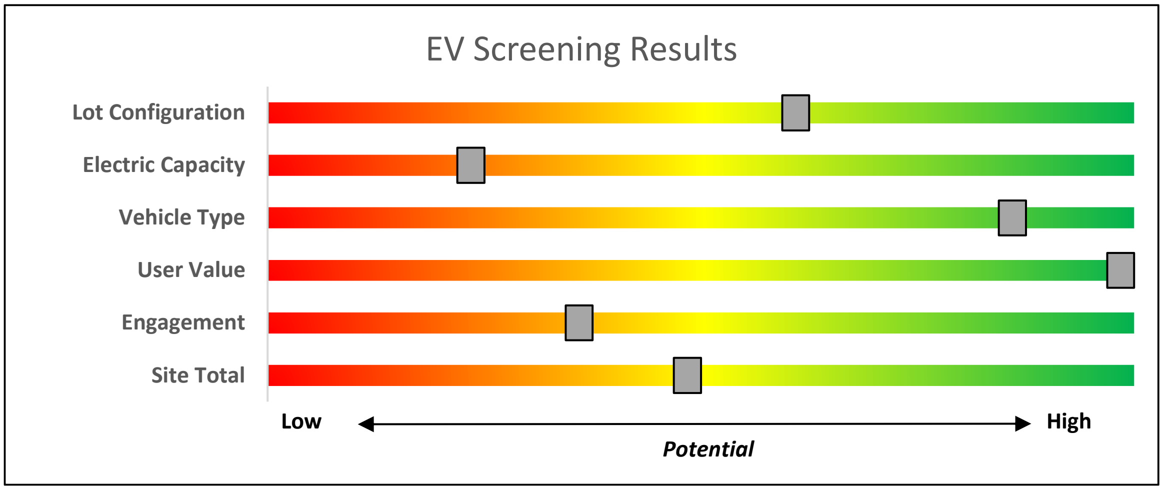



*Figure 10 – EV Charger Screening*

**Electric Vehicle Programs Available**

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

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

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

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

# 8 Project Funding and Incentives

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


## 8.1 Utility Energy Efficiency Programs

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

### *Prescriptive and Custom*

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

**Equipment Examples**

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

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

### *Direct Install*

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

**Incentives**

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

**How to Participate**

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

## Engineered Solutions

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

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

## 8.2 New Jersey's Clean Energy Programs

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

### ***Large Energy Users***

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

**Incentives**

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

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

**How to Participate**

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

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

## Combined Heat and Power

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

**Incentives**

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

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

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

**How to Participate**

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

## Successor Solar Incentive Program (SuSI)

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

**Administratively Determined Incentive (ADI) Program**

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

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

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

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

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

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

**Competitive Solar Incentive Program**

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

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

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

## *Energy Savings Improvement Program*

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

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

**How to Participate**

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

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

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

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

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

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

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

# 9 PROJECT DEVELOPMENT

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

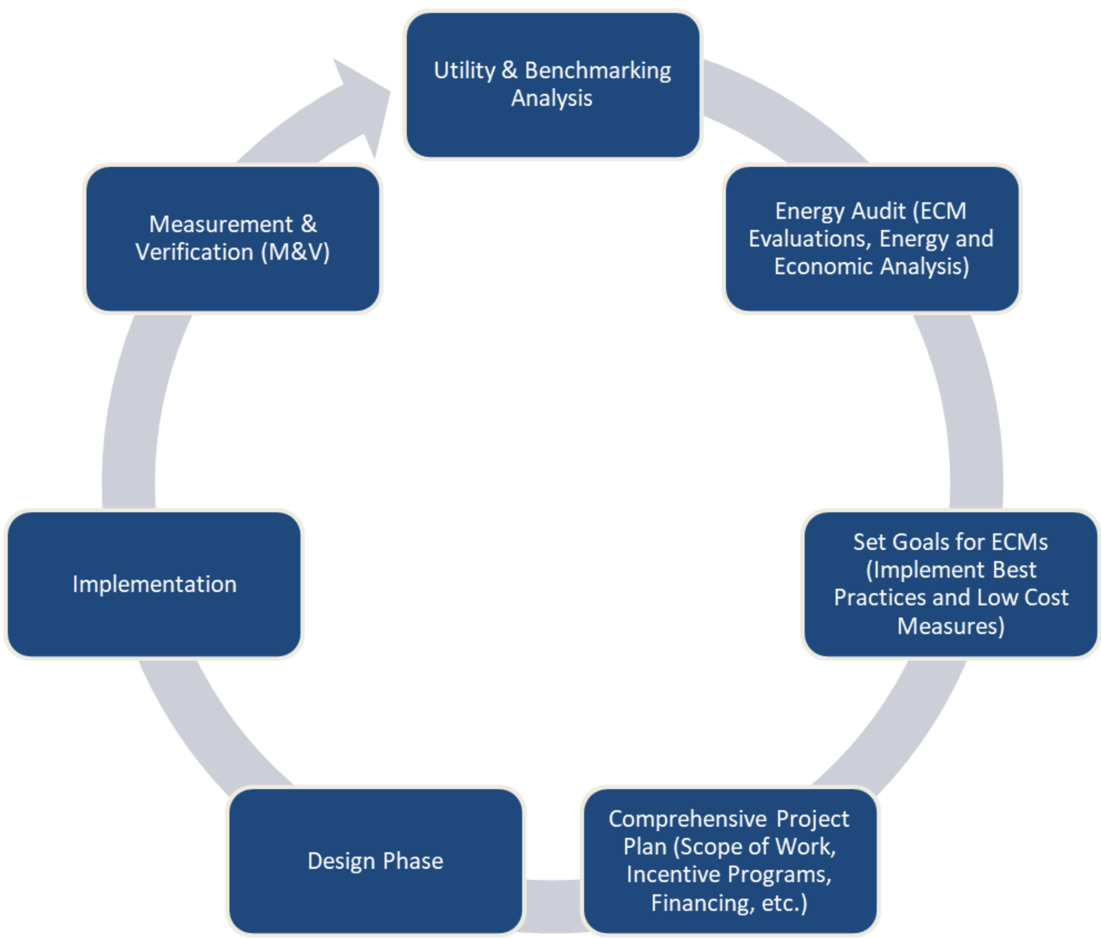


*Figure 11 – Project Development Cycle*

# 10 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

## 10.1 Retail Electric Supply Options

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

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

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

## 10.2 Retail Natural Gas Supply Options

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

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

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

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

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

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

# Appendix A: Equipment Inventory & Recommendations

**Lighting Inventory & Recommendations**

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| 2nd Floor Conference Room | 4 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | S | 32 | 2,608 | | None | No | 4 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 2,608 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Atrium Hallway | 8 | Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps | Wall Switch | S | 26 | 3,200 | 2, 3 | Relamp | Yes | 8 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 26 | 2,208 | 0.0 | 227 | 0 | $25 | $425 | $241 | 7.2 |
| Atrium Hallway | 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 |
| Atrium Hallway | 1 | LED Lamps: (1) 23W Corn Bulb Screw-In Lamp | Wall Switch | S | 23 | 3,200 | | None | No | 1 | LED Lamps: (1) 23W Corn Bulb Screw-In Lamp | Wall Switch | 23 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Atrium Hallway | 11 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | 3 | None | Yes | 11 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.1 | 348 | 0 | $39 | $225 | $225 | 0.0 |
| Basement | 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 |
| Basement | 4 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 3,780 | 3 | None | Yes | 4 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Occupancy Sensor | 10 | 2,608 | 0.0 | 52 | 0 | $6 | $116 | $20 | 16.6 |
| Basement | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 64 | 3,780 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,608 | 0.1 | 549 | 0 | $61 | $226 | $50 | 2.9 |
| Blue Stairwell | 3 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | S | 58 | 3,200 | 3 | None | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,208 | 0.0 | 190 | 0 | $21 | $225 | $105 | 5.6 |
| Boiler Room | 2 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | 5 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | | None | No | 5 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior PAR | 2 | LED Lamps: (1) 25W PAR30 Screw-In Lamp | Timeclock | | 25 | 2,420 | | None | No | 2 | LED Lamps: (1) 25W PAR30 Screw-In Lamp | Timeclock | 25 | 2,420 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Pole light | 2 | LED Lamps: (1) 19W A19 Screw-In Lamp | Timeclock | | 10 | 2,420 | | None | No | 2 | LED Lamps: (1) 19W A19 Screw-In Lamp | Timeclock | 10 | 2,420 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Wall Pack | 5 | LED - Fixtures: Wall Pack | Timeclock | | 40 | 2,420 | | None | No | 5 | LED - Fixtures: Wall Pack | Timeclock | 40 | 2,420 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Wall Pack #2 | 10 | LED - Fixtures: Wall Pack | Timeclock | | 25 | 2,420 | | None | No | 10 | LED - Fixtures: Wall Pack | Timeclock | 25 | 2,420 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Wall Pack #3 | 5 | LED - Fixtures: Wall Pack | Timeclock | | 60 | 2,420 | | None | No | 5 | LED - Fixtures: Wall Pack | Timeclock | 60 | 2,420 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - 1st Floor Hallway | 7 | Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps | Wall Switch | S | 26 | 3,300 | 2, 3 | Relamp | Yes | 7 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 26 | 2,277 | 0.0 | 205 | 0 | $23 | $400 | $239 | 7.0 |
| Lincoln - 1st Floor Hallway | 10 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 10 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - 1st Floor Hallway | 26 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | 3 | None | Yes | 26 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.2 | 823 | 0 | $92 | $450 | $450 | 0.0 |
| Lincoln - 1st Floor Hallway | 4 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,200 | 3 | None | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,208 | 0.0 | 190 | 0 | $21 | $225 | $140 | 4.0 |
| Lincoln - 2nd Floor Hallway | 7 | Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps | Wall Switch | S | 26 | 3,200 | 2, 3 | Relamp | Yes | 7 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 26 | 2,208 | 0.0 | 199 | 0 | $22 | $400 | $239 | 7.2 |
