
# Local Government Energy Audit Report

Rosa Parks Community School

March 23, 2023

*Prepared for:*
Orange Board of Education
369 Main Street
Orange, New Jersey 07050

*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.

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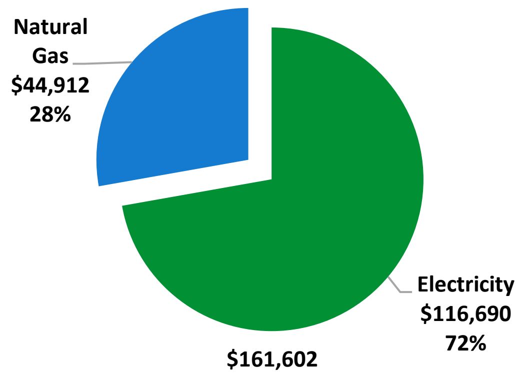
# Table of Contents

# 1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Rosa Parks Community 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: $161,602<br>Electricity: 1,028,033 kWh<br>Natural Gas: 45,619 Therms |  |
| ENERGY STAR® Benchmarking Score | 23 *(1-100 scale)* | This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs. |



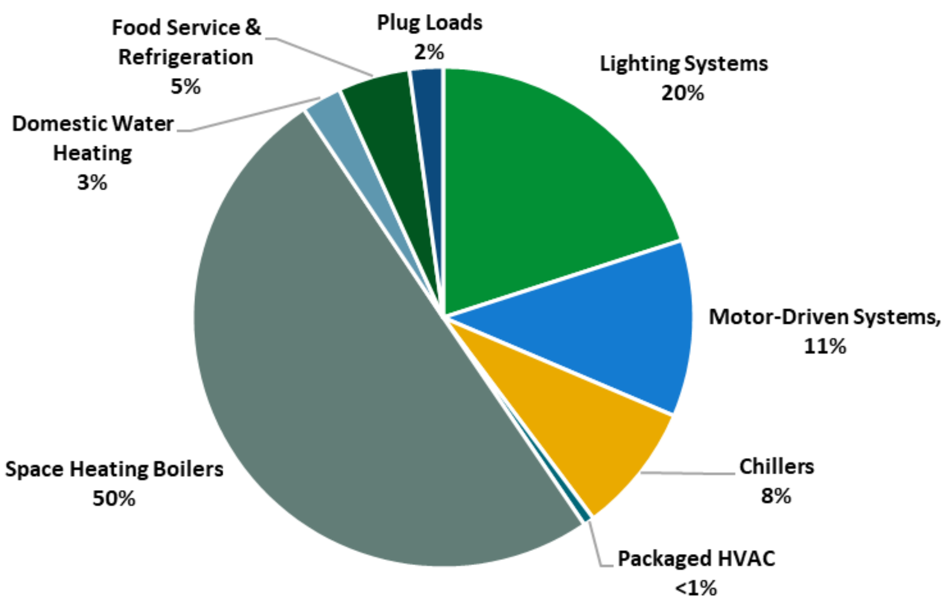


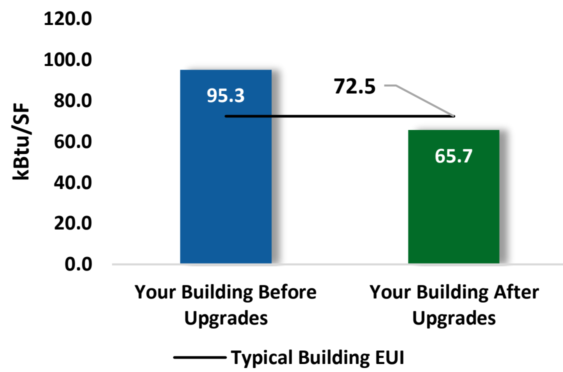

*Figure 1 - Energy Use by System*

## POTENTIAL IMPROVEMENTS

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

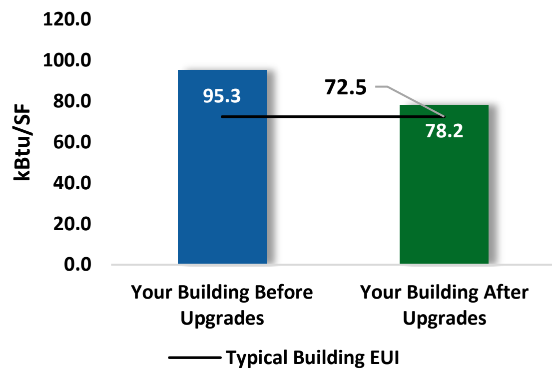
### Scenario 1: Full Package (All Evaluated Measures)

| | |
|---|---|
| Installation Cost | $572,955 |
| Potential Rebates & Incentives[1] | $57,398 |
| Annual Cost Savings | $60,891 |
| Annual Energy Savings | Electricity: 453,779 kWh<br>Natural Gas: 9,531 Therms |
| Greenhouse Gas Emission Savings | 284 Tons |
| Simple Payback | 8.5 Years |
| Site Energy Savings (All Utilities) | 31% |




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

| | |
|---|---|
| Installation Cost | $198,959 |
| Potential Rebates & Incentives | $41,037 |
| Annual Cost Savings | $46,963 |
| Annual Energy Savings | Electricity: 409,707 kWh<br>Natural Gas: 466 Therms |
| Greenhouse Gas Emission Savings | 209 Tons |
| Simple Payback | 3.4 Years |
| Site Energy Savings (all utilities) | 18% |




### On-site Generation Potential

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **259,358** | **44.4** | **-48** | **$28,970** | **$89,917** | **$19,792** | **$70,125** | **2.4** | **255,588** |
| ECM 1 | Install LED Fixtures | Yes | 69,542 | 7.8 | -9 | $7,808 | $27,311 | $3,050 | $24,261 | 3.1 | 69,009 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 189,816 | 36.6 | -39 | $21,162 | $62,606 | $16,742 | $45,864 | 2.2 | 186,579 |
| **Lighting Control Measures** | | | **75,316** | **12.5** | **-16** | **$8,394** | **$39,587** | **$11,960** | **$27,627** | **3.3** | **73,999** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 66,140 | 10.9 | -14 | $7,371 | $29,012 | $3,700 | $25,312 | 3.4 | 64,984 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 9,176 | 1.6 | -2 | $1,023 | $10,575 | $8,260 | $2,315 | 2.3 | 9,015 |
| **Variable Frequency Drive (VFD) Measures** | | | **72,635** | **19.1** | **78** | **$9,015** | **$67,836** | **$8,875** | **$58,961** | **6.5** | **82,299** |
| ECM 5 | Install VFDs on Constant Volume (CV) Fans | Yes | 45,873 | 15.9 | 0 | $5,207 | $39,323 | $6,300 | $33,023 | 6.3 | 46,194 |
| ECM 6 | Install VFDs on Heating Water Pumps | Yes | 20,979 | 3.1 | 0 | $2,381 | $18,354 | $2,400 | $15,954 | 6.7 | 21,126 |
| ECM 7 | Install VFDs on Kitchen Hood Fan Motors | Yes | 5,783 | 0.0 | 78 | $1,426 | $10,159 | $175 | $9,984 | 7.0 | 14,980 |
| **Unitary HVAC Measures** | | | **2,955** | **2.5** | **0** | **$335** | **$23,177** | **$1,103** | **$22,074** | **65.8** | **2,976** |
| ECM 8 | Install High Efficiency Air Conditioning Units | No | 2,955 | 2.5 | 0 | $335 | $23,177 | $1,103 | $22,074 | 65.8 | 2,976 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **570** | **$5,615** | **$211,409** | **$14,362** | **$197,048** | **35.1** | **66,778** |
| ECM 9 | Install High Efficiency Hot Water Boilers | No | 0 | 0.0 | 570 | $5,615 | $211,409 | $14,362 | $197,048 | 35.1 | 66,778 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **42** | **$409** | **$8,974** | **$937** | **$8,037** | **19.6** | **4,868** |
| ECM 10 | Install High Efficiency Gas-Fired Water Heater | No | 0 | 0.0 | 10 | $96 | $8,493 | $697 | $7,797 | 80.9 | 1,146 |
| ECM 11 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 32 | $313 | $480 | $240 | $240 | 0.8 | 3,722 |
| **Food Service & Refrigeration Measures** | | | **4,433** | **0.3** | **0** | **$503** | **$5,007** | **$370** | **$4,637** | **9.2** | **4,464** |
| ECM 12 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 785 | 0.1 | 0 | $89 | $910 | $120 | $790 | 8.9 | 791 |
| ECM 13 | Refrigeration Controls | No | 2,035 | 0.0 | 0 | $231 | $3,867 | $200 | $3,667 | 15.9 | 2,050 |
| ECM 14 | Vending Machine Control | Yes | 1,612 | 0.2 | 0 | $183 | $230 | $50 | $180 | 1.0 | 1,623 |
| **Custom Measures** | | | **39,082** | **0.0** | **326** | **$7,650** | **$127,050** | **$0** | **$127,050** | **16.6** | **77,573** |
| ECM 15 | Upgrade/Replace Energy Management System | No | 39,082 | 0.0 | 326 | $7,650 | $127,050 | $0 | $127,050 | 16.6 | 77,573 |
| **TOTALS (COST EFFECTIVE MEASURES)** | | | **409,707** | **76.3** | **47** | **$46,963** | **$198,959** | **$41,037** | **$157,922** | **3.4** | **418,022** |
| **TOTALS (ALL MEASURES)** | | | **453,779** | **78.8** | **953** | **$60,891** | **$572,955** | **$57,398** | **$515,558** | **8.5** | **568,543** |

* - 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 Rosa Parks Community 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 October 14, 2022, TRC performed an energy audit at Rosa Parks Community School located in Orange, New Jersey. TRC met with Edwin Vasquez to review the facility operations and help focus our investigation on specific energy-using systems.

Rosa Parks Community School is a four-story, 84,700 square foot building built in 1880. Spaces include classrooms, offices, conference rooms, gymnasium, locker rooms, libraries, cafeteria, kitchen, lounges, corridors, stairwells, parking garage, restrooms, storage rooms, electrical and mechanical space.

Lighting for the facility is provided mainly by linear fluorescent T8 fixtures. Two chillers and three boilers provide cooling and heating to spaces. The building has one diesel-fired generator to provide emergency backup electricity. There is one passenger elevator located in the facility.

## 2.2 Building Occupancy

The facility is occupied year-round with a typical occupancy of 600 students and 75 staff. The building has limited use on the weekends and closes at 10:30 PM on weekdays.

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Rosa Parks Community School | Weekday | 6:00 AM - 10:30 PM |
| | Weekend | Limited Use |

*Figure 3 - Building Occupancy Schedule*

## 2.3 Building Envelope

Building walls are concrete block over structural steel with a brick and stone facade. The roof is flat, covered with a gray membrane with stone ballast and is in good condition.

The windows are double glazed and have aluminum frames with thermal breaks. The glass-to-frame seals are in fair condition. The operable window weather seals are in fair condition, showing little evidence of excessive wear. Exterior doors have metal frames and are in fair condition with worn door seals. Degraded window and door seals increase drafts and outside air infiltration. Overall, the building envelope appears in good condition.

