
# Local Government Energy Audit Report

## West New York Public School No. 2

April 1, 2022

*Prepared for:*

West New York Board of Education
5200 Broadway Avenue
West New York, New Jersey 07093

*Prepared by:*

TRC
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New Brunswick, New Jersey 08901

# Disclaimer

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

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

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

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

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

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# Energy Efficiency Incentive & Rebate Transition

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

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

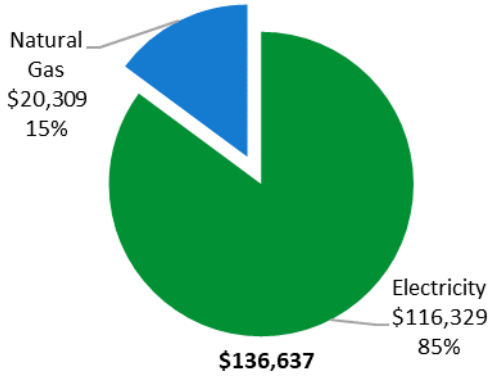
These "next generation" energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and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

New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website.

# 1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for West New York Public School No. 2. 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: $136,637<br>Electricity:<br>906,625 kWh<br>Natural Gas:<br>23,686 Therms |  |
| ENERGY STAR® Benchmarking Score | 87<br>*(1-100 scale)* | Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more. |

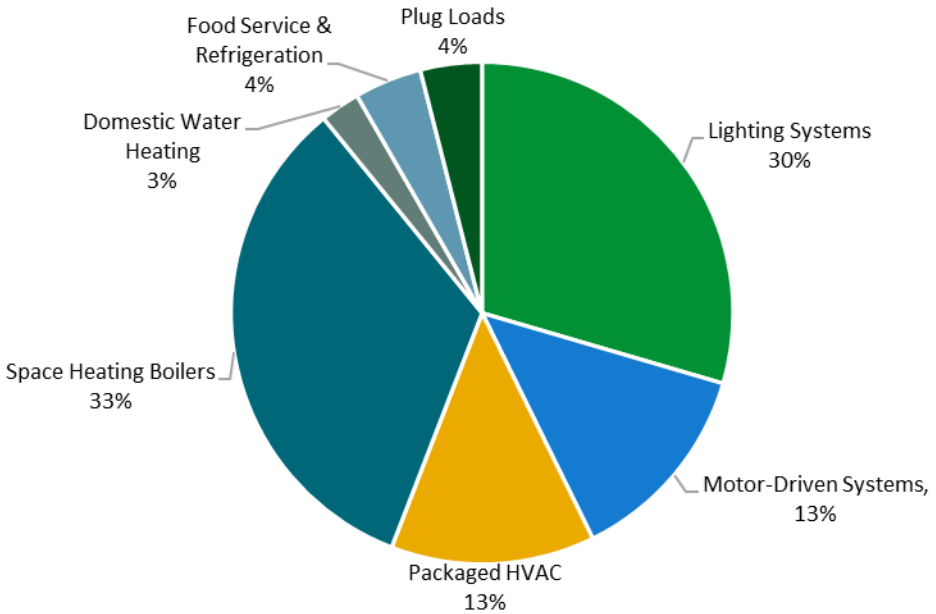


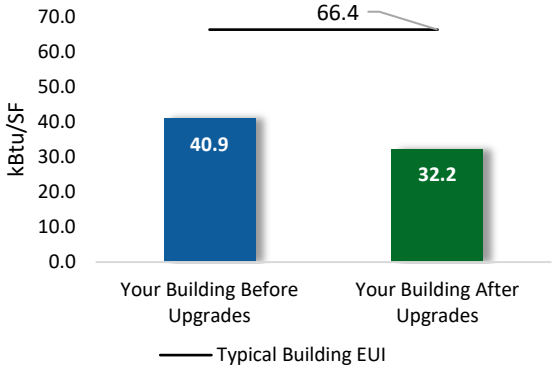

*Figure 1 - Energy Use by System*

## POTENTIAL IMPROVEMENTS

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

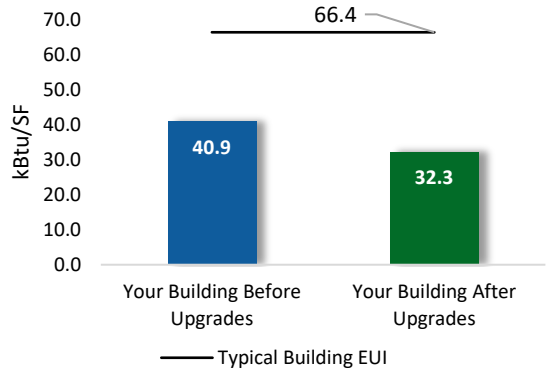
### Scenario 1: Full Package (all evaluated measures)

| | |
|---|---|
| Installation Cost | $182,383 |
| Potential Rebates & Incentives[1] | $39,480 |
| Annual Cost Savings | $42,909 |
| Annual Energy Savings | Electricity: 332,929 kWh<br>Natural Gas: 223 Therms |
| Greenhouse Gas Emission Savings | 169 Tons |
| Simple Payback | 3.3 Years |
| Site Energy Savings (all utilities) | 21% |




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

| | |
|---|---|
| Installation Cost | $179,312 |
| Potential Rebates & Incentives | $39,480 |
| Annual Cost Savings | $42,797 |
| Annual Energy Savings | Electricity: 332,195 kWh<br>Natural Gas: 201 Therms |
| Greenhouse Gas Emission Savings | 168 Tons |
| Simple Payback | 3.3 Years |
| Site Energy Savings (all utilities) | 21% |




### 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** | | | **279,678** | **56.1** | **-47** | **$35,483** | **$146,242** | **$24,387** | **$121,855** | **3.4** | **276,139** |
| ECM 1 | Install LED Fixtures | Yes | 106,059 | 11.9 | -11 | $13,515 | $50,001 | $5,200 | $44,801 | 3.3 | 105,525 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 173,618 | 44.2 | -36 | $21,968 | $96,242 | $19,187 | $77,055 | 3.5 | 170,614 |
| **Lighting Control Measures** | | | **39,946** | **8.0** | **-8** | **$5,054** | **$28,584** | **$14,035** | **$14,549** | **2.9** | **39,248** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 17,200 | 4.4 | -4 | $2,176 | $13,734 | $1,435 | $12,299 | 5.7 | 16,900 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 22,746 | 3.6 | -5 | $2,878 | $14,850 | $12,600 | $2,250 | 0.8 | 22,348 |
| **Motor Upgrades** | | | **134** | **0.0** | **0** | **$17** | **$352** | **$0** | **$352** | **20.5** | **135** |
| ECM 5 | Premium Efficiency Motors | No | 134 | 0.0 | 0 | $17 | $352 | $0 | $352 | 20.5 | 135 |
| **Variable Frequency Drive (VFD) Measures** | | | **12,571** | **0.1** | **39** | **$1,948** | **$4,076** | **$900** | **$3,176** | **1.6** | **17,237** |
| ECM 6 | Install VFDs on Kitchen Hood Fan Motors | Yes | 12,571 | 0.1 | 39 | $1,948 | $4,076 | $900 | $3,176 | 1.6 | 17,237 |
| **HVAC System Improvements** | | | **600** | **0.0** | **28** | **$318** | **$2,971** | **$70** | **$2,901** | **9.1** | **3,891** |
| ECM 7 | Implement Demand Control Ventilation (DCV) | No | 600 | 0.0 | 2 | $96 | $2,719 | $0 | $2,719 | 28.4 | 860 |
| ECM 8 | Install Pipe Insulation | Yes | 0 | 0.0 | 26 | $222 | $252 | $70 | $182 | 0.8 | 3,031 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **10** | **$89** | **$158** | **$88** | **$70** | **0.8** | **1,222** |
| ECM 9 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 10 | $89 | $158 | $88 | $70 | 0.8 | 1,222 |
| **TOTALS (COST EFFECTIVE MEASURES)** | | | **332,195** | **64.2** | **20** | **$42,797** | **$179,312** | **$39,480** | **$139,832** | **3.3** | **336,877** |
| **TOTALS (ALL MEASURES)** | | | **332,929** | **64.2** | **22** | **$42,909** | **$182,383** | **$39,480** | **$142,903** | **3.3** | **337,872** |

* - All incentives presented in this table are included as placeholders 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.

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

## Options from Around the State

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

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

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

The CHP program provides incentives for combined heat and power (aka 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.

### *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.

# 2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for West New York Public School No. 2. 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 August 25, 2021, TRC performed an energy audit at West New York Public School No. 2 located in West New York, New Jersey. TRC met with Rick Solares to review the facility operations and help focus our investigation on specific energy-using systems.

West New York Public School No. 2 is a three-story, 133,510 square foot building built in 1972. Spaces include classrooms and offices, as well as a gymnasium, an auditorium, a cafeteria, a kitchen, computer labs, a library, a conference room, lounges, corridors, stairwells, restrooms, storage rooms, and electrical and mechanical spaces.

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

## 2.2 Building Occupancy

The facility is occupied from July to September, with the school year ending for students in July and restarting in September. The building is closed on the weekends, and the facility closes at 7:00 PM on weekdays. During a typical day, the facility is occupied by approximately 66 staff and 800 students.

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| West New York Public School No. 2 | Weekday | 6:00 AM - 7:00 PM |
| | Weekend | Closed |

*Figure 3 - Building Occupancy Schedule*

## 2.3 Building Envelope

West New York Public School No. 2 is a three-floor building. Building walls are concrete block over structural steel with a brick facade. The roof is flat and covered with a grey membrane and pebbles, it is in good condition.

The windows are double glazed and have aluminum frames with thermal breaks. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing no evidence of excess wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. Overall, the building envelope appears in good condition.