| Lincoln - 2nd Floor Hallway | 8 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 8 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - 2nd Floor Hallway | 24 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,200 | 3 | None | Yes | 24 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,208 | 0.2 | 1,139 | 0 | $127 | $450 | $450 | 0.0 |
| Lincoln - Auditorium | 8 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 8 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Auditorium | 31 | Halogen Incandescent: (1) 75W R30 Screw-In Lamp | Wall Switch | S | 75 | 2,000 | 2, 3 | Relamp | Yes | 31 | LED Lamps: R30 Lamps | Occupancy Sensor | 75 | 1,380 | 0.5 | 1,586 | 0 | $177 | $1,508 | $163 | 7.6 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Location** | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Lincoln - Auditorium | 8 | LED Lamps: (1) 7.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 2,000 | 3 | None | Yes | 8 | LED Lamps: (1) 7.5W A19 Screw-In Lamp | Occupancy Sensor | 10 | 1,380 | 0.0 | 55 | 0 | $6 | $116 | $20 | 15.7 |
| Lincoln - Auditorium | 2 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 2,000 | | None | No | 2 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | 10 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Auditorium | 14 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | 3 | None | Yes | 14 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,380 | 0.1 | 415 | 0 | $46 | $270 | $35 | 5.1 |
| Lincoln - Boys Cafeteria Bath | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,380 | 3 | None | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,332 | 0.0 | 100 | 0 | $11 | $116 | $20 | 8.6 |
| Lincoln - Classroom 101 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 102 | 4 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 1,500 | 3 | None | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,035 | 0.0 | 89 | 0 | $10 | $116 | $20 | 9.6 |
| Lincoln - Classroom 102 | 2 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | S | 26 | 1,500 | 3 | None | Yes | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | 26 | 1,035 | 0.0 | 26 | 0 | $3 | $116 | $20 | 32.9 |
| Lincoln - Classroom 103 | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 104 | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 105 | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 106 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 107 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 108 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 109 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 201 | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 202 | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 202 | 2 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | S | 17 | 1,500 | | None | No | 2 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | 17 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 203 | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 204 | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 205 | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 206 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 207 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 208 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 209 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 210 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Lincoln - Cove Area Boys Bath | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,380 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Cove Area Boys Bath | 2 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | S | 26 | 3,380 | 3 | None | Yes | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | 26 | 2,332 | 0.0 | 59 | 0 | $7 | $116 | $20 | 14.6 |
| Lincoln - Cove Area Girls Bath | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,380 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Cove Area Girls Bath | 2 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | S | 26 | 3,380 | 3 | None | Yes | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | 26 | 2,332 | 0.0 | 59 | 0 | $7 | $116 | $20 | 14.6 |
| Lincoln - Custodial Room | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 1,500 | 3 | None | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,035 | 0.0 | 45 | 0 | $5 | $270 | $35 | 47.2 |
| Lincoln - Electrical Closet | 8 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 1,500 | 3 | None | Yes | 8 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,035 | 0.0 | 59 | 0 | $7 | $116 | $0 | 17.5 |
| Lincoln - Electrical Closet Hallway | 1 | LED - Linear Tubes: (2) 2' Lamps | Wall Switch | S | 17 | 1,500 | | None | No | 1 | LED - Linear Tubes: (2) 2' Lamps | Wall Switch | 17 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Elevator | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,780 | | None | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,780 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Elevator Room | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | 3 | None | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.0 | 40 | 0 | $4 | $116 | $20 | 21.7 |
| Lincoln - Faculty Room | 1 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 2,000 | | None | No | 1 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Faculty Room | 6 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | 3 | None | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,380 | 0.1 | 178 | 0 | $20 | $270 | $35 | 11.8 |
| Lincoln - Faculty Room Bath | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Girls Cafeteria Bath | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | 3 | None | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.0 | 59 | 0 | $7 | $116 | $20 | 14.5 |
| Lincoln - Green Stairwell | 2 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | | 40 | 3,200 | 3 | None | Yes | 2 | LED - Fixtures: Ambient 1x4 Fixture | Occupancy Sensor | 40 | 2,208 | 0.0 | 87 | 0 | $10 | $225 | $70 | 15.9 |
| Lincoln - Handicap Bathroom | 2 | LED - Linear Tubes: (2) 2' Lamps | Wall Switch | S | 17 | 2,000 | 3 | None | Yes | 2 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | 17 | 1,380 | 0.0 | 23 | 0 | $3 | $116 | $20 | 37.0 |
| Lincoln - Kitchen Storage | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | S | 80 | 2,000 | 1 | Relamp & Reballast | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 112 | 0 | $13 | $69 | $10 | 4.7 |
| Lincoln - Lower Lever Hallway | 7 | Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps | Wall Switch | S | 26 | 3,200 | 2, 3 | Relamp | Yes | 7 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 26 | 2,208 | 0.0 | 199 | 0 | $22 | $400 | $239 | 7.2 |
| Lincoln - Lower Lever Hallway | 10 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 10 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Lower Lever Hallway | 30 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | 3 | None | Yes | 30 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.2 | 949 | 0 | $106 | $450 | $450 | 0.0 |
| Lincoln - Media Center | 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 |
| Lincoln - Media Center | 21 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | 3 | None | Yes | 21 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 415 | 0 | $46 | $540 | $70 | 10.1 |
| Lincoln - Media Center | 26 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | 3 | None | Yes | 26 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,380 | 0.3 | 771 | 0 | $86 | $540 | $70 | 5.4 |
| Lincoln - Orange Stairwell | 2 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | S | 58 | 3,200 | 3 | None | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,208 | 0.0 | 127 | 0 | $14 | $225 | $70 | 10.9 |