*Building Walls*

*Building Windows*

Entrance Door


Exit Door

Roof

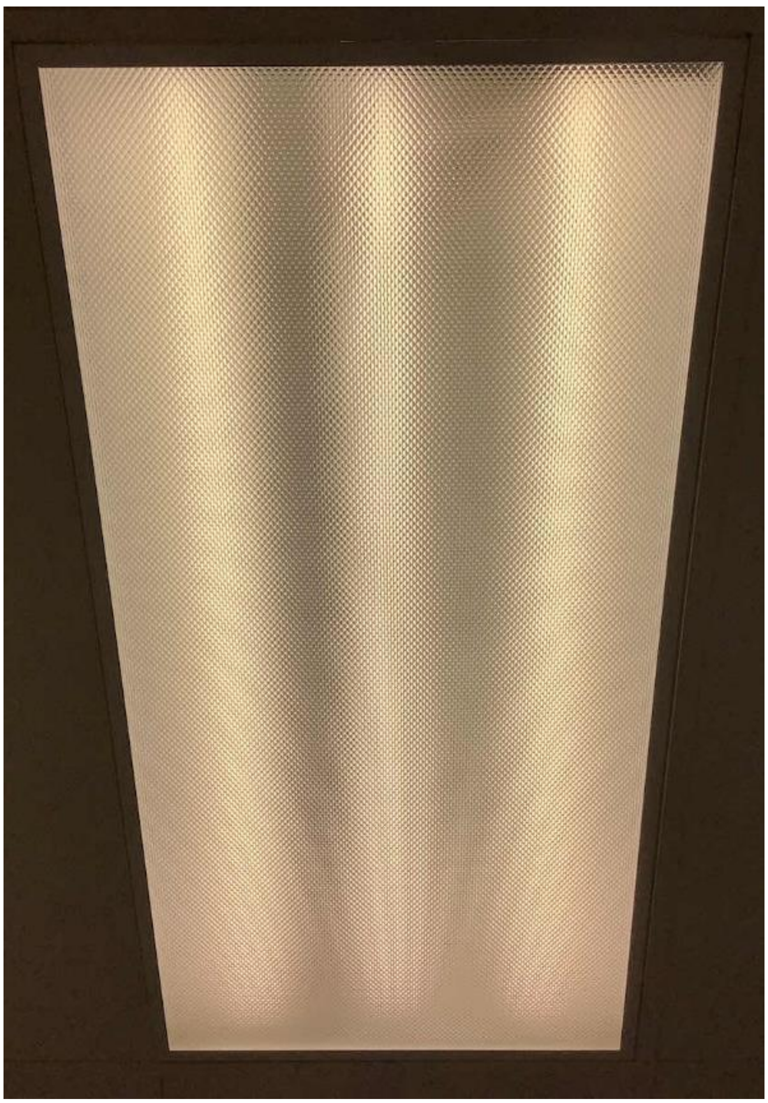
## 2.4 Lighting Systems

The primary interior lighting system uses 32-Watt fluorescent T8 lamps. Fixture types include 1-lamp, 2-lamp, 3-lamp, and 4-lamp, 2-foot and 4-foot long recessed, surface mounted, and pendant fixtures with linear and U-bend tube lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Additionally, compact fluorescent lamps (CFL), metal halide (MH), and LED lamps are also used in some spaces. Typically, CFLs at this site use 26-Watts, while MH lamps draw 70-Watts and 400-Watts. Exit signs use LED sources.

Gymnasium fixtures have a mix of manually controlled high bay LED and MH lamps. The parking garage uses manually controlled LED lamps that are on at all hours of the day.

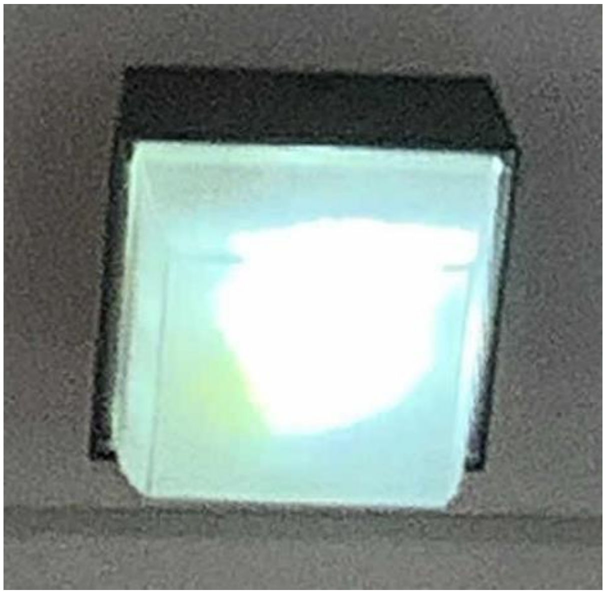
Interior light fixtures are controlled by manual wall switches. All light fixtures are in good condition. Interior lighting levels were generally sufficient. Exterior fixtures use LED, incandescent, and MH lamps. Exterior fixtures are photocell and timer controlled.



*Fluorescent T8 Fixture*

*Fluorescent T8 Fixture*

*Gymnasium LED Fixture*



*MH Fixture*

*Exterior LED Fixture*

*Exterior MH Fixture*

## 2.5 Air Handling Systems

**Unit Ventilators**

Unit ventilators (UV) are used to condition classrooms and offices throughout the building. These UVs each are equipped with chilled water-cooling coils, hot water heating coils, supply fan motors, and pneumatically controlled outside air dampers. The units are in fair condition. The units can be monitored and controlled through the facility's building automation system (BAS).

Unit Ventilator

## Unitary Electric HVAC Equipment

Areas of the building are conditioned using one window AC unit, and three split AC systems. These units have cooling capacities between 1 ton to 3 tons with an estimated efficiency of 10 EER. The units are in fair condition and have been recommended for replacement.

Split AC Systems

## Unitary Heating Equipment

Areas of the building are heated by four electric resistance heaters ranging from 3 kW to 5 kW. The units are in good condition and are controlled by manual dial thermostats.


*Electric Resistance Heaters*

## Air Handling Units (AHUs)

The facility is served by a total of five air handling units (AHUs). The units provide heating and cooling to spaces as noted below. Units are equipped with hot water heating coils and chilled water-cooling coils. Fans are driven by a mix of constant speed and VFD controlled motors. The units are controlled and monitored by the onsite BAS. Refer to Appendix A for detailed information about each unit.

| Units | Area Served | Heating System | Cooling System | VFD Controls | Supply Fan (hp) | Return/Exhaust Fan (hp) |
|---|---|---|---|---|---|---|
| AHU-1 | 1st / 2nd Floors | Boilers | Chillers | Both Fans | 10 | 3 |
| AHU-2 | Cafeteria | Boilers | Chillers | Exhaust Fan | 10 | 3 |
| AHU-3 | Gymnasium | Boilers | Chillers | Exhaust Fan | 10 | 5 |
| AHU-4 | School Building | Boilers | Chillers | None | 15 | 5 |
| AHU-5 | School Building | Boilers | Chillers | None | 10 | 5 |

*Air Handling Unit (AHU-3)*


*Air Handling Unit (AHU-4)*

## 2.6 Heating Hot Water Systems

The building's heating system consists of three Weil McLain gas-fired hot water boilers, each with an output capacity of 2,176 MBh. The burners are fully modulating with a nominal efficiency of 80%. The boilers are configured in a lead/lag control scheme and controlled by the facility's BAS. Multiple boilers are required under high load conditions. Installed in 2004, the boilers are in fair condition. There is a service contract in place.

The boilers are configured in a constant flow primary-secondary distribution with one fractional hp constant speed hot water pump connect to each boiler (BP-1 through BP-3) running the primary loop and three, 15 hp constant speed hot water pumps (HWP-1 and HWP-2) operating the secondary loop with an automated control scheme. The boilers provide hot water to the air handling units, unit ventilators, and unit heaters.


*Hot Water Boilers*

*Heating Hot Water Pumps*

## 2.7 Chilled Water Systems

The chiller plant consists of two, 208-ton York constant speed, air-cooled screw chillers (CH1 and CH2) located on the roof. The chillers are configured in a primary distribution loop with three, 20 hp constant speed chilled water pumps (CHWP-1 through CHWP-3). The chillers supply chilled water to the air handling units and unit ventilators. Chilled water temperatures and chiller operating schedules are controlled by the facility BAS. Installed in 2004, the chillers are in fair condition.

*Air-cooled Chillers*

*Chilled Water Pumps*

## 2.8 Building Automation System (BAS)

A BAS controls the HVAC equipment, boilers, chillers, and air handlers. The BAS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures, and chilled water loop temperatures. The BAS is currently unavailable for access and has been recommended for an upgrade or replacement.

## 2.9 Domestic Hot Water

Hot water is produced by three, 199 MBh gas-fired storage water heaters each with a 100-gallon capacity and a nominal efficiency of 80%. Installed in 2003 and 2018, the units are in good to fair condition. Three fractional circulation pumps distribute water to end uses. The circulation pumps operate continuously. The domestic hot water pipes are insulated, and the insulation is in good condition.

*Water Heaters*

## 2.10 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used to prepare meals for students and staff. Most cooking is done using convection gas-fired ovens. Bulk prepared foods are held in an electric holding cabinet. Equipment is not high efficiency and is in fair condition.

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


*Electric Holding Cabinet*


*Gas-fired Ovens*

## 2.11 Refrigeration

The kitchen has one standard efficiency refrigerator chest. The unit is in good condition.

The walk-in refrigerator has an estimated 0.5-ton compressor located above the walk-in and a 1-fan evaporator. The walk-in medium temperature freezer has a 0.75-ton compressor located above the walk-in and a 2-fan evaporator.

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

*Walk-in Refrigerator*

*Walk-in Freezer*

## 2.12 Plug Load and Vending Machines

The location is doing a great job managing the electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are 84 computer workstations throughout the facility. Plug loads throughout the building include general cafe and office equipment. There are classroom typical loads such as smartboards and projectors, and typical office loads such as copiers, printers, microwaves, televisions, and mini fridges.

There is one residential-style refrigerator that is used to store food and drinks, and one refrigerated beverage vending machine. The vending machine is not equipped with occupancy-based controls.


*Vending Machine*

*Residential-Style Refrigerator*

## 2.13 Water-Using Systems

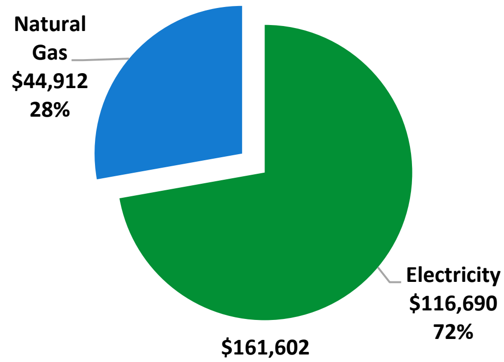
There are 29 restrooms and locker rooms with toilets, showers, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher.