*Building Walls*


*Building Windows*


*Entrance & Exit Doors*

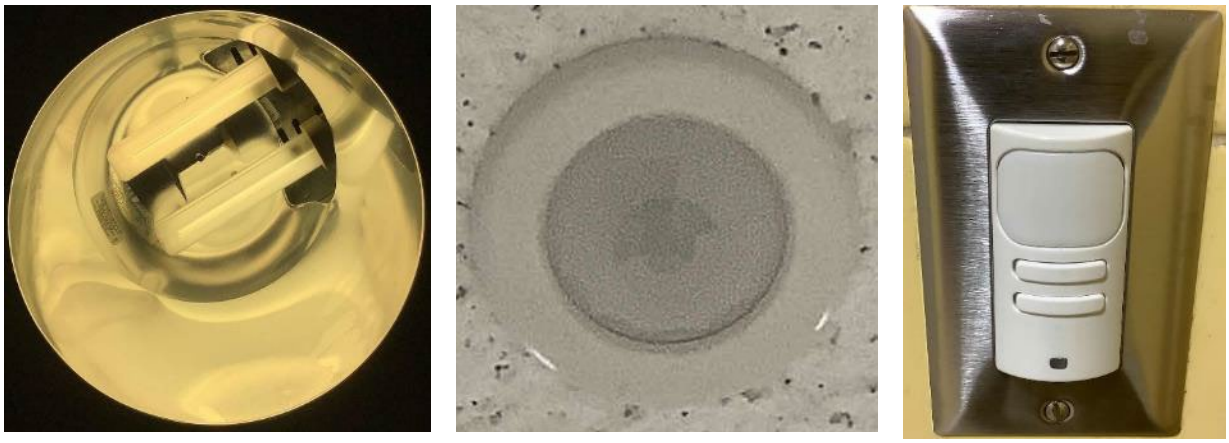
*Roof*

## 2.4 Lighting Systems

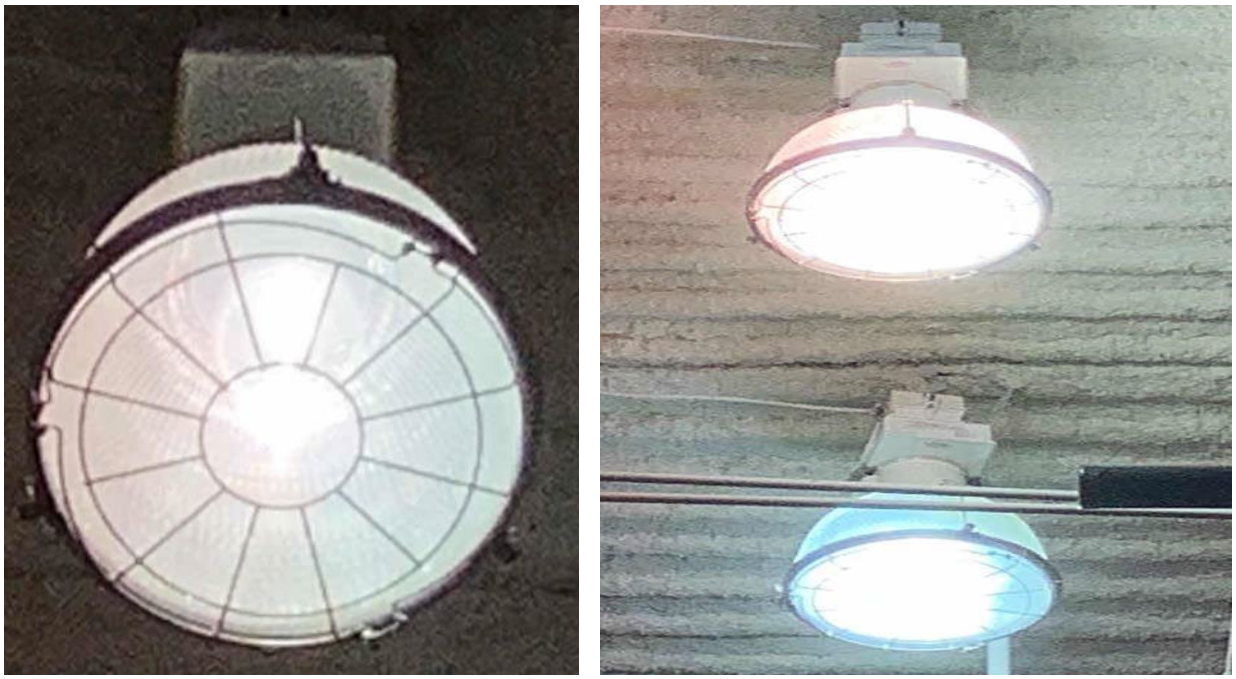
The primary interior lighting system uses 32-Watt fluorescent T8 lamps. Fixture types include 2-lamp and 3-lamp, 4-foot long recessed, surface mounted, and pendant fixtures with linear and U-bend tube lamps. Compact fluorescent (CFL), LED, and high-pressure sodium (HPS) lamps are also used in some spaces. Typically, CFLs at this site use 26-watts and 42-watts, and the HPS lamps draw either 250 or 400-watts. Exit signs use LED sources. Gymnasium fixtures have manually controlled high-bay HPS lamps. Auditorium fixtures have dimmable LED fixtures that are manually controlled.

Interior light fixtures are controlled by a mix of manual wall switches and occupancy sensors, with all the classrooms and some restrooms controlled by sensors. All light fixtures are in good condition. Interior lighting levels were generally sufficient. Exterior fixtures include canopy and wall mounted HPS and CFL fixtures. Exterior fixtures are photocell controlled.

*Fluorescent T8 Fixtures*



*CFL Lamp & Occupancy Sensors*



*Gymnasium High Bay HPS Fixtures*

*Exterior CFL & HPS Fixtures*

## 2.5 Air Handling Systems

### Unit Ventilators

There are 65 McQuay unit ventilators (UV) that condition most areas. These UVs each are equipped with chilled water cooling coils, hot water heating coils, supply fan motors, and pneumatically controlled outside air dampers. Installed in 2008, they appear to be in fair operating condition. The units can be monitored through the onsite building energy management system (EMS); however, the controls are located on each individual unit.

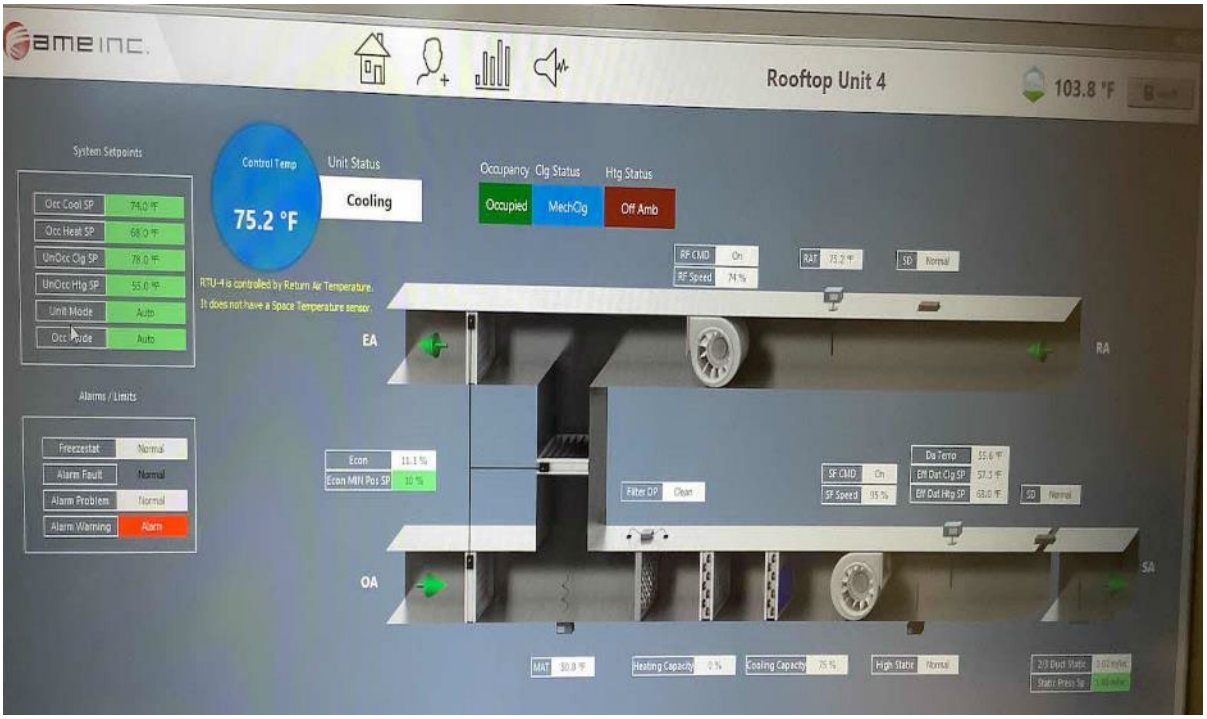
*Unit Ventilator*

### Packaged Units

The facility is served by a total of four packaged roof top units (RTUs) with variable frequency drive (VFD) controlled motors, which are controlled by the onsite EMS. Refer to Appendix A for detailed information about each unit.

| Units | Area Served | Cooling System | Cooling Capacity (tons) | Gas Heating Capacity (MBh) | Supply Fan (hp) | Return Fan (hp) |
|---|---|---|---|---|---|---|
| RTU-1 | Auditorium | Direct Expansion Coils | 30 | 200 | 7.5 | 3 |
| RTU-2 | Hallways & Classrooms | Chiller | 15 | 320 | 5 | 3 |
| RTU-3 | Hallways, Classrooms & Cafeteria | Chiller | 20 | 500 | 10 | 3 |
| RTU-4 | Hallways & Classrooms | Direct Expansion Coils | 25 | 320 | 10 | 3 |

*Roof Top Unit RTU-4*




*Roof Top Unit EMS Diagram View*

## Unitary Electric HVAC Equipment

Electrical rooms 142 & 248 are each cooled by Mitsubishi mini-split units, while server room 119 and computer labs 121 & 232 are each cooled by Sanyo mini-split air conditioning (AC) units. Cooling capacities vary from 1 to 2 tons, with efficiencies ranging from 15.2 SEER to 17 SEER. The units are in good condition and are not ENERGY STAR® labeled.


*Mini-split AC Units*

## Unitary Heating Equipment

The boiler room and electrical room B19 are heated by a total of three Berko electric resistance heaters with a heating capacity of 7.5 kW each. The units are in good condition. Equipment is controlled by manual dial thermostats.

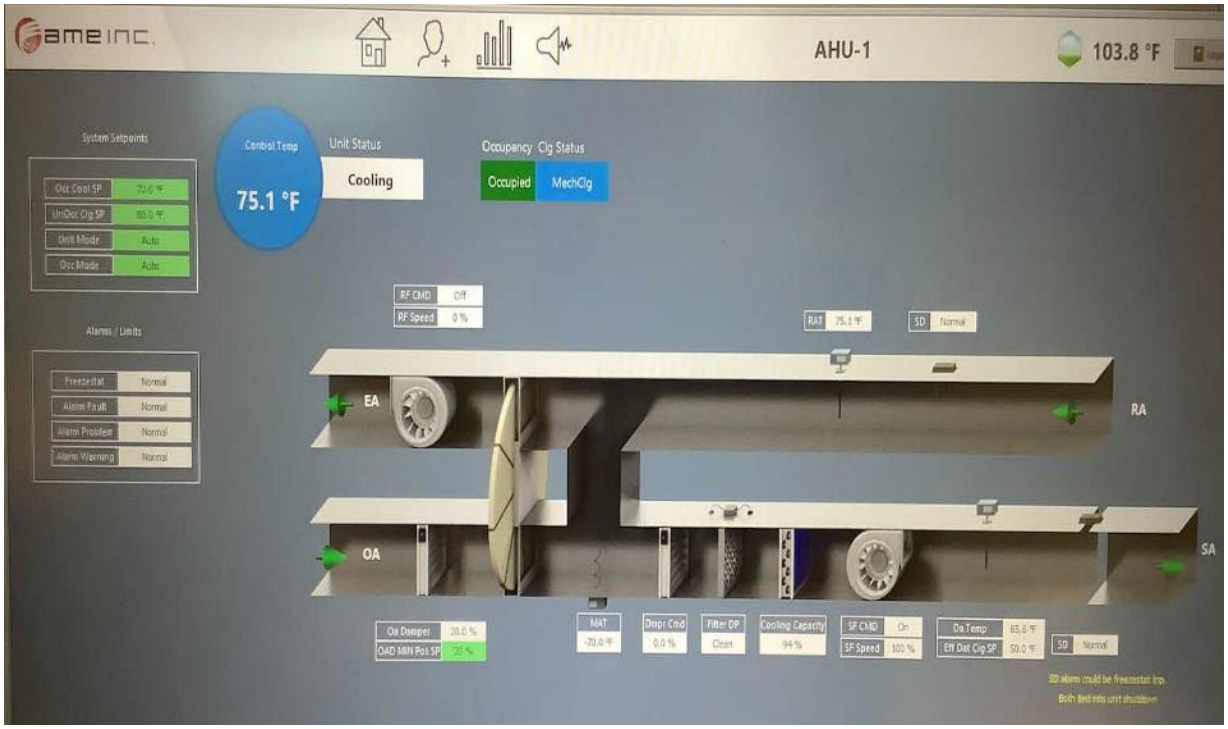


*Electric Resistance Heaters*

## Air Handling Unit

Areas of the building are conditioned by a rooftop air handling unit equipped with VFD controlled supply (7.5 hp), return (5.0 hp), and energy recovery (0.75 hp) motors, as well as chilled water cooling coils. The unit is controlled by the onsite EMS.