| Lincoln - Pink Stairwell | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | | 29 | 3,200 | | None | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Pink Stairwell | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | | 58 | 3,200 | | None | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Lincoln - Purple Stairwell | 1 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | | 40 | 3,200 | | None | No | 1 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | 40 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Purple Stairwell | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | | 58 | 3,200 | | None | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln Kitchen | 9 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 9 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 196 | 0 | $22 | $270 | $35 | 10.7 |
| Red Stairwell | 2 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | S | 58 | 3,200 | 3 | None | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,208 | 0.0 | 127 | 0 | $14 | $225 | $70 | 10.9 |
| Roosevelt - 1st Floor Boys Bathroom | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,380 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 1st Floor Girls Bathroom | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,380 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 1st Floor Hallway | 7 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 7 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 1st Floor Hallway | 12 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 3,200 | 3 | None | Yes | 12 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 2,208 | 0.1 | 419 | 0 | $47 | $225 | $225 | 0.0 |
| Roosevelt - 1st Floor Hallway | 2 | LED Lamps: (16) 7.5W C15 Screw-In Lamps | Wall Switch | S | 120 | 3,200 | 3 | None | Yes | 2 | LED Lamps: (16) 7.5W C15 Screw-In Lamps | Occupancy Sensor | 120 | 2,208 | 0.1 | 262 | 0 | $29 | $225 | $70 | 5.3 |
| Roosevelt - 1st Floor Hallway | 9 | LED Lamps: (4) 7.5W C15 Screw-In Lamps | Wall Switch | S | 30 | 3,200 | 3 | None | Yes | 9 | LED Lamps: (4) 7.5W C15 Screw-In Lamps | Occupancy Sensor | 30 | 2,208 | 0.1 | 295 | 0 | $33 | $225 | $225 | 0.0 |
| Roosevelt - 1st Floor Hallway | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | | None | No | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 1st Floor Hallway | 9 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,200 | 3 | None | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,208 | 0.1 | 427 | 0 | $48 | $225 | $225 | 0.0 |
| Roosevelt - 2nd Elevator Closet | 2 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | S | 27 | 3,380 | 3 | None | Yes | 2 | LED - Fixtures: Ambient 1x4 Fixture | Occupancy Sensor | 27 | 2,332 | 0.0 | 62 | 0 | $7 | $116 | $0 | 16.7 |
| Roosevelt - 2nd Floor Boys Bathroom | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,380 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 2nd Floor Girls Bathroom | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,380 | | None | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 2nd Floor Hallway | 4 | Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps | Wall Switch | S | 26 | 3,200 | 2, 3 | Relamp | Yes | 4 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 26 | 2,208 | 0.0 | 113 | 0 | $13 | $325 | $148 | 13.9 |
| Roosevelt - 2nd Floor Hallway | 1 | Compact Fluorescent: (4) 13W Biaxial Plug-In Lamps | Wall Switch | S | 52 | 3,200 | 2 | Relamp | No | 1 | LED Lamps: GX23 (Plug-In) Lamps | Wall Switch | 52 | 3,200 | 0.0 | 0 | 0 | $0 | $50 | $4 | 0.0 |
| Roosevelt - 2nd Floor Hallway | 6 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 6 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - 2nd Floor Hallway | 25 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 3,200 | 3 | None | Yes | 25 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,208 | 0.2 | 1,187 | 0 | $133 | $450 | $450 | 0.0 |
| Roosevelt - Basement Canary | 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 |
| Roosevelt - Basement Canary | 3 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 3,200 | 3 | None | Yes | 3 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Occupancy Sensor | 10 | 2,208 | 0.0 | 33 | 0 | $4 | $116 | $20 | 26.2 |
| Roosevelt - Basement Canary | 9 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 3,200 | 3 | None | Yes | 9 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,208 | 0.0 | 142 | 0 | $16 | $116 | $20 | 6.0 |
| Roosevelt - Basement Canary | 8 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | 3 | None | Yes | 8 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.1 | 253 | 0 | $28 | $270 | $35 | 8.3 |
| Roosevelt - Basement Canary Bath | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | S | 32 | 3,380 | 2 | Relamp | No | 1 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 3,380 | 0.0 | 65 | 0 | $7 | $18 | $5 | 1.8 |
| Roosevelt - Basement Drying Closet | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 1,500 | | None | No | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | 10 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roosevelt - Basement Hallway | 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 |
| Roosevelt - Basement Hallway | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | 3 | None | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.0 | 95 | 0 | $11 | $225 | $105 | 11.3 |
| Roosevelt - Basement Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 64 | 1,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 1,500 | 0.0 | 58 | 0 | $6 | $37 | $10 | 4.1 |
| Roosevelt - Cafeteria | 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 |
| Roosevelt - Cafeteria | 16 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | 3 | None | Yes | 16 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 316 | 0 | $35 | $270 | $35 | 6.6 |
| Roosevelt - Cafeteria #2 | 8 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | 3 | None | Yes | 8 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 158 | 0 | $18 | $270 | $35 | 13.3 |
| Roosevelt - Classrom 206 | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | S | 15 | 1,500 | | None | No | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classrom 206 | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 101 | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 101 | 4 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | S | 17 | 1,500 | | None | No | 4 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | 17 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 102 | 12 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 12 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 262 | 0 | $29 | $270 | $35 | 8.0 |
| Roosevelt - Classroom 103 | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | S | 15 | 1,500 | | None | No | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 103 | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 105 | 16 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | S | 15 | 1,500 | | None | No | 16 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 105 | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 106 | 8 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 8 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 175 | 0 | $20 | $270 | $35 | 12.0 |
| Roosevelt - Classroom 107 | 8 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 8 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 175 | 0 | $20 | $270 | $35 | 12.0 |
| Roosevelt - Classroom 109 | 12 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 12 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 262 | 0 | $29 | $270 | $35 | 8.0 |
| Roosevelt - Classroom 110 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 111 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 113 | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 114 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 115 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 201 | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 202 | 12 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 12 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 262 | 0 | $29 | $270 | $35 | 8.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roosevelt - Classroom 203 | 8 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | S | 32 | 2,000 | 3 | None | Yes | 8 | LED - Fixtures: Ambient 2x4 Fixture | Occupancy Sensor | 32 | 1,380 | 0.1 | 175 | 0 | $20 | $270 | $35 | 12.0 |