*Typical Restroom Sinks*

# 3 Energy Use and Costs

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

| Utility Summary | | |
|---|---|---|
| Fuel | Usage | Cost |
| Electricity | 1,028,033 kWh | $116,690 |
| Natural Gas | 45,619 Therms | $44,912 |
| Total | | $161,602 |




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

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

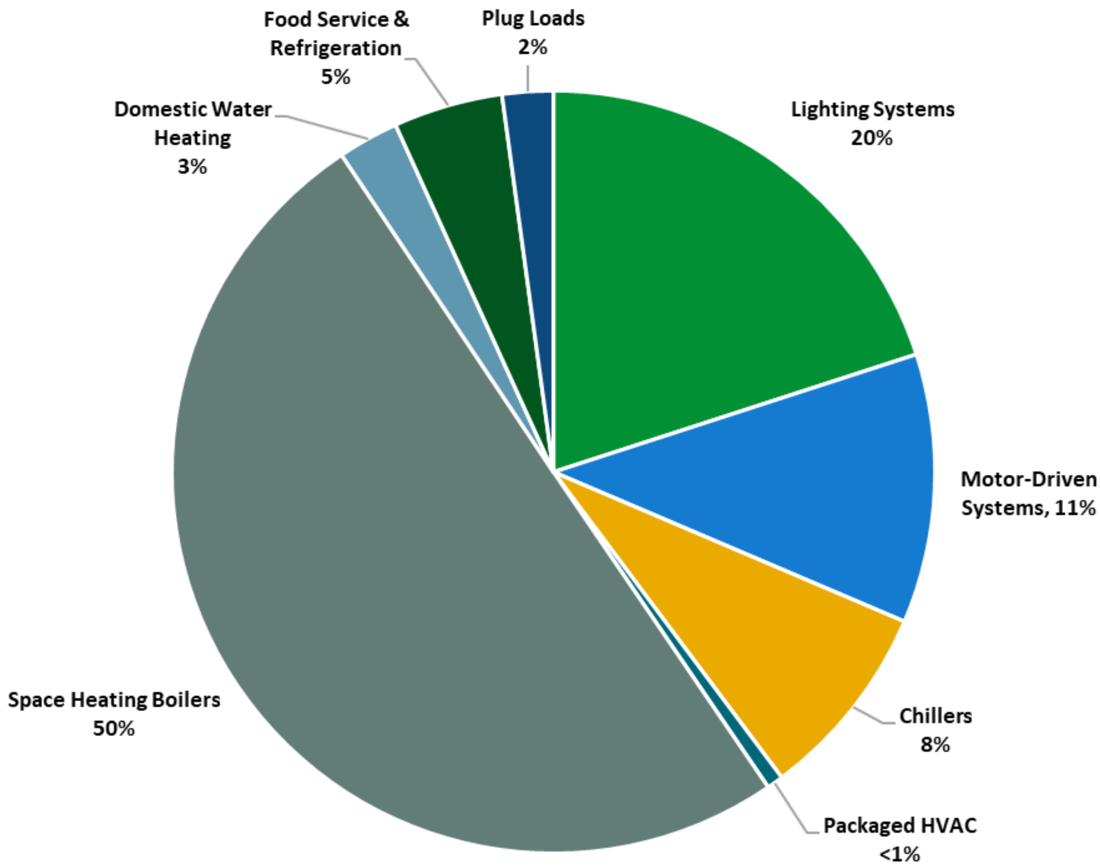
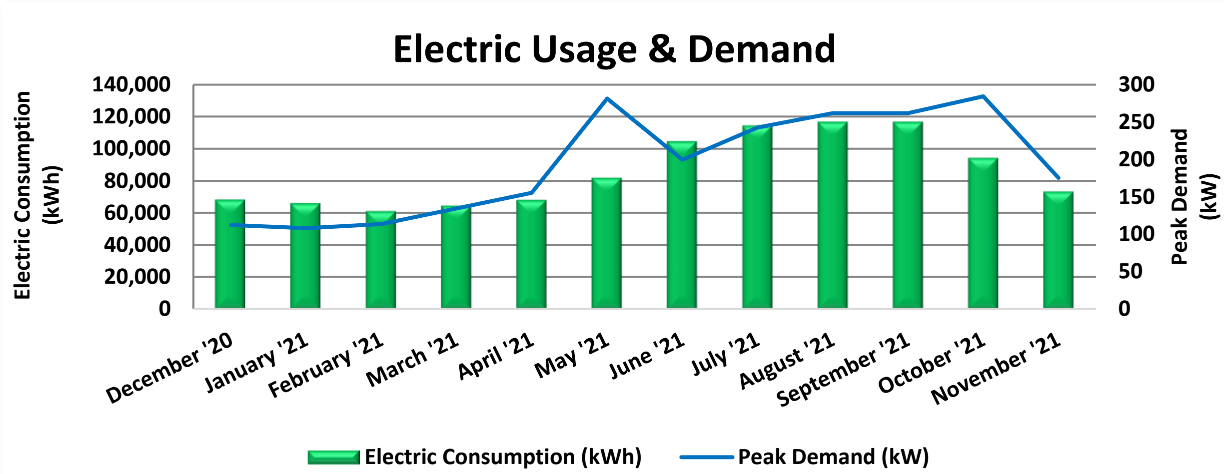



*Figure 4 - Energy Balance*

## 3.1 Electricity

PSE&G delivers electricity under rate class Large Power & Lighting Secondary (LPLS).



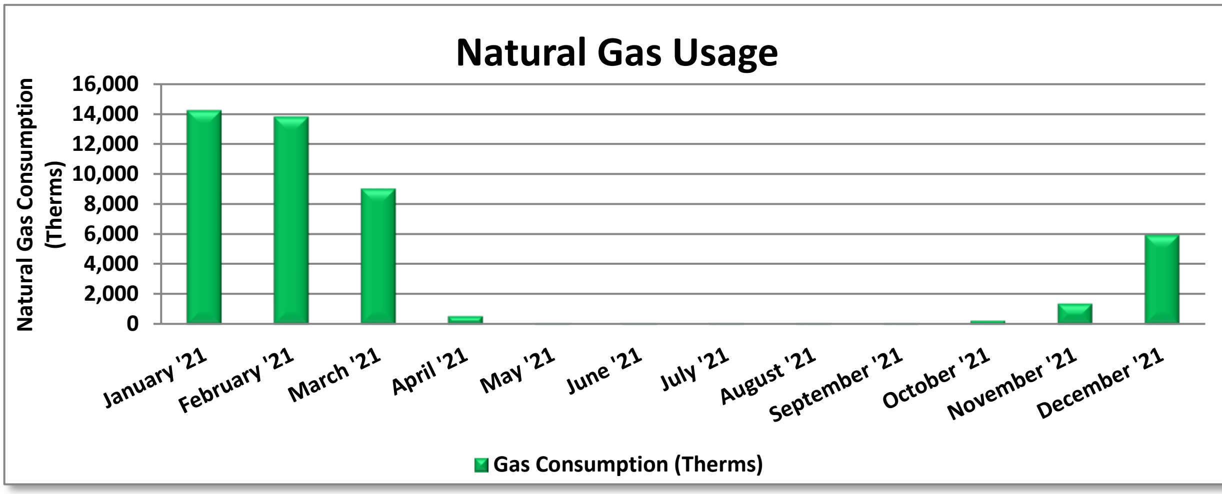

| Electric Billing Data | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 12/30/20 | 30 | 68,266 | 112 | $422 | $8,336 |
| 1/30/21 | 31 | 66,068 | 108 | $406 | $7,901 |
| 2/28/21 | 29 | 60,951 | 113 | $427 | $7,570 |
| 3/30/21 | 30 | 64,448 | 134 | $511 | $8,378 |
| 4/30/21 | 31 | 67,945 | 156 | $585 | $8,423 |
| 5/31/21 | 31 | 81,764 | 281 | $1,065 | $9,427 |
| 6/30/21 | 30 | 104,304 | 200 | $2,556 | $12,056 |
| 7/30/21 | 30 | 114,062 | 243 | $3,102 | $13,211 |
| 8/30/21 | 31 | 116,505 | 262 | $3,350 | $12,367 |
| 9/30/21 | 31 | 116,505 | 262 | $3,350 | $12,367 |
| 10/31/21 | 31 | 94,110 | 285 | $1,077 | $9,096 |
| 11/30/21 | 30 | 73,105 | 176 | $664 | $7,559 |
| **Totals** | **365** | **1,028,033** | **285** | **$17,515** | **$116,690** |
| **Annual** | **365** | **1,028,033** | **285** | **$17,515** | **$116,690** |

Notes:

- Peak demand of 285 kW occurred in October 2021.
- Average demand over the past 12 months was 194 kW.
- The average electric cost over the past 12 months was $0.114/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

## 3.2 Natural Gas

PSE&G delivers natural gas under rate class Large Volume Gas (LVG).




| Gas Billing Data | | | |
|---|---|---|---|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 1/20/21 | 34 | 14,226 | $10,772 |
| 2/17/21 | 28 | 13,796 | $11,474 |
| 3/19/21 | 30 | 9,028 | $8,460 |
| 4/20/21 | 32 | 559 | $525 |
| 5/19/21 | 29 | 92 | $210 |
| 6/17/21 | 29 | 88 | $210 |
| 7/20/21 | 33 | 83 | $198 |
| 8/18/21 | 29 | 78 | $213 |
| 9/17/21 | 30 | 65 | $207 |
| 10/18/21 | 31 | 265 | $415 |
| 11/16/21 | 29 | 1,389 | $3,761 |
| 12/17/21 | 31 | 5,950 | $8,468 |
| **Totals** | **365** | **45,619** | **$44,912** |
| **Annual** | **365** | **45,619** | **$44,912** |

Notes:

- The average gas cost for the past 12 months is $0.984/therm, which is the blended rate used throughout the analysis.
- Summer gas consumption can be attributed to domestic hot water and cooking equipment usage.