*Air Handling Unit*




*Air Handling Unit EMS Diagram View*

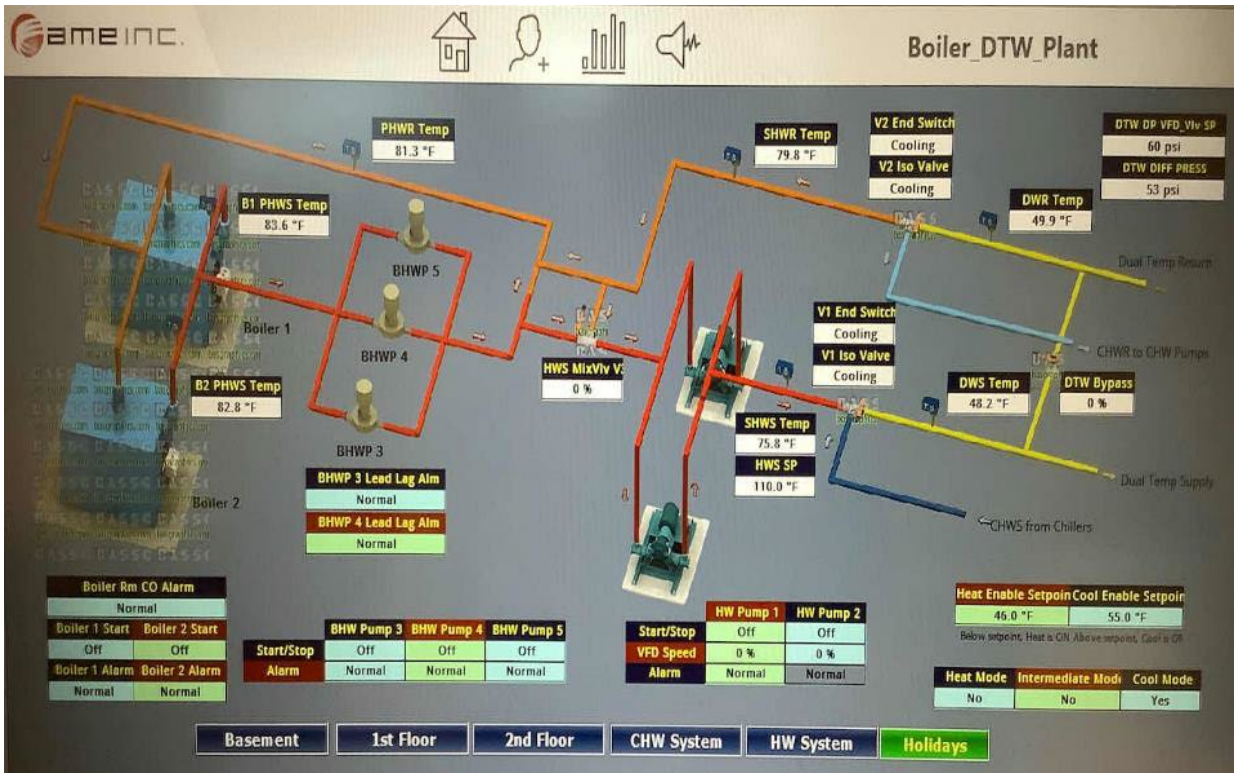
## 2.6 Heating Hot Water Systems

The building heating system consists of two De Dietrich gas-fired high performance hot water boilers, each with an output capacity of 4,412 MBh. The burners are fully modulating with a nominal efficiency of 85%. The boilers are configured in a lead-lag control scheme and are controlled by the building's EMS. Both boilers are required under high load conditions. Installed in 2008, they are in good condition. There is a service contract in place.

The building's hydronic distribution system provides heating and cooling, with the boilers serving the heating component of the dual temperature system. The boilers serve a primary-secondary distribution system with three, 5 hp constant speed hot water pumps (P3, P4, & P5) circulating the primary loop and two VFD-controlled, 20 hp dual temperature pumps (P1 & P2) operating with a lead-lag control scheme on the secondary loop. Note that P1 & P2 serve a dual use function in that they circulate heated and chilled water seasonally in the same secondary loop. A three-way valve controls the secondary loop temperature via the EMS. Hot water from the boilers and chilled water from the chillers mix for the dual temp supply. The boilers provide hot water to the rooftop units and UVs throughout the building. The boilers' schedules and temperatures are controlled and monitored using the onsite EMS.


*Hot Water Boiler & Heating Hot Water Pumps*


*Dual Temp Pumps & VFDs*



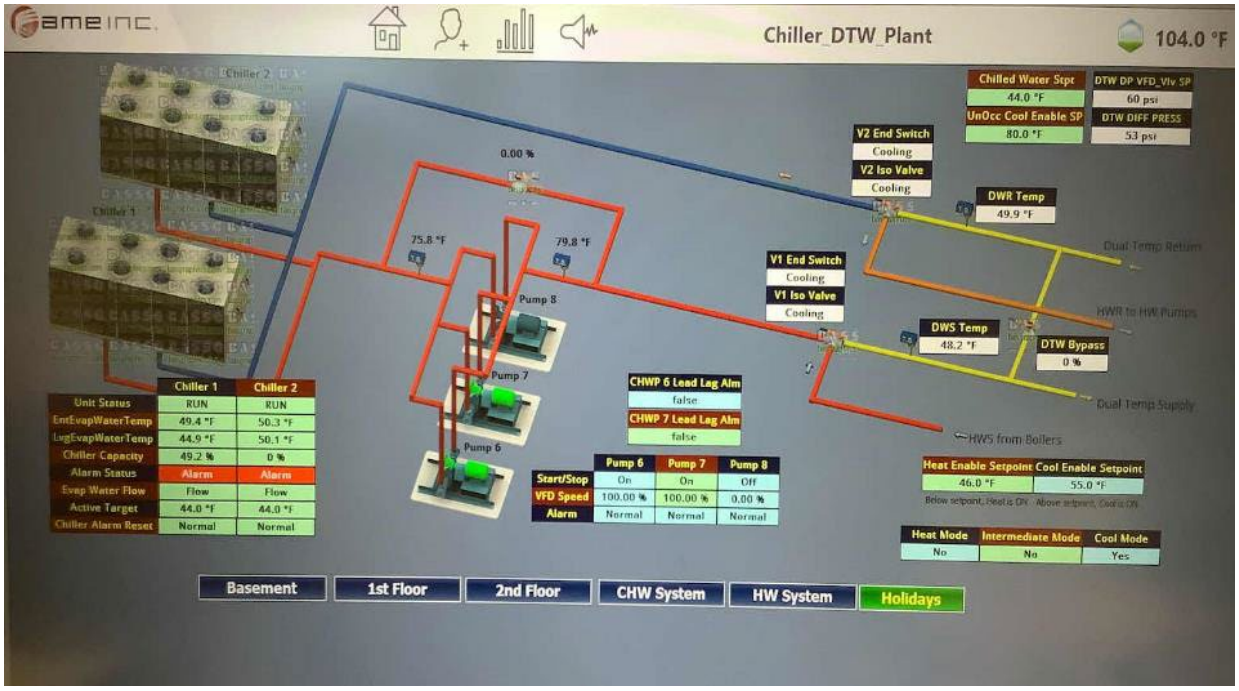

*Hot Water System EMS Diagram View*

## 2.7 Chilled Water Systems

The chiller plant consists of two 140-ton, air-cooled McQuay screw chillers (CH1 and CH2). The chillers are configured in a primary-secondary distribution loop. Three 15 hp VFD controlled chilled water pumps (P6, P7, P8) circulate the primary loop, operating in a lead-lag control scheme with only one pump normally operating and one in standby. The secondary loop is circulated by the two VFD controlled 20 hp dual temperature pumps (P1 & P2) operating with a lead-lag control scheme. The chillers supply chilled water to rooftop units RTU-2, RTU-3, and the air handling unit. The chilled water temperatures and chiller operating schedules are controlled by the onsite EMS. Installed in 2008, the chillers are in fair condition.


*Air Cooled Chiller*

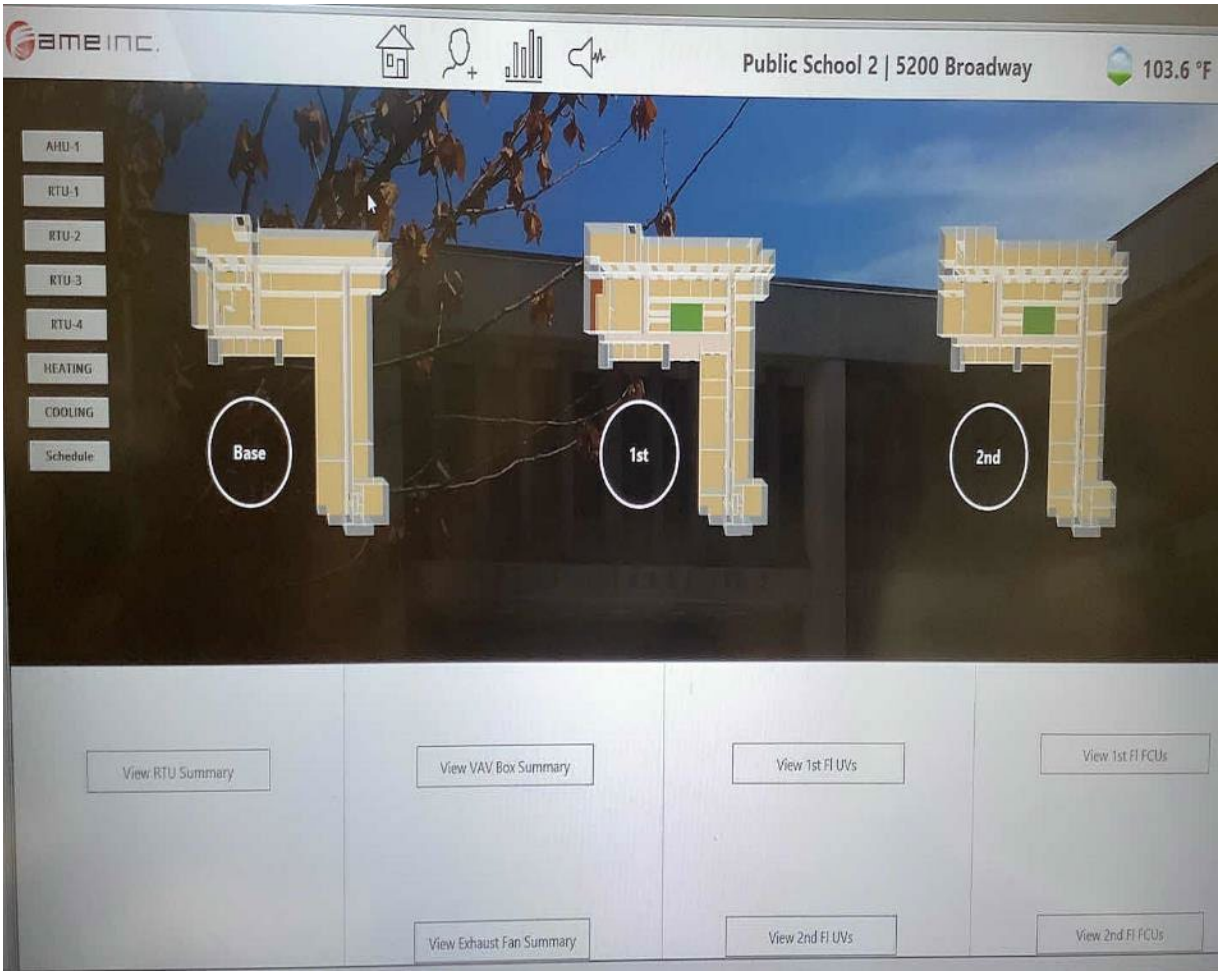
*Chilled Water Pumps & VFD*




*Chilled Water System EMS Diagram View*

## 2.8 Building EMS

An A.M.E. Inc.® EMS controls the HVAC equipment, the boilers, the chillers, the UVs, and the rooftop units. The EMS provides equipment scheduling control, and it monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures, and chilled water loop temperatures.




*Building EMS for Public School #2*

## 2.9 Domestic Hot Water

Hot water is produced by a 400 MBh gas-fired Laars® boiler with an 85% efficiency rating and a 120-gallon storage tank. The water heater was installed in 2015 and is in good condition. Three circulation pumps ranging from 1/6 hp to 1/2 hp distribute water to end uses. The circulation pumps operate continuously. The domestic hot water pipes are partially insulated, and the insulation is in good condition.


*Gas-fired Boiler & Circulation Pump*

## 2.10 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used to prepare meals for students. Most cooking is done using gas-fired convection ovens. Bulk prepared foods are held in several electric holding cabinets. Only the food holding cabinets are high efficiency with the rest being standard efficiency, and all are in good condition.

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


*Gas-fired Convection Ovens & Electric Holding Cabinet*

## 2.11 Refrigeration

The kitchen has two standard efficiency stand-up refrigerators with solid doors and one high-efficiency, stand-up refrigerator with glass doors. There are also two high efficiency refrigerator chests. The refrigeration equipment is all in good condition.

The walk-in refrigerator has a 0.75-ton compressor located outside of the kitchen and a two-fan evaporator. The walk-in medium temperature freezer has a 1-ton compressor located outside of the kitchen and a three-fan evaporator. The walk-in freezer has electric defrost controls and both units have evaporator fan controls.

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

*Stand-Up & Walk-in Refrigerators*

## 2.12 Plug Load & Vending Machines

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

There are approximately 149 computer workstations throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart boards and projectors, and typical office loads such as copiers, printers, microwaves, coffee machines, and mini fridges.

There are three residential style refrigerators that are used to store food and drinks. These vary in condition and efficiency.

*Residential Refrigerator & Copier Machine*

## 2.13 Water-Using Systems

There are 15 restrooms throughout the facility with toilets, urinals, and sinks. Some restrooms contained low-flowing fixtures, while others had faucet flow rates of 2.2 gallons per minute (gpm) or higher.