| Roosevelt - Classroom 204 | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | S | 15 | 1,500 | | None | No | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 204 | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 205 | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 207 | 10 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 10 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 207 | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | S | 26 | 1,500 | | None | No | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | 26 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 208 | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | S | 15 | 1,500 | | None | No | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 208 | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 1,500 | | None | No | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 209 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 211 | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 212 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 213 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 214 | 8 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 2,000 | 3 | None | Yes | 8 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,380 | 0.0 | 79 | 0 | $9 | $116 | $20 | 10.8 |
| Roosevelt - Classroom 215 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Classroom 216 | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | S | 44 | 1,500 | | None | No | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Closet 112 | 1 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 3,780 | | None | No | 1 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 3,780 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Custodial Bath | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 2,000 | | None | No | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | 10 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Custodial Break Room | 3 | LED - Fixtures: Ambient 1x4 Fixture | Occupancy Sensor | S | 27 | 2,000 | | None | No | 3 | LED - Fixtures: Ambient 1x4 Fixture | Occupancy Sensor | 27 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Custodial Break Room | 2 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | S | 15 | 2,000 | | None | No | 2 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Elevator | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | | None | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Elevator Room | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | | None | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Gym | 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 |
| Roosevelt - Gym | 22 | LED - Fixtures: Linear Strip | Wall Switch | S | 60 | 2,000 | 3 | None | Yes | 22 | LED - Fixtures: Linear Strip | Occupancy Sensor | 60 | 1,380 | 0.3 | 900 | 0 | $101 | $440 | $70 | 3.7 |
| Roosevelt - Kitchen | 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 |
| Roosevelt - Kitchen | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 2,000 | | None | No | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | 10 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roosevelt - Kitchen | 3 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 2,000 | 3 | None | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 1,380 | 0.0 | 30 | 0 | $3 | $116 | $20 | 28.9 |
| Roosevelt - Kitchen | 4 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | 3 | None | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.0 | 79 | 0 | $9 | $116 | $20 | 10.8 |
| Roosevelt - Main Office | 9 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | 3 | None | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,380 | 0.1 | 267 | 0 | $30 | $116 | $20 | 3.2 |
| Roosevelt - Main Office | 2 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | S | 26 | 2,000 | 3 | None | Yes | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | 26 | 1,380 | 0.0 | 35 | 0 | $4 | $116 | $20 | 24.7 |
| Roosevelt - Main Office Bath | 1 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | S | 29 | 2,000 | | None | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Nurse's Office | 9 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | 3 | None | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,380 | 0.1 | 267 | 0 | $30 | $270 | $35 | 7.9 |
| Roosevelt - Nurse's Office | 2 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | S | 26 | 2,000 | 3 | None | Yes | 2 | LED - Linear Tubes: (3) 2' Lamps | Occupancy Sensor | 26 | 1,380 | 0.0 | 35 | 0 | $4 | $116 | $20 | 24.7 |
| Roosevelt - Nurse's Office bath | 1 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | S | 26 | 2,000 | | None | No | 1 | LED - Linear Tubes: (3) 2' Lamps | Wall Switch | 26 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Principle's Office | 5 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | S | 44 | 2,000 | 3 | None | Yes | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,380 | 0.0 | 148 | 0 | $17 | $270 | $35 | 14.2 |
| Roosevelt - Vice Principle's Office | 4 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | S | 17 | 2,000 | | None | No | 4 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | 17 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Woodshop | 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 |
| Roosevelt - Woodshop | 23 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | S | 38 | 1,800 | 3 | None | Yes | 23 | LED - Fixtures: Ambient 1x4 Fixture | Occupancy Sensor | 38 | 1,242 | 0.2 | 536 | 0 | $60 | $540 | $70 | 7.8 |
| Roosevelt- Copy Room | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 2,000 | | None | No | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | 10 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt- Copy Room | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 2,000 | | None | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt Basement Open Area | 1 | Exit Signs: LED - 2 W Lamp | None | S | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt Basement Open Area | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | S | 10 | 3,200 | | None | No | 1 | LED Lamps: (1) 9.5W A19 Screw-In Lamp | Wall Switch | 10 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt Basement Open Area | 18 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | S | 27 | 3,200 | 3 | None | Yes | 18 | LED - Fixtures: Ambient 1x4 Fixture | Occupancy Sensor | 27 | 2,208 | 0.1 | 530 | 0 | $59 | $450 | $450 | 0.0 |
| Roosevelt Basement Open Area | 5 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | S | 29 | 3,200 | 3 | None | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.0 | 158 | 0 | $18 | $225 | $175 | 2.8 |
| Roosevelt Basement Open Area | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 64 | 3,200 | 2, 3 | Relamp | Yes | 7 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.2 | 1,084 | 0 | $121 | $481 | $295 | 1.5 |
| Storage | 4 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | S | 15 | 1,500 | | None | No | 4 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 1,500 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Yellow Stairwell | 1 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | | 38 | 3,200 | | None | No | 1 | LED - Fixtures: Ambient 1x4 Fixture | Wall Switch | 38 | 3,200 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Yellow Stairwell | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | | 29 | 3,200 | 3 | None | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,208 | 0.0 | 63 | 0 | $7 | $225 | $70 | 21.9 |
| Yellow Stairwell | 3 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | | 58 | 3,200 | 3 | None | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,208 | 0.0 | 190 | 0 | $21 | $225 | $105 | 5.6 |