## 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** | **23** |
| --- | --- |

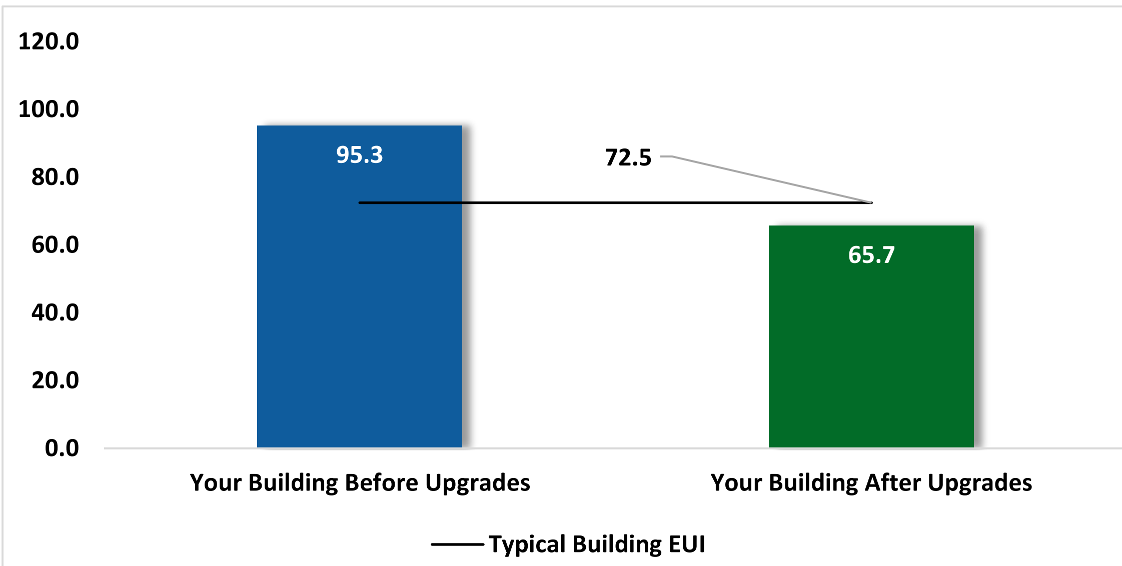



*Figure 5 - Energy Use Intensity Comparison*[3]

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

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

[3] Based on all evaluated ECMs

## Tracking Your Energy Performance

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

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

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

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

# 4 Energy Conservation Measures

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

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

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **259,358** | **44.4** | **-48** | **$28,970** | **$89,917** | **$19,792** | **$70,125** | **2.4** | **255,588** |
| ECM 1 | Install LED Fixtures | Yes | 69,542 | 7.8 | -9 | $7,808 | $27,311 | $3,050 | $24,261 | 3.1 | 69,009 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 189,816 | 36.6 | -39 | $21,162 | $62,606 | $16,742 | $45,864 | 2.2 | 186,579 |
| **Lighting Control Measures** | | | **75,316** | **12.5** | **-16** | **$8,394** | **$39,587** | **$11,960** | **$27,627** | **3.3** | **73,999** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 66,140 | 10.9 | -14 | $7,371 | $29,012 | $3,700 | $25,312 | 3.4 | 64,984 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 9,176 | 1.6 | -2 | $1,023 | $10,575 | $8,260 | $2,315 | 2.3 | 9,015 |
| **Variable Frequency Drive (VFD) Measures** | | | **72,635** | **19.1** | **78** | **$9,015** | **$67,836** | **$8,875** | **$58,961** | **6.5** | **82,299** |
| ECM 5 | Install VFDs on Constant Volume (CV) Fans | Yes | 45,873 | 15.9 | 0 | $5,207 | $39,323 | $6,300 | $33,023 | 6.3 | 46,194 |
| ECM 6 | Install VFDs on Heating Water Pumps | Yes | 20,979 | 3.1 | 0 | $2,381 | $18,354 | $2,400 | $15,954 | 6.7 | 21,126 |
| ECM 7 | Install VFDs on Kitchen Hood Fan Motors | Yes | 5,783 | 0.0 | 78 | $1,426 | $10,159 | $175 | $9,984 | 7.0 | 14,980 |
| **Unitary HVAC Measures** | | | **2,955** | **2.5** | **0** | **$335** | **$23,177** | **$1,103** | **$22,074** | **65.8** | **2,976** |
| ECM 8 | Install High Efficiency Air Conditioning Units | No | 2,955 | 2.5 | 0 | $335 | $23,177 | $1,103 | $22,074 | 65.8 | 2,976 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **570** | **$5,615** | **$211,409** | **$14,362** | **$197,048** | **35.1** | **66,778** |
| ECM 9 | Install High Efficiency Hot Water Boilers | No | 0 | 0.0 | 570 | $5,615 | $211,409 | $14,362 | $197,048 | 35.1 | 66,778 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **42** | **$409** | **$8,974** | **$937** | **$8,037** | **19.6** | **4,868** |
| ECM 10 | Install High Efficiency Gas-Fired Water Heater | No | 0 | 0.0 | 10 | $96 | $8,493 | $697 | $7,797 | 80.9 | 1,146 |
| ECM 11 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 32 | $313 | $480 | $240 | $240 | 0.8 | 3,722 |
| **Food Service & Refrigeration Measures** | | | **4,433** | **0.3** | **0** | **$503** | **$5,007** | **$370** | **$4,637** | **9.2** | **4,464** |
| ECM 12 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 785 | 0.1 | 0 | $89 | $910 | $120 | $790 | 8.9 | 791 |
| ECM 13 | Refrigeration Controls | No | 2,035 | 0.0 | 0 | $231 | $3,867 | $200 | $3,667 | 15.9 | 2,050 |
| ECM 14 | Vending Machine Control | Yes | 1,612 | 0.2 | 0 | $183 | $230 | $50 | $180 | 1.0 | 1,623 |
| **Custom Measures** | | | **39,082** | **0.0** | **326** | **$7,650** | **$127,050** | **$0** | **$127,050** | **16.6** | **77,573** |
| ECM 15 | Upgrade/Replace Energy Management System | No | 39,082 | 0.0 | 326 | $7,650 | $127,050 | $0 | $127,050 | 16.6 | 77,573 |
| **TOTALS** | | | **453,779** | **78.8** | **953** | **$60,891** | **$572,955** | **$57,398** | **$515,558** | **8.5** | **568,543** |

* - 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** | | **259,358** | **44.4** | **-48** | **$28,970** | **$89,917** | **$19,792** | **$70,125** | **2.4** | **255,588** |
| ECM 1 | Install LED Fixtures | 69,542 | 7.8 | -9 | $7,808 | $27,311 | $3,050 | $24,261 | 3.1 | 69,009 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 189,816 | 36.6 | -39 | $21,162 | $62,606 | $16,742 | $45,864 | 2.2 | 186,579 |
| **Lighting Control Measures** | | **75,316** | **12.5** | **-16** | **$8,394** | **$39,587** | **$11,960** | **$27,627** | **3.3** | **73,999** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 66,140 | 10.9 | -14 | $7,371 | $29,012 | $3,700 | $25,312 | 3.4 | 64,984 |
| ECM 4 | Install High/Low Lighting Controls | 9,176 | 1.6 | -2 | $1,023 | $10,575 | $8,260 | $2,315 | 2.3 | 9,015 |
| **Variable Frequency Drive (VFD) Measures** | | **72,635** | **19.1** | **78** | **$9,015** | **$67,836** | **$8,875** | **$58,961** | **6.5** | **82,299** |
| ECM 5 | Install VFDs on Constant Volume (CV) Fans | 45,873 | 15.9 | 0 | $5,207 | $39,323 | $6,300 | $33,023 | 6.3 | 46,194 |
| ECM 6 | Install VFDs on Heating Water Pumps | 20,979 | 3.1 | 0 | $2,381 | $18,354 | $2,400 | $15,954 | 6.7 | 21,126 |
| ECM 7 | Install VFDs on Kitchen Hood Fan Motors | 5,783 | 0.0 | 78 | $1,426 | $10,159 | $175 | $9,984 | 7.0 | 14,980 |
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **32** | **$313** | **$480** | **$240** | **$240** | **0.8** | **3,722** |
| ECM 11 | Install Low-Flow DHW Devices | 0 | 0.0 | 32 | $313 | $480 | $240 | $240 | 0.8 | 3,722 |
| **Food Service & Refrigeration Measures** | | **2,397** | **0.3** | **0** | **$272** | **$1,140** | **$170** | **$970** | **3.6** | **2,414** |
| ECM 12 | Refrigerator/Freezer Case Electrically Commutated Motors | 785 | 0.1 | 0 | $89 | $910 | $120 | $790 | 8.9 | 791 |
| ECM 14 | Vending Machine Control | 1,612 | 0.2 | 0 | $183 | $230 | $50 | $180 | 1.0 | 1,623 |
| **TOTALS** | | **409,707** | **76.3** | **47** | **$46,963** | **$198,959** | **$41,037** | **$157,922** | **3.4** | **418,022** |

* - 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** | | **259,358** | **44.4** | **-48** | **$28,970** | **$89,917** | **$19,792** | **$70,125** | **2.4** | **255,588** |
| ECM 1 | Install LED Fixtures | 69,542 | 7.8 | -9 | $7,808 | $27,311 | $3,050 | $24,261 | 3.1 | 69,009 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 189,816 | 36.6 | -39 | $21,162 | $62,606 | $16,742 | $45,864 | 2.2 | 186,579 |

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

### ECM 1: Install LED Fixtures

Replace existing fixtures containing high-intensity discharge (HID) lamps with new LED light fixtures. This measure saves energy by installing LEDs, which use less power than other technologies with a comparable light output.

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

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

**Affected Building Areas:** gymnasium and exterior MH fixtures.

### ECM 2: Retrofit Fixtures with LED Lamps

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

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

**Affected Building Areas:** all areas with incandescent & CFL lamps, and fluorescent fixtures with T8 tubes.

## 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** | | **75,316** | **12.5** | **-16** | **$8,394** | **$39,587** | **$11,960** | **$27,627** | **3.3** | **73,999** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 66,140 | 10.9 | -14 | $7,371 | $29,012 | $3,700 | $25,312 | 3.4 | 64,984 |
| ECM 4 | Install High/Low Lighting Controls | 9,176 | 1.6 | -2 | $1,023 | $10,575 | $8,260 | $2,315 | 2.3 | 9,015 |

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:** classrooms, offices, conference rooms, lounges, gymnasium, locker rooms, libraries, cafeteria, kitchen, garage, restrooms, and storage rooms.

### ECM 4: Install High/Low Lighting Controls

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

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

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

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

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

**Affected Building Areas**: hallways, lobbies, and stairwells.

## 4.3 Variable Frequency Drives (VFD)

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variable Frequency Drive (VFD) Measures** | | **72,635** | **19.1** | **78** | **$9,015** | **$67,836** | **$8,875** | **$58,961** | **6.5** | **82,299** |
| ECM 5 | Install VFDs on Constant Volume (CV) Fans | 45,873 | 15.9 | 0 | $5,207 | $39,323 | $6,300 | $33,023 | 6.3 | 46,194 |
| ECM 6 | Install VFDs on Heating Water Pumps | 20,979 | 3.1 | 0 | $2,381 | $18,354 | $2,400 | $15,954 | 6.7 | 21,126 |
| ECM 7 | Install VFDs on Kitchen Hood Fan Motors | 5,783 | 0.0 | 78 | $1,426 | $10,159 | $175 | $9,984 | 7.0 | 14,980 |

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new inverter duty rated motor to conservatively account for the cost of an inverter duty rated motor.

### ECM 5: Install VFDs on Constant Volume (CV) Fans

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

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

VAV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g., 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

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

**Affected Air Handlers:** AHU-2 through AHU-5 supply fans, AHU-4 and AHU-5 return fans.

### ECM 6: Install VFDs on Heating Water Pumps

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

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

**Affected Pumps:** HWP-1 and HWP-2.

**ECM 7: Install VFDs on Kitchen Hood Fan Motors**

Install VFDs and sensors to control the kitchen hood fan motor(s). The air flow of the hood is varied based on two key inputs: temperature and smoke/cooking fumes. The VFD controls the amount of exhaust (and kitchen make-up air) based on temperature—the lower the temperature the lower the flow. If the optic sensor is triggered by smoke or cooking fumes, the speed of the fan ramps up to 100%.