*Typical Restroom Sinks*

## 2.14 On-Site Generation

West New York Public School No. 2 has a rooftop photovoltaic (PV) array with approximately 729 panels. The total array size and install date were not provided by the applicant. This system provides approximately 21% of the electricity used. Some electricity generated by the panels is sold back to the grid.

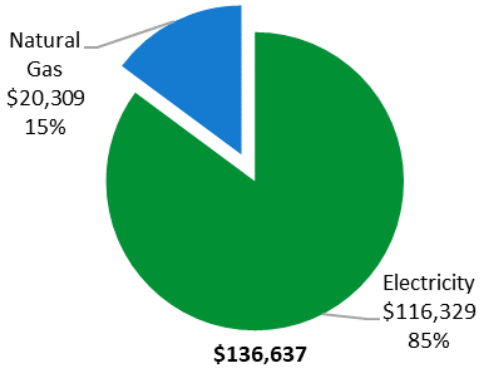
West New York Public School No. 2 has an emergency generator that, in the event of a power outage, serves the entire building, and it is only used for emergency needs.

*Rooftop Solar Panels*

# 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 | 906,625 kWh | $116,329 |
| Natural Gas | 23,686 Therms | $20,309 |
| **Total** | | **$136,637** |




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.

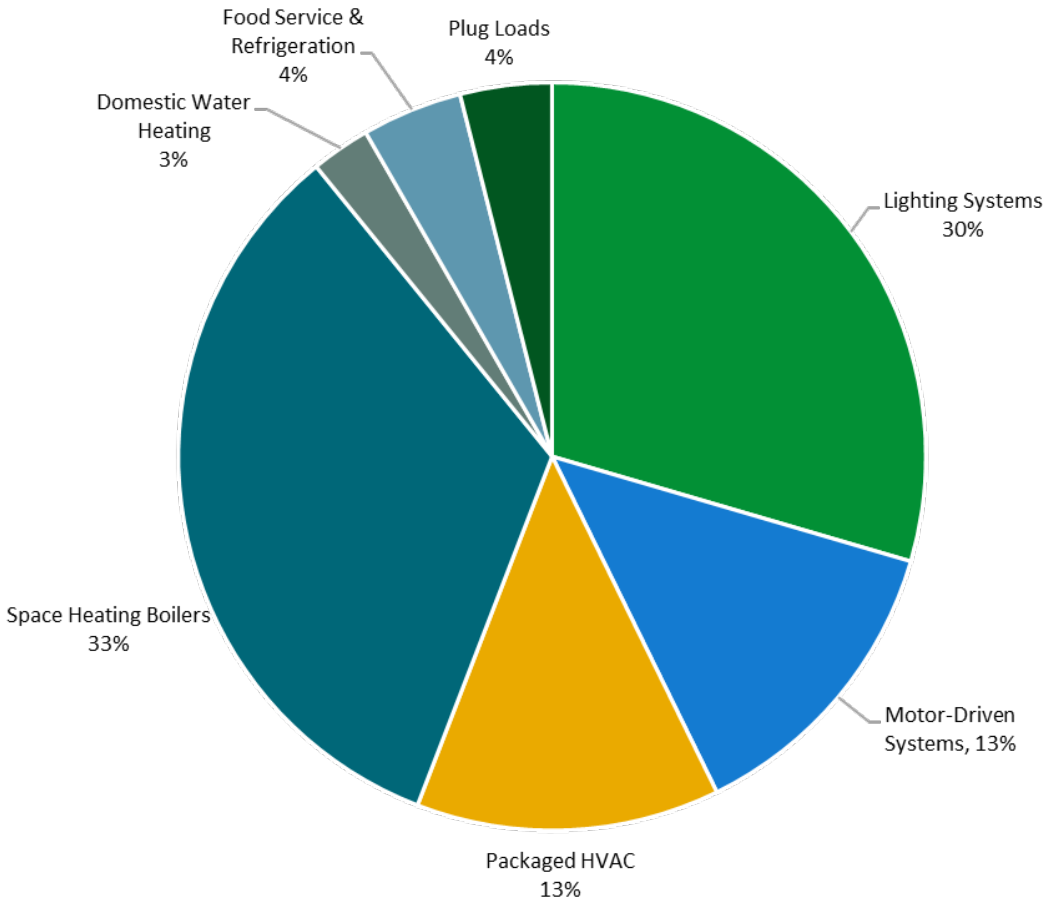
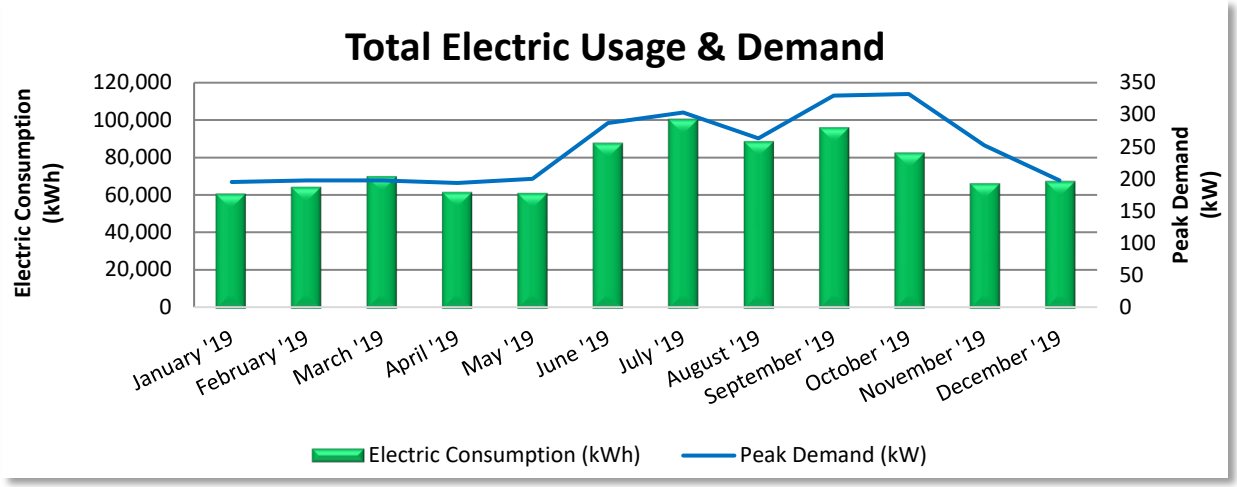
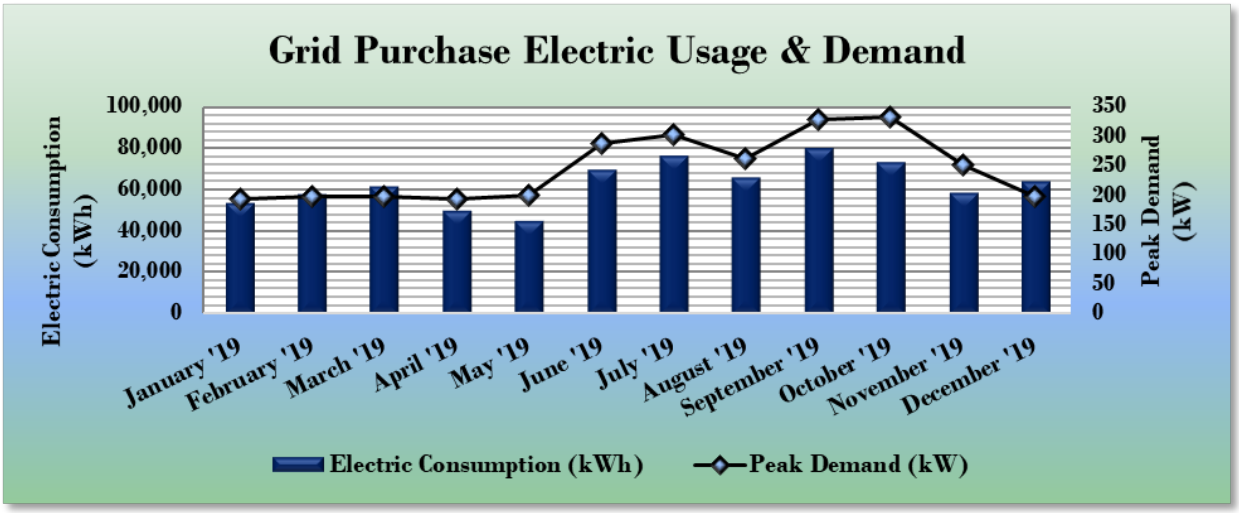


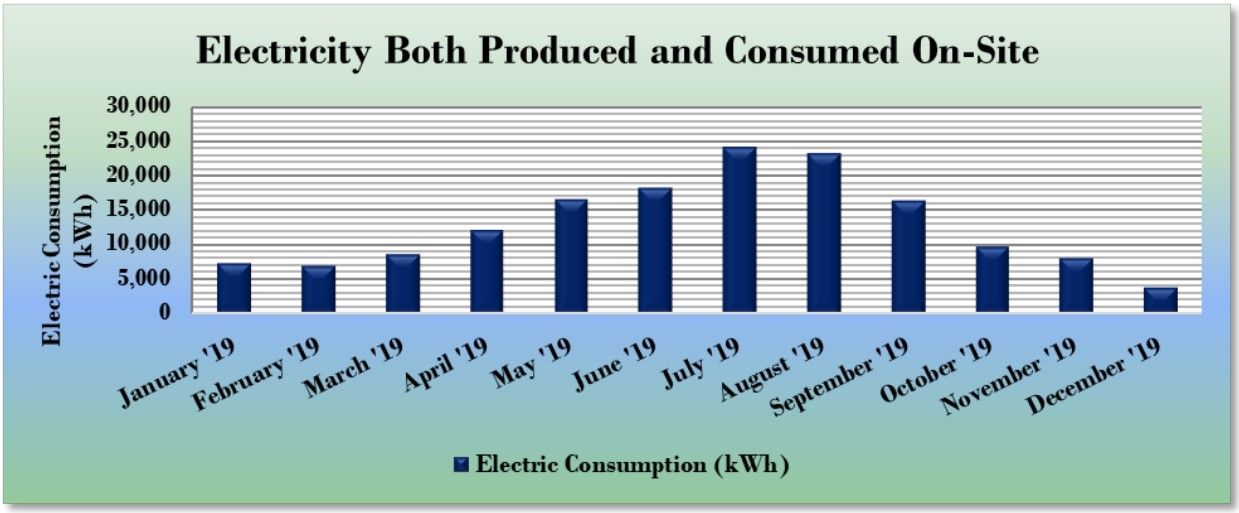

*Figure 4 - Energy Balance*

## 3.1 Electricity

PSE&G delivers electricity under rate class Large Power & Lighting Secondary (LPLS), with electric production provided by East Coast Power & Gas, a third-party supplier.