## 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** |
| Gym | HV-1 & 2 - Gym | 2 | Supply Fan | 3.0 | 80.0% | No | | | W | 2,520 | 4 | No | 89.5% | Yes | 2 | 2.0 | 6,297 | 0 | $723 | $9,110 | $400 | 12.1 |
| Roof | Lincoln Roosevelt Elementary | 2 | Exhaust Fan | 0.5 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| 2nd Floor Elevator Closet | Closet, Elevator and Small Vestibules | 1 | Supply Fan | 0.3 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| 2nd Floor Conference Room | Unit Vent - 2nd Floor Conference Room | 1 | Supply Fan | 0.3 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln Auditorium | Unit Vent - Lincoln Auditorium | 12 | Supply Fan | 0.2 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Various Classrooms | Unit Ventilators | 50 | Supply Fan | 0.2 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Elevator Room | Elevator | 1 | Other | 20.0 | 91.0% | No | | | W | 300 | | No | 91.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Elevator Room | Elevator | 1 | Other | 25.0 | 91.0% | No | | | W | 300 | | No | 91.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | P-R-1&2 - Lincoln | 2 | Heating Hot Water Pump | 15.0 | 93.0% | Yes | | | W | 1,260 | | No | 93.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | P-L-1&2 - Roosevelt | 2 | Heating Hot Water Pump | 7.5 | 93.0% | Yes | | | W | 1,260 | | No | 93.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | RTU 2 - Atrium | 1 | Supply Fan | 5.0 | 86.0% | No | | | W | 2,520 | 4 | No | 89.5% | Yes | 1 | 1.5 | 4,387 | 0 | $503 | $5,028 | $900 | 8.2 |
| Roof | RTU 2 - Atrium | 1 | Exhaust Fan | 2.0 | 84.0% | No | | | W | 2,520 | 4 | No | 86.5% | Yes | 1 | 0.6 | 1,766 | 0 | $203 | $4,182 | $100 | 20.1 |
| Roof | RTU 1 - Classrooms | 1 | Supply Fan | 2.0 | 84.0% | No | | | W | 2,520 | 4 | No | 86.5% | Yes | 1 | 0.6 | 1,766 | 0 | $203 | $4,182 | $100 | 20.1 |
| 2nd Floor Elevator Closet | Furnace - Closet, Elevator and Small Vestibules | 1 | Supply Fan | 0.3 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Ground | RTU - Lincoln Cafeteria | 1 | Supply Fan | 1.0 | 82.0% | No | | | B | 2,520 | 4 | No | 85.5% | Yes | 1 | 0.3 | 923 | 0 | $106 | $3,508 | $75 | 32.4 |
| Media Center | AHU | 2 | Supply Fan | 3.0 | 80.0% | No | | | W | 2,520 | 4 | No | 89.5% | Yes | 2 | 2.0 | 6,297 | 0 | $723 | $9,110 | $400 | 12.1 |
| Various Spaces | Cabinet Unit Heaters | 23 | Supply Fan | 0.1 | 65.0% | No | | | W | 2,520 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Packaged HVAC Inventory & Recommendations