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

## 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** | | **2,955** | **2.5** | **0** | **$335** | **$23,177** | **$1,103** | **$22,074** | **65.8** | **2,976** |
| ECM 8 | Install High Efficiency Air Conditioning Units | 2,955 | 2.5 | 0 | $335 | $23,177 | $1,103 | $22,074 | 65.8 | 2,976 |

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 window AC unit and split systems are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

**ECM 8: Install High Efficiency Air Conditioning Units**

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

**Affected Units:** window AC unit serving the garage office, and the rooftop split systems.

## 4.5 Gas-Fired Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Heating (HVAC/Process) Replacement** | | **0** | **0.0** | **570** | **$5,615** | **$211,409** | **$14,362** | **$197,048** | **35.1** | **66,778** |
| ECM 9 | Install High Efficiency Hot Water Boilers | 0 | 0.0 | 570 | $5,615 | $211,409 | $14,362 | $197,048 | 35.1 | 66,778 |

### ECM 9: Install High Efficiency Hot Water Boilers

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

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are evaluated when the return water temperature is less than 130°F during most of the operating hours.

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

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

## 4.6 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** | **42** | **$409** | **$8,974** | **$937** | **$8,037** | **19.6** | **4,868** |
| ECM 10 | Install High Efficiency Gas-Fired Water Heater | 0 | 0.0 | 10 | $96 | $8,493 | $697 | $7,797 | 80.9 | 1,146 |
| ECM 11 | Install Low-Flow DHW Devices | 0 | 0.0 | 32 | $313 | $480 | $240 | $240 | 0.8 | 3,722 |

### ECM 10: Install High Efficiency Gas-Fired Water Heater

Replace the existing tank water heater with a high efficiency condensing tank water heater. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

### ECM 11: Install Low-Flow DHW Devices

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

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

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

## 4.7 Food Service & Refrigeration Measures

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2$e Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| Food Service & Refrigeration Measures | | 4,433 | 0.3 | 0 | $503 | $5,007 | $370 | $4,637 | 9.2 | 4,464 |
| ECM 12 | Refrigerator/Freezer Case Electrically Commutated Motors | 785 | 0.1 | 0 | $89 | $910 | $120 | $790 | 8.9 | 791 |
| ECM 13 | Refrigeration Controls | 2,035 | 0.0 | 0 | $231 | $3,867 | $200 | $3,667 | 15.9 | 2,050 |
| ECM 14 | Vending Machine Control | 1,612 | 0.2 | 0 | $183 | $230 | $50 | $180 | 1.0 | 1,623 |

### ECM 12: Refrigerator/Freezer Case Electrically Commutated Motors

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

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

### ECM 13: Refrigeration Controls

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

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

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

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

### ECM 14: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

## 4.8 Custom Measures

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Custom Measures** | | **39,082** | **0.0** | **326** | **$7,650** | **$127,050** | **$0** | **$127,050** | **16.6** | **77,573** |
| ECM 15 | Upgrade/Replace Energy Management System | 39,082 | 0.0 | 326 | $7,650 | $127,050 | $0 | $127,050 | 16.6 | 77,573 |

### ECM 15: Upgrade/Replace Energy Management System

Based on our site survey and on conversations with facility staff, it appears that the existing building automation system (BAS) is substantially limited in its capabilities, means of control, monitoring/ reporting function, or condition relative to new systems available in the marketplace. A substantial upgrade to your site's BAS could increase the efficiency of your building HVAC system operation.

The current generation BAS typically provides building systems with a network of temperature and pressure sensors that obtain feedback about field conditions, and it provides signals to control systems to adjust system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatics controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

A controls upgrade would enable automated equipment start and stop times, temperature setpoints, and lockouts and deadbands to be programmed remotely using a graphic interface. Controls can be configured to optimize ventilation and outside air intake by adjusting economizer position, damper function, and fan speed. Existing chilled and hot water distribution system controls are typically tied in, including associated pumps and valves. Coordinated control of HVAC systems is dependent on a network of sensors and status points. A comprehensive building control system provides monitoring and control for all HVAC systems, so operators can adjust system programming for optimal comfort and energy savings.

It is recommended that an HVAC engineer or contractor who specializes in energy management systems be contacted for a detailed evaluation and implementation costs. A controls expert will be able to tell you to what extent an existing system can be refurbished or expanded, what sensors should be replaced, what additional HVAC systems could be controlled, and what monitoring and graphic capabilities can be added. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in upgrading or replacing a BAS. Based on industry standards and previous project experience, the potential energy savings may be up to 20% of existing HVAC energy use. We estimate the cost for upgrading/replacing a BAS is approximately $1.50 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to implement the system upgrade/replacement. For the purposes of this report, we have conservatively estimated savings to be 8.0% 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 Maintenance

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

## Fans to Reduce Cooling Load

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

## Thermostat Schedules and Temperature Resets

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

## Economizer Maintenance

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

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

## Chiller Maintenance

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

## AC System Evaporator/Condenser Coil Cleaning

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

## HVAC Filter Cleaning and Replacement

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

## Ductwork Maintenance

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

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

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

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

## Boiler Maintenance

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

## 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.

## 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 five and ten percent on energy costs. When condenser coils are dirty, your commercial refrigerators and freezers work harder to maintain the temperature inside. Worn gaskets, hinges, door handles, or faulty seals cause cold air to leak from the unit, forcing the unit to run longer and use more electricity.

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

## Water Conservation

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

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

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

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

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

## Procurement Strategies

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

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

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

# 6 On-site Generation

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

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

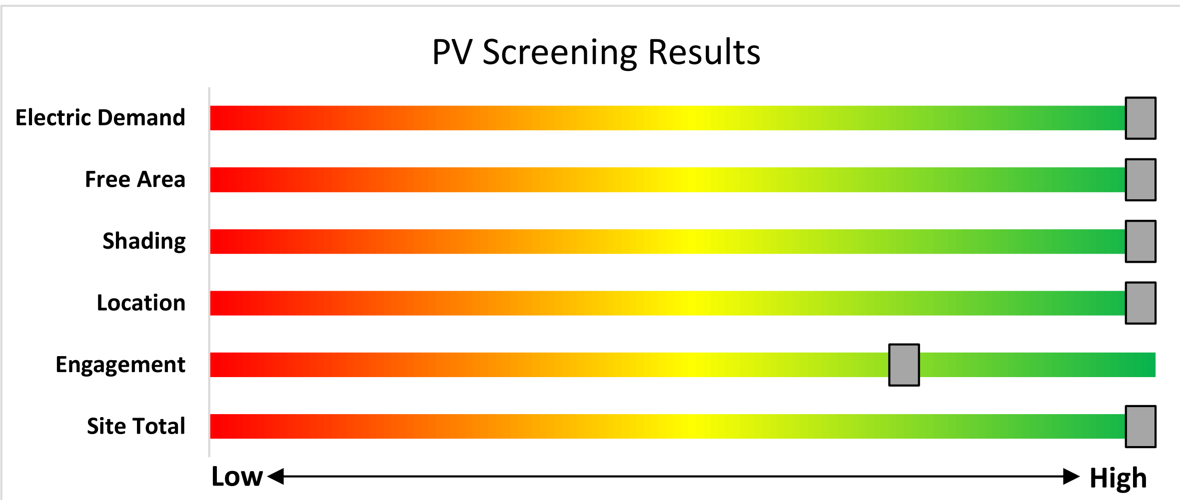
## 6.1 Solar Photovoltaic

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

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

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

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




| | | |
|---|---|---|
| **Potential** | High | |
| **System Potential** | 107 | kW DC STC |
| **Electric Generation** | 127,477 | kWh/yr |
| **Displaced Cost** | $14,470 | /yr |
| **Installed Cost** | $278,200 | |

*Figure 8 - Photovoltaic Screening*

**Successor Solar Incentive Program (SuSI)**

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

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

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

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

## 6.2 Combined Heat and Power

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

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

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

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

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

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

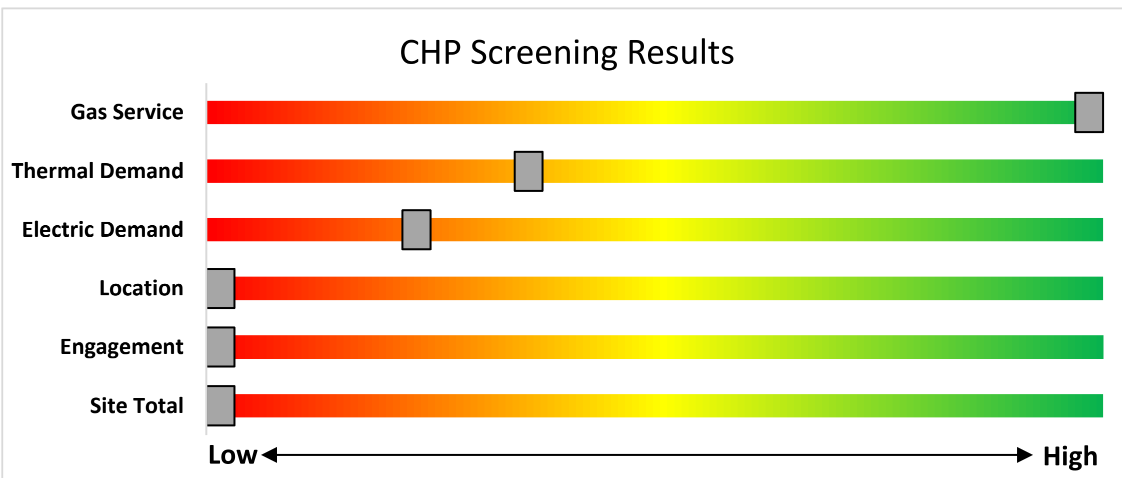



*Figure 9 - Combined Heat and Power Screening*

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

# 7 Electric Vehicles (EV)

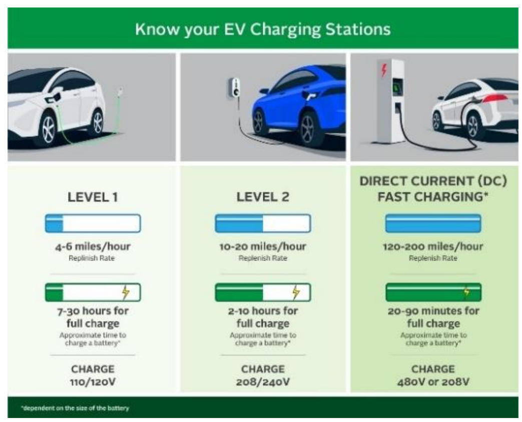
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes 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 high 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.