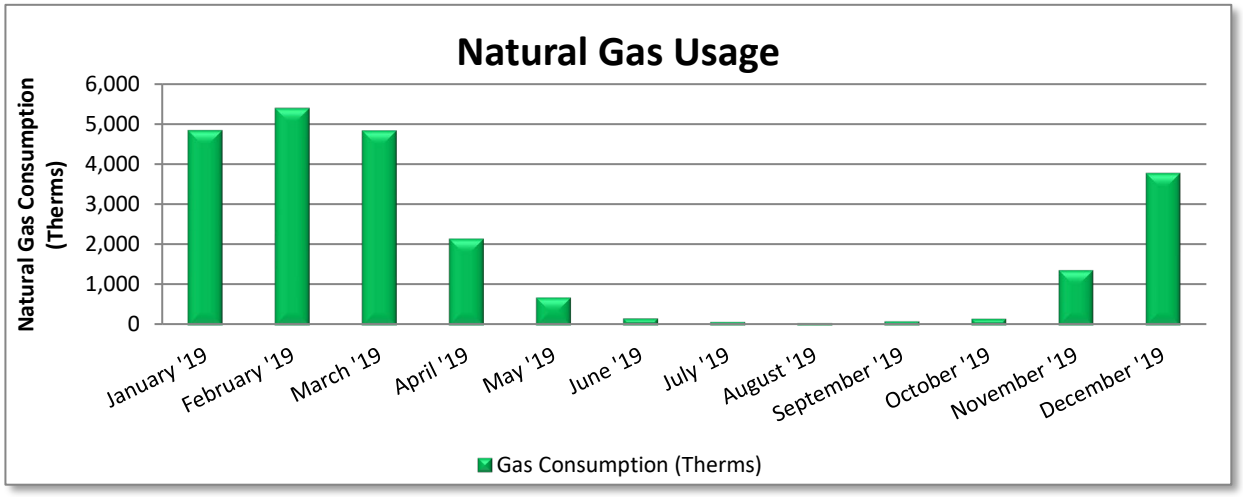
| Electric Billing Data | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 1/18/19 | 32 | 60,876 | 195 | $733 | $7,144 |
| 2/15/19 | 28 | 64,456 | 197 | $740 | $7,203 |
| 3/19/19 | 32 | 70,077 | 197 | $740 | $7,792 |
| 4/17/19 | 29 | 61,625 | 194 | $726 | $7,053 |
| 5/17/19 | 30 | 61,243 | 200 | $750 | $7,313 |
| 6/18/19 | 32 | 87,589 | 287 | $3,639 | $12,857 |
| 7/18/19 | 30 | 100,155 | 304 | $3,837 | $14,340 |
| 8/16/19 | 29 | 88,497 | 263 | $3,018 | $13,039 |
| 9/17/19 | 32 | 95,805 | 330 | $4,179 | $14,144 |
| 10/16/19 | 29 | 82,503 | 332 | $1,248 | $9,803 |
| 11/14/19 | 29 | 66,258 | 252 | $949 | $7,898 |
| 12/17/19 | 33 | 67,541 | 198 | $743 | $7,742 |
| **Totals** | **365** | **906,625** | **332** | **$21,302** | **$116,329** |
| **Annual** | **365** | **906,625** | **332** | **$21,302** | **$116,329** |

Notes:

- Peak demand of 332 kW occurred in October '19.
- Average demand over the past 12 months was 246 kW.
- The average electric cost over the past 12 months was $0.128/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.
- On-site generation is through a PPA, and the site purchases the generated electricity from G&S Hudson Solar LLC. Some of the electricity generated on-site is used on-site and the remainder is exported to the grid.
- The first graph shows combined electricity consumption, the second graph shows energy consumed from the grid, and the third graph reflects energy produced by the solar panels.
- The solar meter does not capture kW load and is not displayed on the third graph.

## 3.2 Natural Gas

PSE&G delivers natural gas under rate class General Service Gas (GSG), with natural gas supply provided by East Coast Power & Gas, a third-party supplier.




| Gas Billing Data | | | |
|---|---|---|---|
| **Period Ending** | **Days in Period** | **Natural Gas Usage (Therms)** | **Natural Gas Cost** |
| 1/18/19 | 32 | 4,845 | $3,534 |
| 2/15/19 | 28 | 5,398 | $4,918 |
| 3/19/19 | 32 | 4,839 | $4,258 |
| 4/17/19 | 29 | 2,162 | $1,285 |
| 5/17/19 | 30 | 694 | $505 |
| 6/18/19 | 32 | 175 | $230 |
| 7/18/19 | 30 | 92 | $186 |
| 8/16/19 | 29 | 56 | $167 |
| 9/17/19 | 32 | 102 | $191 |
| 10/16/19 | 29 | 165 | $232 |
| 11/14/19 | 29 | 1,372 | $1,644 |
| 12/17/19 | 33 | 3,784 | $3,159 |
| **Totals** | **365** | **23,686** | **$20,309** |
| **Annual** | **365** | **23,686** | **$20,309** |

Notes:

- The average gas cost for the past 12 months is $0.857/therm, which is the blended rate used throughout the analysis.
- The reduced natural gas consumption from May ’19 to October ‘19 likely reflects usage for domestic hot water and cooking equipment only.

## 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 | 87 |
|---|---|

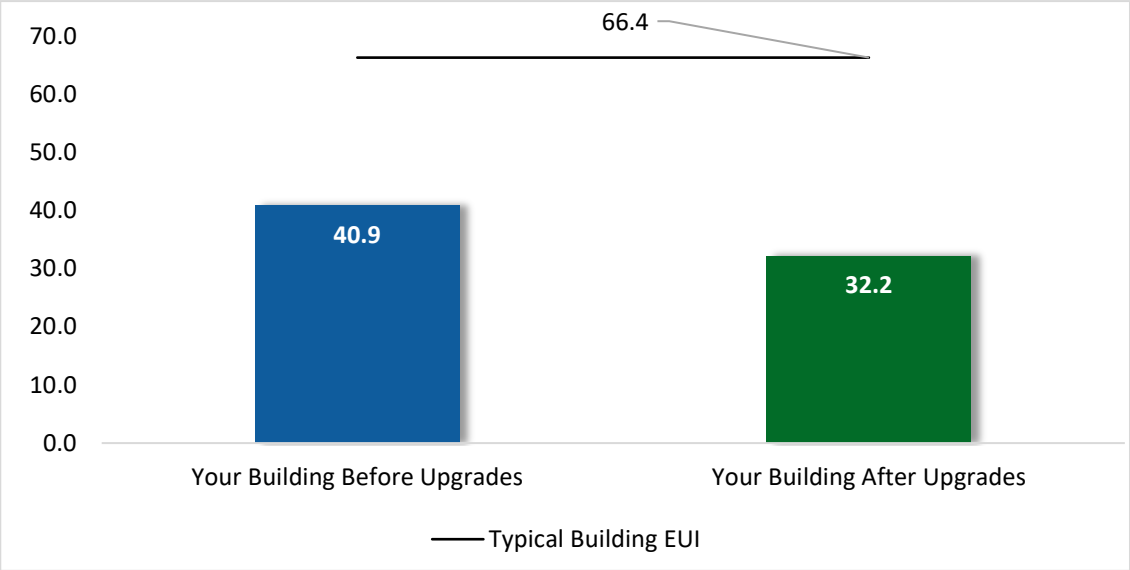



*Figure 5 - Energy Use Intensity Comparison*[3]

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

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

[3] Based on all evaluated ECMs

## Tracking Your Energy Performance

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

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

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

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[4].

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

# 4 Energy Conservation Measures

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

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

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **279,678** | **56.1** | **-47** | **$35,483** | **$146,242** | **$24,387** | **$121,855** | **3.4** | **276,139** |
| ECM 1 | Install LED Fixtures | Yes | 106,059 | 11.9 | -11 | $13,515 | $50,001 | $5,200 | $44,801 | 3.3 | 105,525 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 173,618 | 44.2 | -36 | $21,968 | $96,242 | $19,187 | $77,055 | 3.5 | 170,614 |
| **Lighting Control Measures** | | | **39,946** | **8.0** | **-8** | **$5,054** | **$28,584** | **$14,035** | **$14,549** | **2.9** | **39,248** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 17,200 | 4.4 | -4 | $2,176 | $13,734 | $1,435 | $12,299 | 5.7 | 16,900 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 22,746 | 3.6 | -5 | $2,878 | $14,850 | $12,600 | $2,250 | 0.8 | 22,348 |
| **Motor Upgrades** | | | **134** | **0.0** | **0** | **$17** | **$352** | **$0** | **$352** | **20.5** | **135** |
| ECM 5 | Premium Efficiency Motors | No | 134 | 0.0 | 0 | $17 | $352 | $0 | $352 | 20.5 | 135 |
| **Variable Frequency Drive (VFD) Measures** | | | **12,571** | **0.1** | **39** | **$1,948** | **$4,076** | **$900** | **$3,176** | **1.6** | **17,237** |
| ECM 6 | Install VFDs on Kitchen Hood Fan Motors | Yes | 12,571 | 0.1 | 39 | $1,948 | $4,076 | $900 | $3,176 | 1.6 | 17,237 |
| **HVAC System Improvements** | | | **600** | **0.0** | **28** | **$318** | **$2,971** | **$70** | **$2,901** | **9.1** | **3,891** |
| ECM 7 | Implement Demand Control Ventilation (DCV) | No | 600 | 0.0 | 2 | $96 | $2,719 | $0 | $2,719 | 28.4 | 860 |
| ECM 8 | Install Pipe Insulation | Yes | 0 | 0.0 | 26 | $222 | $252 | $70 | $182 | 0.8 | 3,031 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **10** | **$89** | **$158** | **$88** | **$70** | **0.8** | **1,222** |
| ECM 9 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 10 | $89 | $158 | $88 | $70 | 0.8 | 1,222 |
| **TOTALS** | | | **332,929** | **64.2** | **22** | **$42,909** | **$182,383** | **$39,480** | **$142,903** | **3.3** | **337,872** |

* - All incentives presented in this table are included as placeholders 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** | | **279,678** | **56.1** | **-47** | **$35,483** | **$146,242** | **$24,387** | **$121,855** | **3.4** | **276,139** |
| ECM 1 | Install LED Fixtures | 106,059 | 11.9 | -11 | $13,515 | $50,001 | $5,200 | $44,801 | 3.3 | 105,525 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 173,618 | 44.2 | -36 | $21,968 | $96,242 | $19,187 | $77,055 | 3.5 | 170,614 |
| **Lighting Control Measures** | | **39,946** | **8.0** | **-8** | **$5,054** | **$28,584** | **$14,035** | **$14,549** | **2.9** | **39,248** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 17,200 | 4.4 | -4 | $2,176 | $13,734 | $1,435 | $12,299 | 5.7 | 16,900 |
| ECM 4 | Install High/Low Lighting Controls | 22,746 | 3.6 | -5 | $2,878 | $14,850 | $12,600 | $2,250 | 0.8 | 22,348 |
| **Variable Frequency Drive (VFD) Measures** | | **12,571** | **0.1** | **39** | **$1,948** | **$4,076** | **$900** | **$3,176** | **1.6** | **17,237** |
| ECM 6 | Install VFDs on Kitchen Hood Fan Motors | 12,571 | 0.1 | 39 | $1,948 | $4,076 | $900 | $3,176 | 1.6 | 17,237 |
| **HVAC System Improvements** | | **0** | **0.0** | **26** | **$222** | **$252** | **$70** | **$182** | **0.8** | **3,031** |
| ECM 8 | Install Pipe Insulation | 0 | 0.0 | 26 | $222 | $252 | $70 | $182 | 0.8 | 3,031 |
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **10** | **$89** | **$158** | **$88** | **$70** | **0.8** | **1,222** |
| ECM 9 | Install Low-Flow DHW Devices | 0 | 0.0 | 10 | $89 | $158 | $88 | $70 | 0.8 | 1,222 |
| **TOTALS** | | **332,195** | **64.2** | **20** | **$42,797** | **$179,312** | **$39,480** | **$139,832** | **3.3** | **336,877** |

* - All incentives presented in this table are included as placeholders 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** | | **279,678** | **56.1** | **-47** | **$35,483** | **$146,242** | **$24,387** | **$121,855** | **3.4** | **276,139** |
| ECM 1 | Install LED Fixtures | 106,059 | 11.9 | -11 | $13,515 | $50,001 | $5,200 | $44,801 | 3.3 | 105,525 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 173,618 | 44.2 | -36 | $21,968 | $96,242 | $19,187 | $77,055 | 3.5 | 170,614 |

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 are 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 HPS fixtures.

### ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent and CFL lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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 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** | | **40,795** | **8.2** | **-9** | **$5,161** | **$29,124** | **$14,105** | **$15,019** | **2.9** | **40,081** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 18,049 | 4.6 | -4 | $2,283 | $14,274 | $1,505 | $12,769 | 5.6 | 17,733 |
| ECM 4 | Install High/Low Lighting Controls | 22,746 | 3.6 | -5 | $2,878 | $14,850 | $12,600 | $2,250 | 0.8 | 22,348 |

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

### ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

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

**Affected building areas:** offices, cafeteria, kitchen, lounges, gymnasium, library, 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.

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

**Affected building areas**: hallways, stairwells, and main lobby.

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 an occupant approaches.

## 4.3 Motors

| # | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Motor Upgrades** | | **134** | **0.0** | **0** | **$17** | **$352** | **$0** | **$352** | **20.5** | **135** |
| ECM 5 | Premium Efficiency Motors | 134 | 0.0 | 0 | $17 | $352 | $0 | $352 | 20.5 | 135 |

### ECM 5: Premium Efficiency Motors

We evaluated replacing standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

**Affected motors:**

| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Additional Motor Description |
|---|---|---|---|---|---|
| Boiler Room | Domestic Hot Water | 1 | DHW Circulation Pump | 0.5 | DHW Circulation Pump |

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

## 4.4 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** | | **12,571** | **0.1** | **39** | **$1,948** | **$4,076** | **$900** | **$3,176** | **1.6** | **17,237** |
| ECM 6 | Install VFDs on Kitchen Hood Fan Motors | 12,571 | 0.1 | 39 | $1,948 | $4,076 | $900 | $3,176 | 1.6 | 17,237 |

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

### ECM 6: Install VFDs on Kitchen Hood Fan Motors

Install VFDs and sensors to control the kitchen hood fan motor. 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.