| | | Existing Conditions | | | | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (MBh) | Cooling Mode Efficiency (SEER/IEER/EER) | Heating Mode Efficiency | Manufacturer | Model | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (MBh) | Cooling Mode Efficiency (SEER/IEER/EER) | Heating Mode Efficiency | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Condensing Unit - Media Center | 2 | Split-System | 10.00 | | 10.00 | | Trane | TTA120B300EA | B | 5 | Yes | 2 | Split-System | 10.00 | | 14.00 | | 3.4 | 2,057 | 0 | $236 | $31,788 | $1,580 | 128.0 |
| Exterior Ground | Main Office | 1 | Split-System | 3.00 | | 10.00 | | Airdale | MC4D04040F | B | 5 | Yes | 1 | Split-System | 3.00 | | 16.00 | | 0.7 | 405 | 0 | $46 | $5,517 | $315 | 111.9 |
| Exterior Ground | Nurse's Office | 1 | Split-System | 2.00 | | 10.00 | | Airedale | SCC24DFAOAOAAOB | B | 5 | Yes | 1 | Split-System | 2.00 | | 16.00 | | 0.5 | 270 | 0 | $31 | $4,040 | $210 | 123.6 |
| Exterior Ground | Principle Office | 1 | Split-System | 2.00 | | 10.00 | | Airedale | SCC24DFAOAOAAOB | B | 5 | Yes | 1 | Split-System | 2.00 | | 16.00 | | 0.5 | 270 | 0 | $31 | $4,040 | $210 | 123.6 |
| Exterior Ground | Room 102 | 1 | Split-System | 2.00 | | 10.50 | | Friedrich | MR24C3E | B | 5 | Yes | 1 | Split-System | 2.00 | | 16.00 | | 0.4 | 236 | 0 | $27 | $4,040 | $210 | 141.6 |
| Exterior Ground | Room 202 | 1 | Split-System | 2.00 | | 10.50 | | Friedrich | MR24C3E | B | 5 | Yes | 1 | Split-System | 2.00 | | 16.00 | | 0.4 | 236 | 0 | $27 | $4,040 | $210 | 141.6 |
| Exterior Ground | Vice Principle Office | 1 | Split-System | 1.00 | | 10.00 | | Friedrich | MR12 | B | 5 | Yes | 1 | Split-System | 1.00 | | 16.00 | | 0.2 | 135 | 0 | $15 | $3,428 | $105 | 214.5 |
| 2nd Floor Elevator Closet | Furnace - Closet, Elevator and Small Vestibules | 1 | Electric Forced Air Furnace | | 19.11 | | 1 COP | Lennox | CB19-51-2P | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Ground | RTU - Lincoln Cafeteria | 1 | Package Unit | 6.25 | 96.00 | 11.00 | 0.8 AFUE | Trane | YCH075C3LOAA | B | 5 | Yes | 1 | Package Unit | 6.25 | 96.00 | 14.00 | 0.82 Et | 0.7 | 438 | 3 | $86 | $13,748 | $494 | 154.0 |
| Roof | RTU 2 - Atrium | 1 | Package Unit | 10.00 | 202.00 | 10.10 | 0.81 AFUE | Trane | THC120A3RHAOE96 | B | 5 | Yes | 1 | Package Unit | 10.00 | 202.00 | 14.00 | 0.82 Et | 1.7 | 993 | 3 | $151 | $17,444 | $790 | 110.2 |
| Roof | RTU 1 - Classrooms | 1 | Package Unit | 6.00 | 121.00 | 9.70 | 0.8 AFUE | Trane | THC072A3RH | B | 5 | Yes | 1 | Package Unit | 6.00 | 121.00 | 14.00 | 0.82 Et | 1.1 | 1,062 | 3 | $167 | $13,373 | $474 | 77.3 |
| Cafeteria #2 | Cafeteria #2 | 1 | Electric Resistance Heat | | 17.06 | | 1 COP | | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| 2nd Floor Conference Room | Window AC -2nd Floor Conference Room | 1 | Window AC | 0.40 | | 10.70 | | Frigidaire | FRA055XT7 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 101 | Window AC - Lincoln - Classroom 101 | 1 | Window AC | 1.25 | | 10.70 | | Frigidaire | LRA157MT1 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Classroom 103 | Window AC - Lincoln - Classroom 103 | 1 | Window AC | 2.00 | | 9.40 | | Frigidaire | FAS256R2A | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Faculty Room | Window AC - Lincoln - Faculty Room | 1 | Window AC | 2.00 | | 9.40 | | Friedrich | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Basement Canary | Window AC - Roosevelt - Basement Canary | 1 | Window AC | 1.25 | | 10.70 | | General Electric | | B | 5 | Yes | 1 | Window AC | 1.25 | | 12.00 | | 0.1 | 71 | 0 | $8 | $1,018 | $0 | 125.4 |
| Roosevelt - Cafeteria #2 | Window AC - Roosevelt - Cafeteria #2 | 1 | Window AC | 2.00 | | 9.40 | | | | B | 5 | Yes | 1 | Window AC | 2.00 | | 12.00 | | 0.3 | 258 | 0 | $30 | $1,582 | $0 | 53.5 |