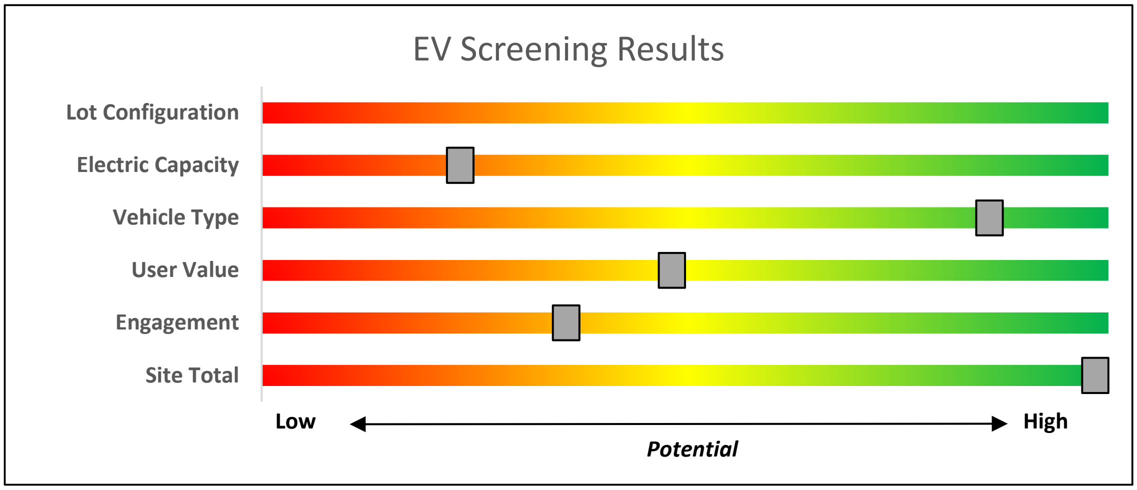



*Figure 10 – EV Charger Screening*

**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.New Jersey's Clean Energy Programs

## 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.

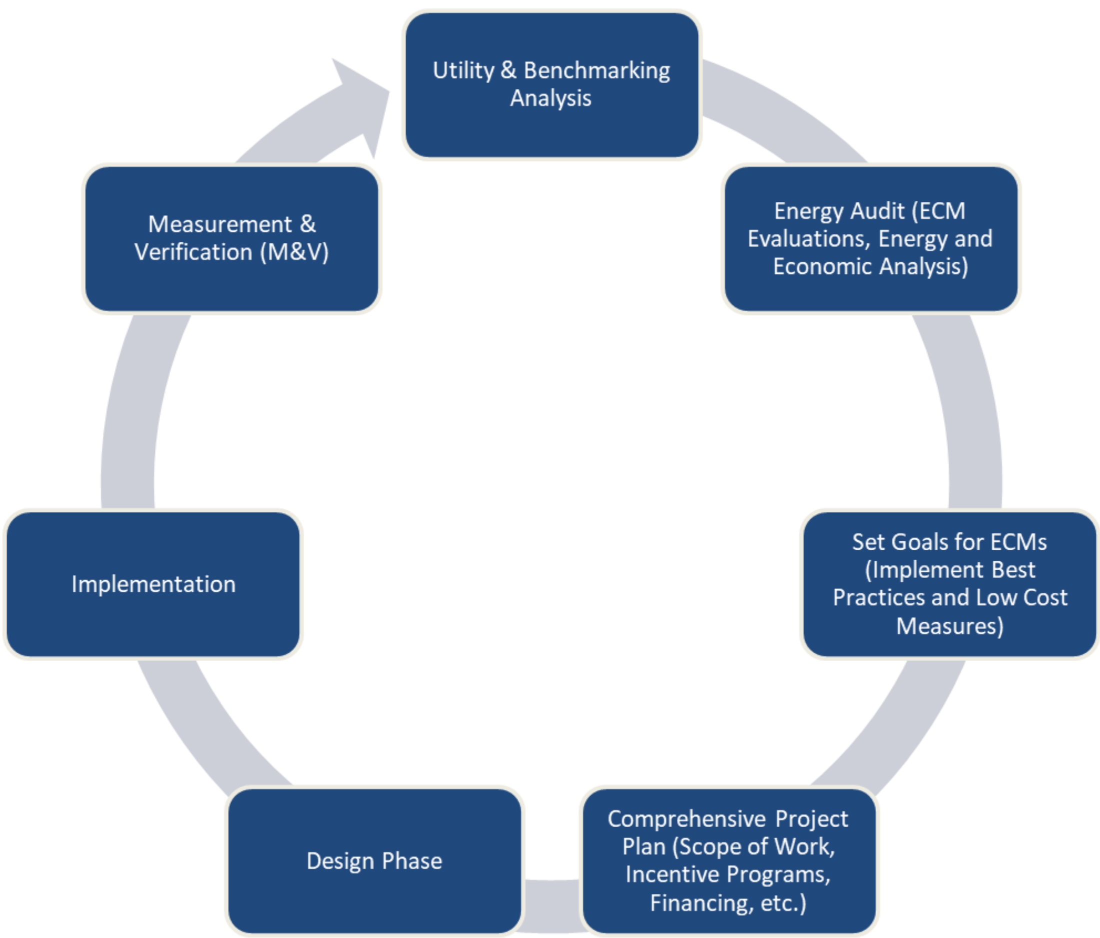


*Figure 11 – Project Development Cycle*

# 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].

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[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 |
| Cafeteria | 4 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Cafeteria | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.3 | 1,617 | 0 | $180 | $635 | $135 | 2.8 |
| Cafeteria | 40 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 40 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 1.8 | 9,700 | -2 | $1,081 | $3,001 | $705 | 2.1 |
| Classroom 102 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.5 | 2,667 | -1 | $297 | $872 | $200 | 2.3 |
| Classroom 103 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,133 | -1 | $349 | $1,073 | $255 | 2.3 |
| Classroom 104 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,133 | -1 | $349 | $1,073 | $255 | 2.3 |
| Classroom 106 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.3 | 1,455 | 0 | $162 | $599 | $125 | 2.9 |
| Classroom 401 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.4 | 2,182 | 0 | $243 | $763 | $170 | 2.4 |
| Classroom 402 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 404 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 406 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 407 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 408 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 410 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 411 | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 16 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.9 | 4,557 | -1 | $508 | $1,708 | $390 | 2.6 |
| Classroom 412 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 413 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 414 | 19 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 19 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 1.0 | 5,412 | -1 | $603 | $1,928 | $450 | 2.4 |
| Classroom 415 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 416 | 20 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 20 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.6 | 3,233 | -1 | $360 | $1,270 | $270 | 2.8 |
| Classroom 417 | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 14 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.6 | 3,395 | -1 | $378 | $1,037 | $245 | 2.1 |
| Classroom 418 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.4 | 2,182 | 0 | $243 | $763 | $170 | 2.4 |
| Classroom 419 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.4 | 2,182 | 0 | $243 | $763 | $170 | 2.4 |
| Conference 1st Floor | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.2 | 1,212 | 0 | $135 | $544 | $110 | 3.2 |
| Corridor - Elevator to Central | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,500 | 0.0 | 191 | 0 | $21 | $55 | $15 | 1.9 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Corridor - Kitchen | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,415 | 0.1 | 323 | 0 | $36 | $298 | $90 | 5.8 |
| Corridor 1st | 4 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Corridor 1st | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 4 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | High/Low Control | 58 | 2,415 | 0.6 | 3,133 | -1 | $349 | $1,253 | $605 | 1.9 |
| Corridor 1st to Central | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 4 | Relamp | Yes | 8 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 2,415 | 0.4 | 1,940 | 0 | $216 | $888 | $400 | 2.3 |
| Corridor 1st to Central | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 3,500 | 0.0 | 112 | 0 | $12 | $72 | $10 | 5.0 |
| Elevator 1 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Gymnasium | 3 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Gymnasium | 7 | LED - Fixtures: High-Bay | Wall Switch | S | 150 | 3,500 | 3 | None | Yes | 7 | LED - Fixtures: High-Bay | Occupancy Sensor | 150 | 2,415 | 0.2 | 1,253 | 0 | $140 | $270 | $35 | 1.7 |
| Gymnasium | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 2,415 | 0.1 | 302 | 0 | $34 | $261 | $40 | 6.6 |
| Gymnasium | 32 | Metal Halide: (1) 400W Lamp | Wall Switch | S | 458 | 3,500 | 1, 3 | Fixture Replacement | Yes | 32 | LED - Fixtures: High-Bay | Occupancy Sensor | 120 | 2,415 | 8.6 | 46,225 | -10 | $5,152 | $16,569 | $1,705 | 2.9 |
| Janitorial 1st - Female | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 600 | 0.0 | 22 | 0 | $2 | $37 | $10 | 10.9 |
| Janitorial 1st - Male | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 600 | 0.0 | 22 | 0 | $2 | $37 | $10 | 10.9 |
| Kitchen | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 22 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 22 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 1.0 | 5,335 | -1 | $595 | $1,745 | $400 | 2.3 |
| Locker Room - Female | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 485 | 0 | $54 | $226 | $50 | 3.2 |
| Locker Room - Kitchen | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,500 | 0.0 | 191 | 0 | $21 | $55 | $15 | 1.9 |
| Locker Room - Male | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 485 | 0 | $54 | $226 | $50 | 3.2 |
| Main Lobby | 18 | Compact Fluorescent: (1) 26W Circline/T6 Plug-In Lamp | Wall Switch | S | 26 | 3,500 | 2, 4 | Relamp | Yes | 18 | LED Lamps: Circline Lamps | High/Low Control | 19 | 2,415 | 0.2 | 893 | 0 | $100 | $1,125 | $720 | 4.1 |
| Main Lobby | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Main Lobby | 17 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | S | 32 | 3,500 | 2, 4 | Relamp | Yes | 17 | LED - Linear Tubes: (1) 4' Lamp | High/Low Control | 15 | 2,415 | 0.3 | 1,440 | 0 | $160 | $985 | $680 | 1.9 |
| Main Office | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 14 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.6 | 3,395 | -1 | $378 | $1,037 | $245 | 2.1 |
| Main Vestibule | 4 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 2,415 | 0.1 | 604 | 0 | $67 | $560 | $75 | 7.2 |
| Mechanical - Elevator to Central | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 600 | 2 | Relamp | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 600 | 0.1 | 65 | 0 | $7 | $110 | $30 | 10.9 |
| Office - 122 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,500 | 0.0 | 191 | 0 | $21 | $55 | $15 | 1.9 |
| Office - Copy Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.2 | 970 | 0 | $108 | $489 | $95 | 3.6 |