## 4.5 HVAC Improvements

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated M&L Cost ($) | Estimated Incentive ($)* | Estimated Net M&L Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **HVAC System Improvements** | | **600** | **0.0** | **28** | **$318** | **$2,971** | **$70** | **$2,901** | **9.1** | **3,891** |
| ECM 7 | Implement Demand Control Ventilation (DCV) | 600 | 0.0 | 2 | $96 | $2,719 | $0 | $2,719 | 28.4 | 860 |
| ECM 8 | Install Pipe Insulation | 0 | 0.0 | 26 | $222 | $252 | $70 | $182 | 0.8 | 3,031 |

### ECM 7: Implement Demand Control Ventilation (DCV)

We evaluated implementing demand control ventilation (DCV) in selected areas of the facility. DCV monitors the indoor air's carbon dioxide ($CO_2$) content to measure room occupancy. This data is used to regulate the amount of outdoor air provided to the space for ventilation.

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

Energy savings associated with DCV are based on hours of operation, space occupancy, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

**Affected building areas:** auditorium.

### ECM 8: Install Pipe Insulation

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

**Affected Systems:** domestic hot water piping around the pumps.

## 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** | **10** | **$89** | **$158** | **$88** | **$70** | **0.8** | **1,222** |
| ECM 9 | Install Low-Flow DHW Devices | 0 | 0.0 | 10 | $89 | $158 | $88 | $70 | 0.8 | 1,222 |

### ECM 9: Install Low-Flow DHW Devices

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

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

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

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 between 5 to 20 percent 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, planned capital upgrades, and 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 will 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 can't manage what you don't 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[5] . 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 and thus 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 (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

[5] 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.

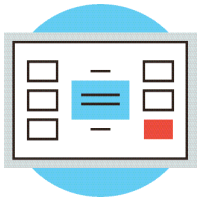
## Motor Maintenance

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 5-10°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 AC 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 check for fire dampers or balancing dampers that have failed closed.

Duct leakage in commercial buildings can account for 5% to 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.

## Water Heater Maintenance

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

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

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

## Refrigeration Equipment Maintenance

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

Maintaining your commercial refrigeration equipment can save between 5 and 10 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[6] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[7] 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.

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

[7] 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.

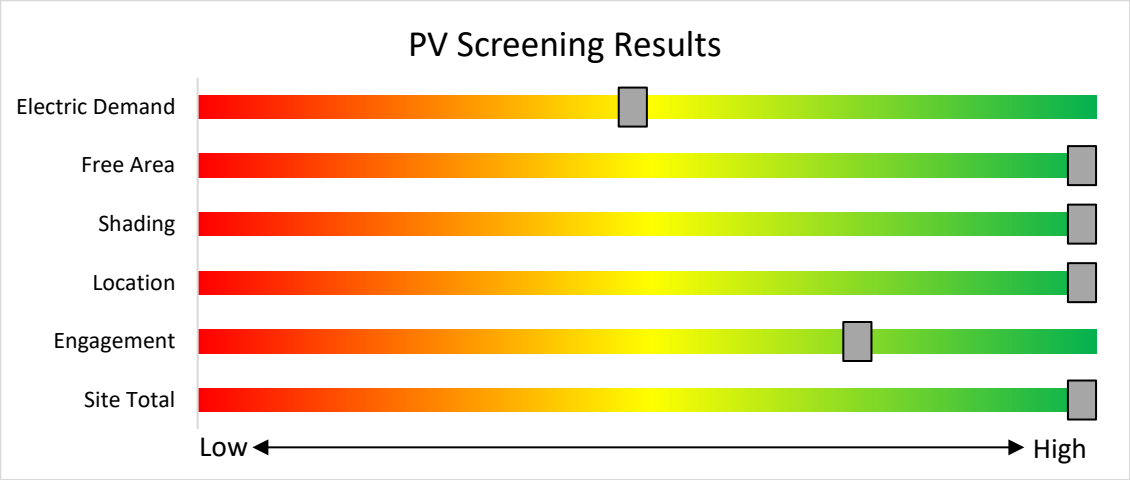
## 6.1 Solar Photovoltaic

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 an additional PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. An additional 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** | $16,360 | /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.

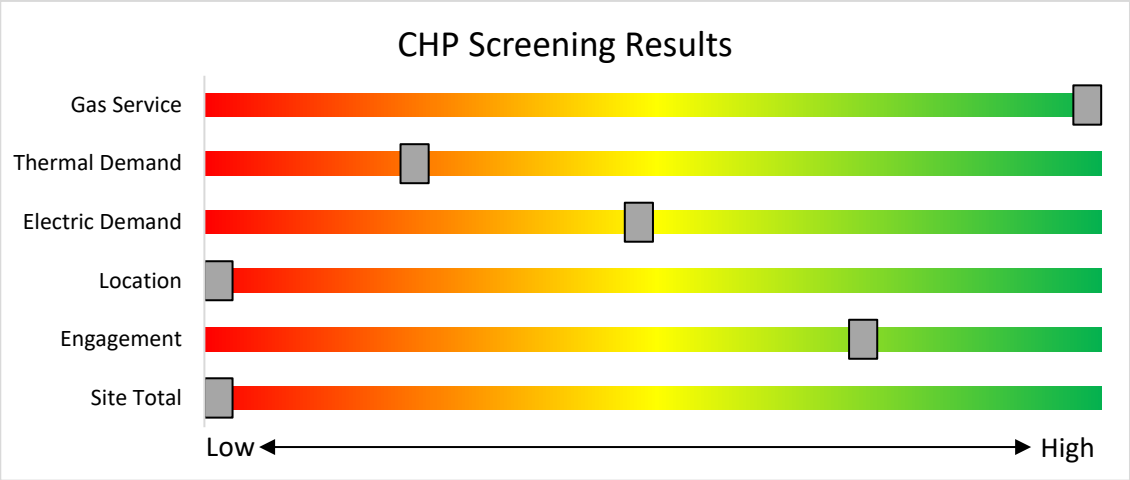



*Figure 9 - Combined Heat and Power Screening*

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/

# 7 PROJECT FUNDING AND INCENTIVES

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

## 7.1 Utility Energy Efficiency Programs


New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website.

# 8 New Jersey's Clean Energy Programs

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

## 8.1 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<br>Fuel Cells with Heat Recovery | >3 MW | $350 | | |
| Waste Heat to Power* | <1 MW | $1,000 | 30% | $2 million |
| | > 1MW | $500 | | $3 million |

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

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

**How to Participate**

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

## 8.2 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 in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the 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 (ESP) 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.*

## 8.3 Successor Solar Incentive Program (SuSI)

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

**Administratively Determined Incentive (ADI) Program**

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

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

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

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

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

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

**Competitive Solar Incentive Program**

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

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

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

# 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. 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 includes the review of multiple bids for project work, incorporate potential operational & maintenance (O&M) cost savings and maximize your incentive potential.

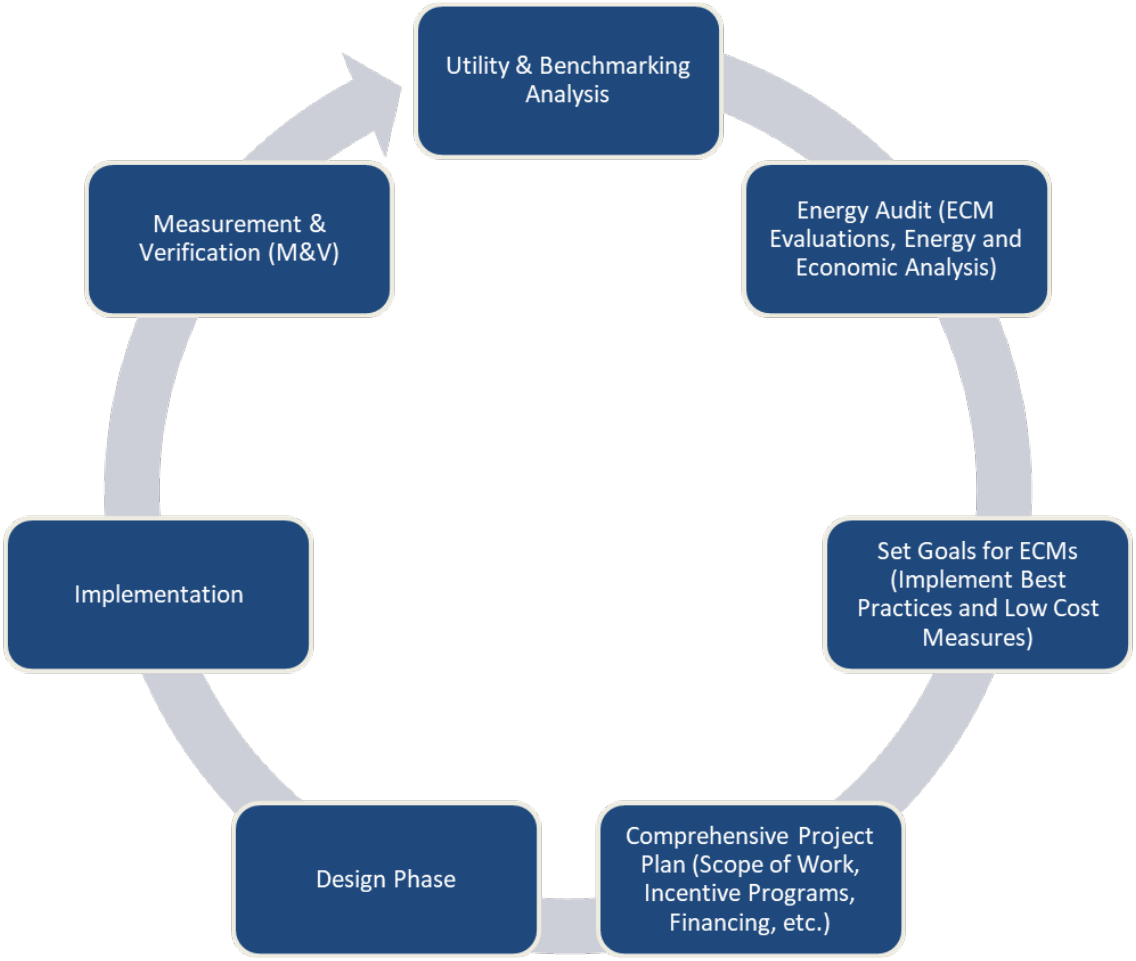



*Figure 30 – Project Development Cycle*

# 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. So, 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[8].

## 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 that fluctuate monthly. The utility provides basic gas supply service (BGSS) 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[9].