## 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 | Lincoln Roosevelt Elementary | 5 | Condensing Hot Water Boiler | 1,770 | Aerco | Benchmark 2.0 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Demand Control Ventilation Recommendations

| | | Recommendation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Affected | ECM # | Number of Zones | Cooling Capacity of Controlled System (Tons) | Electric Heating Capacity of Controlled System (kBtu/hr) | Output Heating Capacity of Controlled System (MBh) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | RTU-2 - Atrium | 6 | 2.00 | 10.00 | 0.00 | 202.00 | 0.0 | 184 | 11 | $173 | $2,719 | $0 | 15.7 |
| Exterior Ground | RTU - Cafeteria | 6 | 2.00 | 6.25 | 0.00 | 96.00 | 0.0 | 119 | 5 | $87 | $2,719 | $0 | 31.3 |

## 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 |
| Basement | Lincoln Roosevelt Elementary School | 7 | 4 | 1.25 | 0.0 | 0 | 2 | $29 | $48 | $8 | 1.4 |

## DHW Inventory & Recommendations

| | | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Manufacturer | Model | Remaining Useful Life | ECM # | Replace? | System Quantity | System Type | Fuel Type | System Efficiency | Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Basement | Lincoln Roosevelt | 1 | Storage Tank Water Heater (> 50 Gal) | BRADFORD WHITE | D100T2503NA | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Low-Flow Device Recommendations

| | Recommedation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | ECM # | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Various Restrooms | 8 | 33 | Faucet Aerator (Lavatory) | 2.50 | 0.50 | 0.0 | 0 | 37 | $500 | $237 | $118 | 0.2 |
| Faculty Room | 8 | 1 | Faucet Aerator (Kitchen) | 2.50 | 1.50 | 0.0 | 0 | 1 | $8 | $7 | $2 | 0.7 |
| Nurse's Office | 8 | 1 | Faucet Aerator (Lavatory) | 2.50 | 0.50 | 0.0 | 0 | 1 | $15 | $7 | $4 | 0.2 |
| Copy Room | 8 | 1 | Faucet Aerator (Lavatory) | 2.50 | 0.50 | 0.0 | 0 | 1 | $15 | $7 | $4 | 0.2 |

**Commercial Refrigerator/Freezer Inventory & Recommendations**

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Refrigerator/ Freezer Type | Manufacturer | Model | ENERGY STAR Qualified? | ECM # | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen - Lincoln & Roosevelt | 2 | Freezer Chest | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen - Lincoln & Roosevelt | 3 | Refrigerator Chest | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Kitchen | 2 | Stand-Up Freezer, Solid Door (>50 cu. ft.) | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Kitchen | 2 | Stand-Up Refrigerator, Solid Door (>50 cu. ft.) | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Kitchen | 2 | Stand-Up Freezer, Solid Door (>50 cu. ft.) | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Kitchen | 3 | Stand-Up Refrigerator, Solid Door (>50 cu. ft.) | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Kitchen | 1 | Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.) | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

**Cooking Equipment Inventory & Recommendations**

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Type | Manufacturer | Model | High Efficiency Equipement? | ECM # | Install High Efficiency Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roosevelt - Kitchen | 1 | Insulated Food Holding Cabinet (Full Size) | CresCor | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Kitchen | 1 | Electric Combination Oven/Steam Cooker (<15 Pans) | Hobart | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Lincoln - Kitchen | 1 | Electric Convection Oven (Full Size) | Blodgett | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roosevelt - Kitchen | 1 | Electric Convection Oven (Half Size) | Blodgett | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