| | 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 |
| Office - Gym | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 485 | 0 | $54 | $226 | $50 | 3.2 |
| Office - Kitchen | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 485 | 0 | $54 | $226 | $50 | 3.2 |
| Office - Nurse 109 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 8 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.4 | 2,279 | 0 | $254 | $854 | $195 | 2.6 |
| Principals Office | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.2 | 970 | 0 | $108 | $489 | $95 | 3.6 |
| Restroom - 102 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - 103 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - 104 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - 109 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - 1st Faculty #1 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - 1st Faculty #2 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Cafeteria Mens | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Cafeteria Women | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Female 1st | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.2 | 970 | 0 | $108 | $489 | $95 | 3.6 |
| Restroom - Kitchen | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Locker Room Female | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Locker Room Men | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Main Office | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,500 | 0.0 | 127 | 0 | $14 | $37 | $10 | 1.9 |
| Restroom - Male 1st | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.2 | 970 | 0 | $108 | $489 | $95 | 3.6 |
| Stairs - Gym | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | | 114 | 4,290 | 2, 4 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | High/Low Control | 58 | 2,960 | 0.3 | 2,095 | 0 | $233 | $663 | $330 | 1.4 |
| Stairs East | 21 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,290 | 2, 4 | Relamp | Yes | 21 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,960 | 0.6 | 4,161 | -1 | $464 | $1,667 | $945 | 1.6 |
| Stairs North | 21 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,290 | 2, 4 | Relamp | Yes | 21 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,960 | 0.6 | 4,161 | -1 | $464 | $1,667 | $945 | 1.6 |
| Stairs to Central #1 | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,290 | 2, 4 | Relamp | Yes | 7 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,960 | 0.2 | 1,387 | 0 | $155 | $706 | $315 | 2.5 |
| Stairs to Central #2 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,290 | 2, 4 | Relamp | Yes | 1 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,960 | 0.0 | 198 | 0 | $22 | $37 | $10 | 1.2 |
| Stairs to Central #2 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | | 93 | 4,290 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 2,960 | 0.1 | 594 | 0 | $66 | $335 | $100 | 3.5 |
| Stairs West | 17 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,290 | 2, 4 | Relamp | Yes | 17 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,960 | 0.5 | 3,369 | -1 | $375 | $1,296 | $765 | 1.4 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Storage - Kitchen | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 600 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 414 | 0.1 | 83 | 0 | $9 | $226 | $30 | 21.1 |
| Storage 414 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 414 | 0.1 | 83 | 0 | $9 | $380 | $30 | 37.7 |
| Classroom 203 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 204 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 206 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 207 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 208 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Classroom 209 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.6 | 3,418 | -1 | $381 | $1,146 | $275 | 2.3 |
| Conference 202 | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.2 | 1,212 | 0 | $135 | $544 | $110 | 3.2 |
| Corridor 2nd | 5 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 5 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Corridor 2nd | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 4 | Relamp | Yes | 15 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,415 | 0.5 | 2,425 | -1 | $270 | $1,223 | $675 | 2.0 |
| Corridor 2nd | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 4 | Relamp | Yes | 6 | LED - Linear Tubes: (2) U-Lamp | High/Low Control | 33 | 2,415 | 0.2 | 906 | 0 | $101 | $660 | $270 | 3.9 |
| Corridor 2nd - Mech | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | S | 32 | 3,500 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (1) 4' Lamp | High/Low Control | 15 | 2,415 | 0.0 | 169 | 0 | $19 | $262 | $80 | 9.6 |
| Electrical Room 2nd Floor | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 414 | 0.1 | 83 | 0 | $9 | $380 | $65 | 33.9 |
| Electrical Room 2nd Floor | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 600 | 0.0 | 37 | 0 | $4 | $73 | $20 | 12.9 |
| Janitorial 2nd Floor | 1 | Linear Fluorescent - T8: 2' T8 (17W) - 1L | Wall Switch | S | 22 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (1) 2' Lamp | Wall Switch | 9 | 600 | 0.0 | 9 | 0 | $1 | $16 | $3 | 13.4 |
| Library 2nd Floor | 20 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 20 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 1.1 | 5,696 | -1 | $635 | $2,001 | $470 | 2.4 |
| Library 2nd Floor | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 2,415 | 0.1 | 302 | 0 | $34 | $261 | $40 | 6.6 |
| Mechanical 2nd Floor | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | 40 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2 | Relamp | No | 40 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 600 | 1.0 | 871 | 0 | $97 | $1,461 | $400 | 10.9 |
| Office - 200 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.2 | 970 | 0 | $108 | $489 | $95 | 3.6 |
| Office - 202 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 3,500 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,415 | 0.2 | 1,139 | 0 | $127 | $562 | $115 | 3.5 |
| Office - 202 #1 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 727 | 0 | $81 | $434 | $80 | 4.4 |
| Office - 202 #2 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 727 | 0 | $81 | $434 | $80 | 4.4 |
| Office - 202 #3 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 727 | 0 | $81 | $434 | $80 | 4.4 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Janitorial 4th Floor #1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 600 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 414 | 0.1 | 98 | 0 | $11 | $262 | $60 | 18.6 |
| Janitorial 4th Floor #2 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 600 | 0.0 | 33 | 0 | $4 | $55 | $15 | 10.9 |
| Office - 403 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 727 | 0 | $81 | $434 | $80 | 4.4 |
| Office - 405 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 727 | 0 | $81 | $434 | $80 | 4.4 |
| Office - 409 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.1 | 647 | 0 | $72 | $416 | $75 | 4.7 |
| Office - 411 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.1 | 485 | 0 | $54 | $380 | $65 | 5.8 |
| Restroom - Female 4th | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.1 | 485 | 0 | $54 | $380 | $65 | 5.8 |
| Restroom - Female Staff 4th | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.1 | 485 | 0 | $54 | $380 | $65 | 5.8 |
| Restroom - Male 4th | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.1 | 485 | 0 | $54 | $380 | $65 | 5.8 |
| Restroom - Male Staff 4th | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 3,500 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,415 | 0.1 | 485 | 0 | $54 | $380 | $65 | 5.8 |
| Storage 407 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 414 | 0.1 | 55 | 0 | $6 | $189 | $20 | 27.4 |
| Storage 411 #1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 414 | 0.1 | 55 | 0 | $6 | $189 | $20 | 27.4 |
| Storage 411 #2 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 600 | 0.0 | 37 | 0 | $4 | $73 | $20 | 12.9 |
| Storage 417 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 600 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 600 | 0.0 | 33 | 0 | $4 | $55 | $15 | 10.9 |
| Electrical Room - Garage | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 414 | 0.4 | 333 | 0 | $37 | $708 | $155 | 14.9 |
| Parking Garage | 3 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Parking Garage | 34 | LED - Fixtures: High-Bay | Wall Switch | S | 150 | 8,760 | 3 | None | Yes | 34 | LED - Fixtures: High-Bay | Occupancy Sensor | 150 | 6,044 | 1.1 | 15,235 | -3 | $1,698 | $810 | $105 | 0.4 |
| Exterior - Parking Garage | 9 | Metal Halide: (1) 400W Lamp | Photocell | | 458 | 4,380 | 1 | Fixture Replacement | No | 9 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Photocell | 120 | 4,380 | 0.0 | 13,324 | 0 | $1,512 | $4,991 | $450 | 3.0 |
| Mechanical - Boilers | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2 | Relamp | No | 5 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 600 | 0.1 | 109 | 0 | $12 | $183 | $50 | 10.9 |
| Mechanical - Elevator | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | S | 32 | 600 | 2 | Relamp | No | 2 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 600 | 0.0 | 23 | 0 | $3 | $37 | $10 | 10.3 |
| Mechanical - Generator | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 600 | 2 | Relamp | No | 4 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 600 | 0.1 | 87 | 0 | $10 | $146 | $40 | 10.9 |
| Office - Garage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 3,500 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,415 | 0.1 | 485 | 0 | $54 | $226 | $50 | 3.2 |
| Exterior Lighting | 13 | Incandescent: (1) 70W PAR30 Screw-In Lamp | Photocell | | 70 | 4,380 | 2 | Relamp | No | 13 | LED Lamps: PAR30 Lamps | Photocell | 11 | 4,380 | 0.0 | 3,359 | 0 | $381 | $302 | $39 | 0.7 |
| Exterior Lighting | 8 | LED - Fixtures: Wall Pack | Photocell | | 40 | 4,380 | | None | No | 8 | LED - Fixtures: Wall Pack | Photocell | 40 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior Lighting | 7 | Metal Halide: (1) 400W Lamp | Timeclock | | 458 | 4,380 | 1 | Fixture Replacement | No | 7 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | 120 | 4,380 | 0.0 | 10,363 | 0 | $1,176 | $3,882 | $350 | 3.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | 11 | Metal Halide: (1) 70W Lamp | Photocell | | 95 | 4,380 | 1 | Fixture Replacement | No | 11 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Photocell | 21 | 4,380 | 0.0 | 3,565 | 0 | $405 | $2,267 | $550 | 4.2 |

**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 |
| Mechanical - Boilers | Cooling System | 3 | Chilled Water Pump | 20.0 | 91.7% | Yes | | | B | 2,190 | | No | 91.7% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical - Boilers | Boilers | 3 | Combustion Air Fan | 1.0 | 82.5% | No | Marathon | | B | 2,000 | | No | 82.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof 2nd Floor | School Building | 2 | Exhaust Fan | 0.3 | 62.5% | No | | | W | 2,700 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Garage | School Building | 2 | Exhaust Fan | 0.3 | 62.5% | No | | | W | 2,700 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | School Building | 1 | Exhaust Fan | 1.0 | 82.5% | No | | | W | 2,700 | | No | 82.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | School Building | 4 | Exhaust Fan | 0.5 | 75.0% | No | | | W | 2,700 | | No | 75.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | Domestic Hot Water | 3 | DHW Circulation Pump | 0.1 | 60.0% | No | Taco | | W | 8,760 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical - Boilers | Heating System | 3 | Heating Hot Water Pump | 0.8 | 84.0% | No | Baldor | | W | 2,190 | | No | 84.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical - Boilers | Heating System | 2 | Heating Hot Water Pump | 15.0 | 91.0% | No | Marathon | | B | 2,190 | 6 | No | 93.0% | Yes | 2 | 3.1 | 20,979 | 0 | $2,381 | $18,354 | $2,400 | 6.7 |
| Roof 2nd Floor | Kitchen | 1 | Kitchen Hood Exhaust Fan | 1.5 | 84.0% | No | | | W | 3,150 | 7 | No | 86.5% | Yes | 1 | 0.0 | 3,162 | 39 | $744 | $3,887 | $75 | 5.1 |
| Roof 2nd Floor | Kitchen | 2 | Kitchen Hood Exhaust Fan | 0.5 | 75.0% | No | | | W | 3,150 | 7 | No | 78.2% | Yes | 2 | 0.0 | 2,621 | 39 | $682 | $6,272 | $100 | 9.0 |
| Mechanical - Elevator to Central | Elevator | 1 | Other | 25.0 | 91.7% | No | US Motors | | W | 400 | | No | 91.7% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Garage | Garage Door | 2 | Other | 0.3 | 62.5% | No | LiftMaster | | W | 800 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical - Elevator | Elevator | 1 | Other | 25.0 | 91.7% | No | US Motors | | W | 400 | | No | 91.7% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical - Boilers | Sump Pump | 1 | Process Pump | 0.3 | 62.5% | No | | | W | 800 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | AHU1 - 1st/2nd Floors | 1 | Supply Fan | 10.0 | 91.7% | Yes | Baldor | | W | 2,700 | | No | 91.7% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | AHU2 Cafeteria | 1 | Supply Fan | 10.0 | 91.7% | No | | | W | 2,700 | 5 | No | 91.7% | Yes | 1 | 2.9 | 8,237 | 0 | $935 | $6,697 | $1,100 | 6.0 |
| Mechanical 2nd Floor | AHU3 Gym | 1 | Supply Fan | 10.0 | 91.7% | No | | | W | 2,700 | 5 | No | 91.7% | Yes | 1 | 2.9 | 8,237 | 0 | $935 | $6,697 | $1,100 | 6.0 |
| Roof | AHU4 | 1 | Supply Fan | 15.0 | 93.0% | No | | | W | 2,700 | 5 | No | 93.0% | Yes | 1 | 4.3 | 12,183 | 0 | $1,383 | $9,177 | $1,200 | 5.8 |
| Roof | AHU5 | 1 | Supply Fan | 10.0 | 91.7% | No | | | W | 2,700 | 5 | No | 91.7% | Yes | 1 | 2.9 | 8,237 | 0 | $935 | $6,697 | $1,100 | 6.0 |