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

[9] 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 |
| Classroom 105 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 106 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 115 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Occupancy Sensor | S | 62 | 1,973 | 2 | Relamp | No | 8 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,973 | 0.2 | 573 | 0 | $73 | $292 | $80 | 2.9 |
| Classroom 120 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 122 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 123 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 124 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 127 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 128 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 645 | 0 | $82 | $329 | $90 | 2.9 |
| Classroom 130 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 8 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 738 | 0 | $93 | $870 | $120 | 8.0 |
| Classroom 135 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,612 | 0 | $204 | $822 | $225 | 2.9 |
| Classroom 135 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 2 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 185 | 0 | $23 | $217 | $30 | 8.0 |
| Classroom 137 | 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 |
| Classroom 137 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 137 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 2 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 185 | 0 | $23 | $217 | $30 | 8.0 |
| Classroom 139 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 140 | 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 |
| Classroom 140 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 140 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 2 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 185 | 0 | $23 | $217 | $30 | 8.0 |
| Classroom 151 | 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 |
| Classroom 151 | 13 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 13 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,397 | 0 | $177 | $712 | $195 | 2.9 |
| Classroom 151 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 2 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 185 | 0 | $23 | $217 | $30 | 8.0 |
| Classroom 153 | 13 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 13 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,397 | 0 | $177 | $712 | $195 | 2.9 |
| Classroom 153 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.0 | 92 | 0 | $12 | $109 | $15 | 8.0 |
| Classroom 157 | 13 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 13 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,397 | 0 | $177 | $712 | $195 | 2.9 |

| | 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 |
| Classroom 160 | 13 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 13 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,397 | 0 | $177 | $712 | $195 | 2.9 |
| Classroom 160 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.0 | 92 | 0 | $12 | $109 | $15 | 8.0 |
| Classroom 162 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 164 | 1 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Occupancy Sensor | S | 52 | 1,973 | 2 | Relamp | No | 1 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 37 | 1,973 | 0.0 | 33 | 0 | $4 | $25 | $2 | 5.6 |
| Classroom 164 | 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 |
| Classroom 164 | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.6 | 1,934 | 0 | $245 | $986 | $270 | 2.9 |
| Classroom 166 | 1 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Occupancy Sensor | S | 52 | 1,973 | 2 | Relamp | No | 1 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 37 | 1,973 | 0.0 | 33 | 0 | $4 | $25 | $2 | 5.6 |
| Classroom 166 | 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 |
| Classroom 166 | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.6 | 1,934 | 0 | $245 | $986 | $270 | 2.9 |
| Computer Lab 121 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Conference Room 150 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 645 | 0 | $82 | $329 | $90 | 2.9 |
| Corridor 1st | 20 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 20 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Corridor 1st | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 4,380 | 2, 4 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 3,022 | 0.0 | 303 | 0 | $38 | $55 | $15 | 1.0 |
| Corridor 1st | 93 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 4,380 | 2, 4 | Relamp | Yes | 93 | LED - Linear Tubes: (3) U-Lamp | High/Low Control | 50 | 3,022 | 3.9 | 25,919 | -5 | $3,279 | $13,708 | $4,650 | 2.8 |
| Corridor Stage | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Corridor Stage | 3 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 4,380 | 2, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (3) U-Lamp | High/Low Control | 50 | 3,022 | 0.1 | 836 | 0 | $106 | $551 | $150 | 3.8 |
| Electrical Room 125 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Electrical Room 142 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Electrical Room 156 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Electrical Room B19 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Electrical Room B19 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.2 | 122 | 0 | $15 | $489 | $95 | 25.5 |
| Exterior Courtyard | 8 | High-Pressure Sodium: (1) 250W Lamp | Photocell | | 295 | 4,380 | 1 | Fixture Replacement | No | 8 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Photocell | 75 | 4,380 | 0.0 | 7,709 | 0 | $989 | $3,766 | $400 | 3.4 |
| 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 | 48 | High-Pressure Sodium: (1) 400W Lamp | Wall Switch | S | 465 | 2,860 | 1, 3 | Fixture Replacement | Yes | 48 | LED - Fixtures: High-Bay | Occupancy Sensor | 120 | 1,973 | 13.2 | 57,715 | -12 | $7,302 | $24,719 | $2,540 | 3.0 |
| Janitorial 126 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.1 | 41 | 0 | $5 | $189 | $40 | 29.0 |

| | 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 |
| Janitorial 145 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Library Lower | 16 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Wall Switch | S | 52 | 2,860 | 2, 3 | Relamp | Yes | 16 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 37 | 1,973 | 0.3 | 1,332 | 0 | $169 | $940 | $102 | 5.0 |
| Library Lower | 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 |
| Library Lower | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 396 | 0 | $50 | $110 | $30 | 1.6 |
| Library Lower | 29 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 29 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 1.2 | 5,277 | -1 | $668 | $3,692 | $505 | 4.8 |
| Lounge 146 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,860 | 0.0 | 156 | 0 | $20 | $55 | $15 | 2.0 |
| Lounge 204 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,860 | 0.0 | 156 | 0 | $20 | $55 | $15 | 2.0 |
| Main Lobby | 60 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Wall Switch | S | 52 | 2,860 | 2, 4 | Relamp | Yes | 60 | LED Lamps: GX23 (Plug-In) Lamps | High/Low Control | 37 | 1,973 | 1.1 | 4,996 | -1 | $632 | $3,750 | $2,220 | 2.4 |
| 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 Office | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Main Office | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Nurses Office 103 | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 7 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 1,387 | 0 | $175 | $653 | $140 | 2.9 |
| Office - 108 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 594 | 0 | $75 | $434 | $80 | 4.7 |
| Office - 129 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 793 | 0 | $100 | $489 | $95 | 3.9 |
| Office - 131 | 5 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 910 | 0 | $115 | $813 | $110 | 6.1 |
| Office - 147 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 793 | 0 | $100 | $489 | $95 | 3.9 |
| Office - 148 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 396 | 0 | $50 | $226 | $50 | 3.5 |
| Office - 202 | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 1,092 | 0 | $138 | $922 | $125 | 5.8 |
| Office - 203 | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 1,092 | 0 | $138 | $922 | $125 | 5.8 |
| Office - 205 | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 1,092 | 0 | $138 | $922 | $125 | 5.8 |
| Office - 206 | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 1,092 | 0 | $138 | $922 | $125 | 5.8 |
| Restroom - 135 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 137 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 140 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 143 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Restroom - 144 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 151 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 153 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 157 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 160 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 162 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,860 | 0.0 | 156 | 0 | $20 | $55 | $15 | 2.0 |
| Restroom - 164 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,860 | 0.0 | 156 | 0 | $20 | $55 | $15 | 2.0 |
| Restroom - 166 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,860 | 0.0 | 156 | 0 | $20 | $55 | $15 | 2.0 |
| Restroom - Female 1st | 2 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | Occupancy Sensor | S | 84 | 1,973 | 2 | Relamp | No | 2 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 1,973 | 0.0 | 109 | 0 | $14 | $54 | $4 | 3.6 |
| Restroom - Female 1st | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Occupancy Sensor | S | 62 | 1,973 | 2 | Relamp | No | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.2 | 504 | 0 | $64 | $580 | $80 | 7.8 |
| Restroom - Male 1st | 2 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | Occupancy Sensor | S | 84 | 1,973 | 2 | Relamp | No | 2 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 1,973 | 0.0 | 109 | 0 | $14 | $54 | $4 | 3.6 |
| Restroom - Male 1st | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Occupancy Sensor | S | 62 | 1,973 | 2 | Relamp | No | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.2 | 504 | 0 | $64 | $580 | $80 | 7.8 |
| Restroom - Nurse | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 364 | 0 | $46 | $333 | $50 | 6.2 |
| Server Room 119 | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 304 | 0.2 | 114 | 0 | $14 | $705 | $95 | 42.3 |
| Stage | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stage | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,860 | 2 | Relamp | No | 18 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,860 | 0.4 | 1,869 | 0 | $236 | $657 | $180 | 2.0 |
| Stairs A | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stairs A | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,380 | 2, 4 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.3 | 2,023 | 0 | $256 | $815 | $450 | 1.4 |
| Stairs B | 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 |
| Stairs B | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,380 | 2, 4 | Relamp | Yes | 14 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.4 | 2,832 | -1 | $358 | $1,186 | $630 | 1.6 |
| Stairs C | 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 |
| Stairs C | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,380 | 2, 4 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.3 | 2,023 | 0 | $256 | $815 | $450 | 1.4 |
| Stairs E | 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 |
| Stairs E | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,380 | 2, 4 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.3 | 2,023 | 0 | $256 | $815 | $450 | 1.4 |
| Stairs F | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Stairs F | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,380 | 2, 4 | Relamp | Yes | 8 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.2 | 1,618 | 0 | $205 | $742 | $360 | 1.9 |
| Storage 108 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.1 | 81 | 0 | $10 | $416 | $40 | 36.6 |
| Storage 149 Vault | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 440 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 304 | 0.1 | 61 | 0 | $8 | $226 | $30 | 25.4 |
| Theater | 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 |
| Theater | 40 | LED - Fixtures: Downlight Recessed | Wall Switch | S | 20 | 2,860 | | None | No | 40 | LED - Fixtures: Downlight Recessed | Wall Switch | 20 | 2,860 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Classroom 212 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 213 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 214 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 215 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 216 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 216 | 3 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 3 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 277 | 0 | $35 | $326 | $45 | 8.0 |
| Classroom 223 | 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 |
| Classroom 223 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 225 | 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 |
| Classroom 225 | 20 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 20 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.7 | 2,149 | 0 | $272 | $1,095 | $300 | 2.9 |
| Classroom 230 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 231 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 233 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 234 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 235 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 236 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 237 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 238 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 239 | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 537 | 0 | $68 | $274 | $75 | 2.9 |
| Classroom 240 | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 537 | 0 | $68 | $274 | $75 | 2.9 |

| | 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 |
| Classroom 244 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.3 | 967 | 0 | $122 | $493 | $135 | 2.9 |
| Classroom 244 | 3 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 3 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 277 | 0 | $35 | $326 | $45 | 8.0 |
| Classroom 245 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 246 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 247 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 254 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 255 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 256 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 257 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 259 | 7 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 7 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.2 | 646 | 0 | $82 | $761 | $105 | 8.0 |
| Classroom 261 | 10 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 10 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.3 | 923 | 0 | $117 | $1,087 | $150 | 8.0 |
| Classroom 262 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 264 | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 537 | 0 | $68 | $274 | $75 | 2.9 |
| Classroom 265 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Classroom 266 | 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 |
| Classroom 266 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,612 | 0 | $204 | $822 | $225 | 2.9 |
| Classroom 266 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.0 | 92 | 0 | $12 | $109 | $15 | 8.0 |
| Classroom 267 | 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 |
| Classroom 267 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.5 | 1,612 | 0 | $204 | $822 | $225 | 2.9 |
| Classroom 267 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Occupancy Sensor | S | 92 | 1,973 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.0 | 92 | 0 | $12 | $109 | $15 | 8.0 |
| Classroom 269 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 11 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,182 | 0 | $150 | $602 | $165 | 2.9 |
| Computer Lab 232 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Occupancy Sensor | S | 93 | 1,973 | 2 | Relamp | No | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.4 | 1,289 | 0 | $163 | $657 | $180 | 2.9 |
| Corridor 2nd | 17 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 17 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Corridor 2nd | 93 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 4,380 | 2, 4 | Relamp | Yes | 93 | LED - Linear Tubes: (3) U-Lamp | High/Low Control | 50 | 3,022 | 3.9 | 25,919 | -5 | $3,279 | $13,708 | $4,650 | 2.8 |
| Corridor CST | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 4,380 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 3,022 | 0.1 | 607 | 0 | $77 | $335 | $100 | 3.1 |

| | 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 Guidance | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 4,380 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 3,022 | 0.1 | 607 | 0 | $77 | $335 | $100 | 3.1 |
| Corridor Guidance #2 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 4,380 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (3) U-Lamp | High/Low Control | 50 | 3,022 | 0.1 | 557 | 0 | $71 | $442 | $100 | 4.9 |
| Electrical Room 248 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Electrical Room 263 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Electrical Room 270 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Janitorial 251 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Library Upper | 12 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Wall Switch | S | 52 | 2,860 | 2, 3 | Relamp | Yes | 12 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 37 | 1,973 | 0.2 | 999 | 0 | $126 | $570 | $59 | 4.0 |
| Library Upper | 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 |
| Library Upper | 36 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 36 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 1.5 | 6,551 | -1 | $829 | $4,723 | $645 | 4.9 |
| Lounge 252 | 1 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | Wall Switch | S | 84 | 2,860 | 2, 3 | Relamp | Yes | 1 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 1,973 | 0.0 | 136 | 0 | $17 | $27 | $2 | 1.5 |
| Lounge 252 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 594 | 0 | $75 | $164 | $45 | 1.6 |
| Lounge 252 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.1 | 364 | 0 | $46 | $487 | $65 | 9.2 |
| Office - 208 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 396 | 0 | $50 | $226 | $50 | 3.5 |
| Office - 209 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 594 | 0 | $75 | $434 | $80 | 4.7 |
| Office - 210 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 396 | 0 | $50 | $226 | $50 | 3.5 |
| Office - 218 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 594 | 0 | $75 | $434 | $80 | 4.7 |
| Office - 218 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2, 3 | Relamp | Yes | 1 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 1,973 | 0.0 | 182 | 0 | $23 | $109 | $15 | 4.1 |
| Office - 219 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 396 | 0 | $50 | $226 | $50 | 3.5 |
| Office - 220 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 594 | 0 | $75 | $434 | $80 | 4.7 |
| Office - 227 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.1 | 396 | 0 | $50 | $226 | $50 | 3.5 |
| Restroom - 249 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - 250 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 2,860 | 0.0 | 134 | 0 | $17 | $109 | $15 | 5.5 |
| Restroom - Female 242 | 1 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | Wall Switch | S | 84 | 2,860 | 2, 3 | Relamp | Yes | 1 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 1,973 | 0.0 | 136 | 0 | $17 | $27 | $2 | 1.5 |
| Restroom - Female 242 | 1 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | None | S | 84 | 8,760 | 2 | Relamp | No | 1 | LED Lamps: PL-L (Biax) Lamps | None | 59 | 8,760 | 0.0 | 241 | 0 | $30 | $27 | $2 | 0.8 |
| Restroom - Female 242 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,860 | 2, 3 | Relamp | Yes | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.2 | 987 | 0 | $125 | $850 | $115 | 5.9 |