**Plug Load Inventory**

| | Existing Conditions | | | | | |
|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? | Manufacturer | Model |
| Lincoln - Various Spaces | 25 | Desktop | 150 | No | | |
| Roosevelt - Various Spaces | 34 | Desktop | 150 | No | | |
| Lincoln - Various Spaces | 3 | Coffee Machine | 900 | No | | |
| Roosevelt - Various Spaces | 2 | Coffee Machine | 900 | No | | |
| Lincoln - Various Spaces | 5 | Microwave | 1,000 | No | | |
| Roosevelt - Various Spaces | 5 | Microwave | 1,000 | No | | |
| Lincoln - Various Spaces | 12 | Printer (Medium/Small) | 240 | No | | |
| Roosevelt - Various Spaces | 20 | Printer (Medium/Small) | 240 | No | | |
| Lincoln - Various Spaces | 1 | Printer (Large) | 600 | No | | |
| Roosevelt - Various Spaces | 1 | Printer (Large) | 600 | No | | |
| Lincoln - Various Spaces | 8 | Projector | 200 | No | | |
| Roosevelt - Various Spaces | 20 | Projector | 200 | No | | |
| Lincoln - Various Spaces | 1 | Refrigerator (Mini) | 126 | No | | |
| Roosevelt - Various Spaces | 4 | Refrigerator (Mini) | 126 | No | | |
| Roosevelt - Various Spaces | 1 | Refrigerator (Mini) | 126 | No | | |
| Lincoln - Various Spaces | 1 | Refrigerator (Residential) | 172 | No | | |
| Roosevelt - Various Spaces | 2 | Refrigerator (Residential) | 172 | No | | |
| Lincoln - Various Spaces | 11 | Smartboard | 316 | No | | |
| Roosevelt - Various Spaces | 3 | Smartboard | 316 | No | | |
| Lincoln - Various Spaces | 2 | Television | 124 | No | | |
| Roosevelt - Various Spaces | 1 | Television | 124 | No | | |
| Lincoln Faculty Room | 1 | Toaster | 850 | No | | |
| Lincoln Faculty Room | 1 | Water Cooler | 92 | No | | |
| Roosevelt Woodshop | 1 | Toaster Oven | 1,200 | No | | |
| Lincoln - Kitchen | 4 | Warming Table | 2,000 | No | | |
| Roosevelt - Kitchen | 4 | Warming Table | 2,000 | No | | |
| Lincoln - Kitchen | 1 | Warming Table | 3,000 | No | | |

## Vending Machine Inventory & Recommendations

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

## Custom (High Level) Measure Analysis

**Retro-Commissioning Study**

| | | | | | |
|---|---|---|---|---|---|
| **Building Square Footage** | 65,753 | | **Fuel Utility Rate** | $13.560 | MMBtu |
| **Percent of Conditioned Area Impacted** | 100% | | **Blended Electric Utility Rate** | $0.115 | kWh |

| Existing Conditions | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | Area(s)/System(s) Served | Remaining Useful Life | Total HVAC Motor Usage kWh | Total HVAC Electric Usage kWh | Total HVAC Fuel Usage MMBtu | Description | % Savings HVAC Motor Usage kWh | % Savings HVAC Electric Usage kWh | % Savings HVAC Fuel Usage MMBtu | Estimated Cost per Sqft | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Base Incentives | Enhanced Incentives | Total Incentives | Total Net Cost | Payback w/o Incentives in Years | Simple Payback w/ Incentives in Years |
| HVAC Controls Not Currently Optimized | HVAC Equipment & Systems | 3 | 108,726 | 35,156 | 4,713 | Retro-Commissioning Study | 5% | 5% | 5% | $0.30 | 0.00 | 7,194 | 236 | $4,021 | $19,726 | $0 | $0 | $0 | $19,726 | 4.91 | 4.91 |

# 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

**58**

ENERGY STAR® Score[1]

### Lincoln Roosevelt Elementary School

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 107,350
**Built:** 1918

**For Year Ending:** June 30, 2022
**Date Generated:** May 04, 2023

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

**Property & Contact Information**

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Lincoln Roosevelt Elementary School<br>34 N. Hillside Avenue<br>Succasunna, New Jersey 07876 | Roxbury Township Public Schools<br>42 N. Hillside Avenue<br>Succasunna, NJ 07876<br>(973) 584-6099 | Kathy Kolbusch<br>42 N. Hillside Ave.<br>Succasunna, NJ 07876<br>9735846099 5005<br>kkolbusch@roxbury.org |

**Property ID:** 21476795
**00765557; 00986181:** 021106429029; 021106428026
**S314121241:** 100000080596

**Energy Consumption and Energy Use Intensity (EUI)**

**Site EUI**
57.6 kBtu/ft²

**Source EUI**
81.2 kBtu/ft²

**Annual Energy by Fuel**

| | | |
|---|---|---|
| Electric - Grid (kBtu) | 1,267,331 (20%) |
| Natural Gas (kBtu) | 4,919,336 (80%) |

**National Median Comparison**

| | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 62.8 |
| National Median Source EUI (kBtu/ft²) | 88.5 |
| % Diff from National Median Source EUI | -8% |

**Annual Emissions**

| | |
|---|---|
| Total (Location-Based) GHG Emissions (Metric Tons CO2e/year) | 372 |

### Signature & Stamp of Verifying Professional

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

LP Signature: _______________________Date: ___________

**Licensed Professional**

____ _________
,
(____)____-______
__________________

**Professional Engineer or Registered Architect Stamp (if applicable)**

# Appendix C: Glossary

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

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

| | |
|---|---|
| **SEER** | *Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input. |
| **SEP** | *Statement of energy performance:* a summary document from the ENERGY STAR Portfolio Manager. |
| **Simple Payback** | The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings. |
| **SREC (II)** | *Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array. |
| **T5, T8, T12** | A reference to a linear lamp diameter. The number represents increments of 1/8$^{th}$ 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. |