| | | Existing Conditions | | | | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Manufacturer | Model | Remaining Useful Life | Annual Operating Hours | ECM # | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Mechanical 2nd Floor | AHU1 - 1st/2nd Floors | 1 | Return Fan | 3.0 | 86.5% | Yes | AO Smith | | W | 2,700 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | AHU2 Cafeteria | 1 | Return Fan | 3.0 | 86.5% | Yes | | | W | 2,700 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | AHU3 Gym | 1 | Return Fan | 5.0 | 87.5% | Yes | Weg | | W | 2,700 | | No | 87.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | AHU4 | 1 | Return Fan | 5.0 | 87.5% | No | | | W | 2,700 | 5 | No | 89.5% | Yes | 1 | 1.5 | 4,490 | 0 | $510 | $5,028 | $900 | 8.1 |
| Roof | AHU5 | 1 | Return Fan | 5.0 | 87.5% | No | | | W | 2,700 | 5 | No | 89.5% | Yes | 1 | 1.5 | 4,490 | 0 | $510 | $5,028 | $900 | 8.1 |
| Mechanical 2nd Floor | Unit Heater | 1 | Supply Fan | 0.1 | 60.0% | No | | | W | 2,700 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Classrooms | Unit Ventilators | 42 | Supply Fan | 0.1 | 60.0% | No | | | W | 2,700 | | No | 60.0% | 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 2nd Floor | Electrical Rooms | 2 | Split-System | 3.00 | | 10.00 | | Liebert | PFH037A-PL3 | B | 8 | Yes | 2 | Split-System | 3.00 | | 16.00 | | 1.4 | 1,620 | 0 | $184 | $11,034 | $630 | 56.6 |
| Roof 2nd Floor | Office 122 | 1 | Split-System | 1.50 | | 10.00 | | Liebert | PFH020A-PL3 | B | 8 | Yes | 1 | Split-System | 1.50 | | 16.00 | | 0.3 | 405 | 0 | $46 | $3,734 | $158 | 77.8 |
| Roof | Electrical Rooms | 2 | Split-System | 1.50 | | 10.00 | | Liebert | PFH020A-PL3 | B | 8 | Yes | 2 | Split-System | 1.50 | | 16.00 | | 0.7 | 810 | 0 | $92 | $7,467 | $315 | 77.8 |
| Corridor - Elevator to Central | Corridor - Elevator to Central | 1 | Electric Resistance Heat | | 10.24 | | 1 COP | Trane | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stairs to Central #1 | Stairs to Central #1 | 1 | Electric Resistance Heat | | 17.06 | | 1 COP | Trane | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stairs to Central #2 | Stairs to Central #2 | 1 | Electric Resistance Heat | | 10.24 | | 1 COP | Trane | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Electrical Room - Garage | Electrical Room - Garage | 1 | Electric Resistance Heat | | 10.24 | | 1 COP | Qmark | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Office - Garage | Office - Garage | 1 | Window AC | 1.00 | | 10.00 | | | | B | 8 | Yes | 1 | Window AC | 1.00 | | 12.00 | | 0.1 | 120 | 0 | $14 | $942 | $0 | 69.2 |

## Electric Chiller Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Chiller Quantity | System Type | Cooling Capacity per Unit (Tons) | Manufacturer | Model | Remaining Useful Life | ECM # | Install High Efficiency Chillers? | Chiller Quantity | System Type | Constant/ Variable Speed | Cooling Capacity (Tons) | Full Load Efficiency (kW/Ton) | IPLV Efficiency (kW/Ton) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Cooling System | 2 | Air-Cooled Screw Chiller | 208.00 | York | YCAS0208EB46 | B | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Space Heating Boiler Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Output Capacity per Unit (MBh) | Manufacturer | Model | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Output Capacity per Unit (MBh) | Heating Efficiency | Heating Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Mechanical - Boilers | Heating System | 3 | Non-Condensing Hot Water Boiler | 2,176 | Weil McLain | 988 | B | 9 | Yes | 3 | Condensing Hot Water Boiler | 2,176 | 93.00% | Et | 0.0 | 0 | 570 | $5,615 | $211,409 | $14,362 | 35.1 |

## 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 |
| Mechanical 2nd Floor | Domestic Hot Water | 2 | Storage Tank Water Heater (> 50 Gal) | AO Smith | BTR-197-118 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical 2nd Floor | Domestic Hot Water | 1 | Storage Tank Water Heater (> 50 Gal) | AO Smith | BTR-197-110 | B | 10 | Yes | 1 | Storage Tank Water Heater (> 50 Gal) | Natural Gas | 93.00% | UEF | 0.0 | 0 | 10 | $96 | $8,493 | $697 | 80.9 |

## Low-Flow Device Recommendations

| | Recommendation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | ECM # | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Rosa Parks Community School | 11 | 67 | Faucet Aerator (Lavatory) | 2.20 | 0.50 | 0.0 | 0 | 32 | $313 | $480 | $240 | 0.8 |

## Walk-In Cooler/Freezer Inventory & Recommendations

| | Existing Conditions | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Cooler/ Freezer Quantity | Case Type/Temperature | Manufacturer | Model | ECM # | Install EC Evaporator Fan Motors? | Install Electric Defrost Control? | Install Evaporator Fan Control? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Cooler (35F to 55F) | Heatcraft | ADT065 | 12, 13 | Yes | No | Yes | 0.0 | 683 | 0 | $78 | $1,977 | $115 | 24.0 |
| Kitchen | 1 | Medium Temp Freezer (0F to 30F) | Heatcraft | LET090 | 12, 13 | Yes | Yes | Yes | 0.1 | 2,138 | 0 | $243 | $2,799 | $205 | 10.7 |

**Commercial Refrigerator/Freezer Inventory & Recommendations**

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Refrigerator/ Freezer Type | Manufacturer | Model | ENERGY STAR Qualified? | ECM # | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Refrigerator Chest | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

**Commercial Ice Maker Inventory & Recommendations**

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Ice Maker Type | Manufacturer | Model | ENERGY STAR Qualified? | ECM # | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Ice Making Head (<450 lbs/day), Batch | Manitowoc | QD0602A | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

**Cooking Equipment Inventory & Recommendations**

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Type | Manufacturer | Model | High Efficiency Equipement? | ECM # | Install High Efficiency Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Gas Combination Oven/Steam Cooker (<15 Pans) | Cleveland | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 2 | Gas Convection Oven (Full Size) | Garland | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 2 | Gas Conveyor Oven (≥25") | | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Gas Griddle (4 Feet Width) | Market Forge | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Insulated Food Holding Cabinet (3/4 Size) | Wittco | | 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 |
| Rosa Parks Community School | 84 | Desktop | 120 | No | | |
| Rosa Parks Community School | 12 | Microwave | 1,000 | No | | |
| Rosa Parks Community School | 93 | Printer (Medium/Small) | 450 | No | | |
| Rosa Parks Community School | 3 | Printer/Copier (Large) | 600 | No | | |
| Rosa Parks Community School | 3 | Projector | 240 | No | | |
| Rosa Parks Community School | 6 | Refrigerator (Mini) | 174 | No | | |
| Rosa Parks Community School | 1 | Refrigerator (Residential) | 340 | No | | |
| Rosa Parks Community School | 3 | Serving Table (Chilled/Heated) | 3,000 | No | | |
| Rosa Parks Community School | 9 | Smart Board | 215 | Yes | | |
| Rosa Parks Community School | 4 | Television | 224 | No | | |
| Rosa Parks Community School | 3 | Water Fountain | 370 | No | | |
| Rosa Parks Community School | 1 | Server | 4,000 | No | | |
| Rosa Parks Community School | 1 | Kiln | 14,300 | No | | |

## Vending Machine Inventory & Recommendations

| | Existing Conditions | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Vending Machine Type | ECM # | Install Controls? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Lounge 318 | 1 | Refrigerated | 14 | Yes | 0.2 | 1,612 | 0 | $183 | $230 | $50 | 1.0 |

## Custom (High Level) Measure Analysis

Upgrade/Replace Energy Management System

| | | | |
|---|---|---|---|
| Building Square Footage | 84,700 | Fuel Utility Rate | $9.845 MMBtu |
| Percent of Conditioned Area Impacted | 100% | Blended Electric Utility Rate | $0.114 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 No Longer Operational | HVAC Equipment & Systems | 15 | 272,167 | 216,360 | 4,080 | Upgrade/Replace Energy Management System | 8% | 8% | 8% | $1.50 | 0.00 | 39,082 | 326 | $7,650 | $127,050 | $0 | $0 | $0 | $127,050 | 16.61 | 16.61 |

# 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

# 23

ENERGY STAR® Score[1]

### Rosa Parks Community School

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 84,700
**Built:** 1880

**For Year Ending:** November 30, 2021
**Date Generated:** November 14, 2022

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

### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Rosa Parks Community School<br>369 Main Street<br>Orange, New Jersey 07048 | Orange Board of Education<br>451 Lincoln Avenue<br>Orange, NJ 07050<br>(973) 677-6000 | Jason E. Ballard<br>451 Lincoln Avenue<br>Orange, NJ 07050<br>(973) 677-6000<br>ballarja@orange.k12.nj.us |

**Property ID**: 21694612

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

**Site EUI**
95.7 kBtu/ft²

**Annual Energy by Fuel**

| | |
|---|---|
| Natural Gas (kBtu) | 4,609,598 (57%) |
| Electric - Grid (kBtu) | 3,499,884 (43%) |

**Source EUI**
172.8 kBtu/ft²

**National Median Comparison**

| | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 72.5 |
| National Median Source EUI (kBtu/ft²) | 131 |
| % Diff from National Median Source EUI | 32% |

**Annual Emissions**

| | |
|---|---|
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 628 |

### Signature & Stamp of Verifying Professional

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

LP Signature: ______________________Date: ___________

**Licensed Professional**

____ ________
,
(____)____-______
_________________

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

# APPENDIX C: GLOSSARY

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

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

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| **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. |