| | 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 |
| Restroom - Male 241 | 2 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | None | S | 84 | 8,760 | 2, 3 | Relamp | Yes | 2 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 6,044 | 0.1 | 834 | 0 | $106 | $54 | $4 | 0.5 |
| Restroom - Male 241 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | None | S | 62 | 8,760 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | None | 33 | 8,760 | 0.0 | 279 | 0 | $35 | $72 | $10 | 1.8 |
| Restroom - Male 241 | 7 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,860 | 2, 3 | Relamp | Yes | 7 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.2 | 864 | 0 | $109 | $777 | $105 | 6.2 |
| Stairs G | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stairs G | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | | 62 | 4,380 | 2, 4 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.1 | 809 | 0 | $102 | $371 | $180 | 1.9 |
| Storage 226 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 440 | 0.0 | 24 | 0 | $3 | $55 | $15 | 13.1 |
| Storage 228 | 1 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Wall Switch | S | 52 | 440 | 2, 3 | Relamp | Yes | 1 | LED Lamps: GX23 (Plug-In) Lamps | Occupancy Sensor | 37 | 304 | 0.0 | 13 | 0 | $2 | $25 | $2 | 14.2 |
| Storage 228 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 440 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 304 | 0.1 | 61 | 0 | $8 | $226 | $30 | 25.4 |
| Storage 258 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 16 | 0 | $2 | $37 | $10 | 13.1 |
| Storage 268 | 4 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 440 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 304 | 0.2 | 112 | 0 | $14 | $705 | $60 | 45.5 |
| Boiler Room | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | 27 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,860 | 2 | Relamp | No | 27 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,860 | 0.6 | 2,803 | -1 | $355 | $986 | $270 | 2.0 |
| Cafeteria | 6 | Compact Fluorescent: (4) 42W Triple Biaxial Plug-In Lamps | Wall Switch | S | 168 | 2,860 | 2, 3 | Relamp | Yes | 6 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 118 | 1,973 | 0.4 | 1,634 | 0 | $207 | $594 | $59 | 2.6 |
| Cafeteria | 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 |
| Cafeteria | 38 | LED - Fixtures: Downlight Recessed | Wall Switch | S | 20 | 2,860 | 3 | None | Yes | 38 | LED - Fixtures: Downlight Recessed | Occupancy Sensor | 20 | 1,973 | 0.2 | 741 | 0 | $94 | $810 | $105 | 7.5 |
| Corridor B1 | 15 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 15 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Corridor B1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 4,380 | 2, 4 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 3,022 | 0.1 | 405 | 0 | $51 | $73 | $20 | 1.0 |
| Corridor B1 | 49 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 4,380 | 2, 4 | Relamp | Yes | 49 | LED - Linear Tubes: (3) U-Lamp | High/Low Control | 50 | 3,022 | 2.0 | 13,656 | -3 | $1,728 | $7,126 | $2,450 | 2.7 |
| Janitorial B22 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) U-Lamp | Wall Switch | 50 | 440 | 0.0 | 21 | 0 | $3 | $109 | $15 | 36.0 |
| Janitorial B29 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 440 | 0.0 | 14 | 0 | $2 | $72 | $10 | 35.2 |
| Kitchen | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 21 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 21 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 1.0 | 4,161 | -1 | $526 | $1,690 | $385 | 2.5 |
| Mechanical - Crawlspace | 8 | LED Lamps: (1) 9W A19 Screw-In Lamp | Wall Switch | S | 9 | 440 | | None | No | 8 | LED Lamps: (1) 9W A19 Screw-In Lamp | Wall Switch | 9 | 440 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mechanical - Elevator | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 440 | 0.0 | 32 | 0 | $4 | $73 | $20 | 13.1 |
| Office - B20 | 4 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,860 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.1 | 494 | 0 | $62 | $560 | $75 | 7.8 |

| | 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 - B30 Custodian | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,860 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,973 | 0.2 | 793 | 0 | $100 | $489 | $95 | 3.9 |
| Restroom - B21 | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | S | 33 | 2,860 | | None | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,860 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Restroom - B31 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,860 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,860 | 0.0 | 91 | 0 | $12 | $72 | $10 | 5.4 |
| Restroom - Female B | 2 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | Occupancy Sensor | S | 84 | 1,973 | 2 | Relamp | No | 2 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 1,973 | 0.0 | 109 | 0 | $14 | $54 | $4 | 3.6 |
| Restroom - Female B | 1 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | S | 33 | 1,973 | | None | No | 1 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Restroom - Female B | 5 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Occupancy Sensor | S | 62 | 1,973 | 2 | Relamp | No | 5 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.1 | 315 | 0 | $40 | $362 | $50 | 7.8 |
| Restroom - Male B | 2 | Compact Fluorescent: (2) 42W Triple Biaxial Plug-In Lamps | Occupancy Sensor | S | 84 | 1,973 | 2 | Relamp | No | 2 | LED Lamps: PL-L (Biax) Lamps | Occupancy Sensor | 59 | 1,973 | 0.0 | 109 | 0 | $14 | $54 | $4 | 3.6 |
| Restroom - Male B | 5 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Occupancy Sensor | S | 62 | 1,973 | 2 | Relamp | No | 5 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 1,973 | 0.1 | 315 | 0 | $40 | $362 | $50 | 7.8 |
| Storage - Elevator | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.1 | 81 | 0 | $10 | $416 | $40 | 36.6 |
| Storage B01 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.3 | 183 | 0 | $23 | $599 | $90 | 22.0 |
| Storage B02 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.3 | 183 | 0 | $23 | $599 | $90 | 22.0 |
| Storage B03 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.3 | 183 | 0 | $23 | $599 | $90 | 22.0 |
| Storage B04 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.3 | 183 | 0 | $23 | $599 | $90 | 22.0 |
| Storage B06 | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 440 | 2, 3 | Relamp | Yes | 18 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 304 | 0.5 | 366 | 0 | $46 | $1,197 | $180 | 22.0 |
| Storage B19 | 6 | U-Bend Fluorescent - T8: U T8 (32W) - 3L | Wall Switch | S | 92 | 440 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) U-Lamp | Occupancy Sensor | 50 | 304 | 0.2 | 168 | 0 | $21 | $922 | $90 | 39.2 |
| Exterior | 20 | Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps | Photocell | | 52 | 4,380 | 2 | Relamp | No | 20 | LED Lamps: GX23 (Plug-In) Lamps | Photocell | 37 | 4,380 | 0.0 | 1,314 | 0 | $169 | $500 | $40 | 2.7 |
| Exterior | 48 | High-Pressure Sodium: (1) 250W Lamp | Photocell | | 295 | 4,380 | 1 | Fixture Replacement | No | 48 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Photocell | 75 | 4,380 | 0.0 | 46,253 | 0 | $5,935 | $22,595 | $2,400 | 3.4 |

## Motor Inventory & Recommendations

| | | Existing Conditions | | | | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Manufacturer | Model | Remaining Useful Life | Annual Operating Hours | ECM # | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Rooftop Unit 1 | 1 | Supply Fan | 7.5 | 88.5% | Yes | McQuay | | W | 1,540 | | No | 88.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 1 | 1 | Return Fan | 3.0 | 86.5% | Yes | McQuay | | W | 1,540 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 2 | 1 | Supply Fan | 5.0 | 87.5% | Yes | McQuay | | W | 1,650 | | No | 87.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 2 | 1 | Return Fan | 3.0 | 86.5% | Yes | McQuay | | W | 1,650 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 3 | 1 | Supply Fan | 10.0 | 89.5% | Yes | McQuay | | W | 1,705 | | No | 89.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 3 | 1 | Return Fan | 3.0 | 86.5% | Yes | McQuay | | W | 1,705 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 4 | 1 | Supply Fan | 10.0 | 89.5% | Yes | McQuay | | W | 1,595 | | No | 89.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Rooftop Unit 4 | 1 | Return Fan | 3.0 | 86.5% | Yes | McQuay | | W | 1,595 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Air Handling Unit 1 | 1 | Supply Fan | 7.5 | 88.5% | Yes | McQuay | | W | 2,035 | | No | 88.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Air Handling Unit 1 | 1 | Return Fan | 5.0 | 87.5% | Yes | McQuay | | W | 2,035 | | No | 87.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Air Handling Unit 1 | 1 | Other | 0.8 | 78.0% | Yes | McQuay | | W | 2,035 | | No | 78.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Various | Unit Ventilators | 65 | Supply Fan | 0.3 | 62.5% | No | McQuay | | W | 1,980 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Cooling System | 3 | Chilled Water Pump | 15.0 | 91.0% | Yes | Marathon | | W | 1,460 | | No | 91.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Boilers | 2 | Combustion Air Fan | 3.0 | 86.5% | No | Marathon | | W | 700 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Domestic Hot Water | 1 | DHW Circulation Pump | 0.2 | 60.0% | No | | | W | 8,760 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Domestic Hot Water | 1 | DHW Circulation Pump | 0.5 | 78.2% | No | US Motors | | W | 8,760 | | No | 78.2% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Domestic Hot Water | 1 | DHW Circulation Pump | 0.5 | 75.0% | No | Emerson | | W | 8,760 | 5 | Yes | 78.2% | No | | 0.0 | 134 | 0 | $17 | $352 | $0 | 20.5 |
| Boiler Room | Glycol Pump | 1 | Process Pump | 0.3 | 62.0% | No | Baldor | | W | 2,745 | | No | 62.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Sump Pumps | 2 | Process Pump | 0.3 | 62.5% | No | | | W | 730 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Dual Temp System | 2 | Water Supply Pump | 20.0 | 91.0% | Yes | Marathon | | W | 2,200 | | No | 91.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | | Existing Conditions | | | | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Manufacturer | Model | Remaining Useful Life | Annual Operating Hours | ECM # | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room | Heating System | 3 | Heating Hot Water Pump | 5.0 | 84.0% | No | US Motors | | W | 1,460 | | No | 84.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Kitchen | 1 | Kitchen Hood Exhaust Fan | 5.0 | 87.5% | No | Reliance Electric | | W | 5,250 | 6 | No | 89.5% | Yes | 1 | 0.1 | 12,571 | 39 | $1,948 | $4,076 | $900 | 1.6 |
| Roof | School Building | 14 | Exhaust Fan | 0.3 | 62.5% | No | Greenheck | | W | 1,357 | | No | 62.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Elevator Room | Building | 1 | Other | 25.0 | 93.0% | No | ThyssenKrupp | | W | 400 | | No | 93.0% | 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 |
| Various | Various | 65 | Unit Ventilator | 1.50 | 50.00 | | | McQuay | U AVS 6 S13 A E | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | RTU1 - Auditorium | 1 | Package Unit | 30.00 | 200.00 | 10.50 | 0.8 Et | McQuay | RPS030CLA | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | RTU2 - Hallways & Classrooms | 1 | Package Unit | 15.00 | 320.00 | | 0.8 Et | McQuay | RFS015CSA | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | RTU3 - Hallways, Classrooms, & Cafeteria | 1 | Package Unit | 20.00 | 500.00 | | 0.8 Et | McQuay | RFS020CSA | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | RTU4 - Hallways & Classrooms | 1 | Package Unit | 25.00 | 320.00 | 10.00 | 0.8 Et | McQuay | RPS025CLA | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Electrical Room B19 | Electrical Room B19 | 1 | Electric Resistance Heat | | 25.59 | | 1 COP | Berko | HUHAA720 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Boiler Room | 2 | Electric Resistance Heat | | 25.59 | | 1 COP | Berko | HUHAA720 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Computer Lab 121 | 1 | Ductless Mini-Split AC | 2.02 | | 17.00 | | Sanyo | CL2472 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Electrical Room 142 | 1 | Ductless Mini-Split HP | 1.00 | | 15.20 | | Mitsubishi | PUY-A12NHA3 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Server Room 119 | 1 | Ductless Mini-Split AC | 2.02 | | 17.00 | | Sanyo | CL2472 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Computer Lab 232 | 1 | Ductless Mini-Split AC | 2.02 | | 17.00 | | Sanyo | CL2472 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Electrical Room 248 | 1 | Ductless Mini-Split HP | 1.00 | | 15.20 | | Mitsubishi | PUY-A12NHA3 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Electric Chiller Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Chiller Quantity | System Type | Cooling Capacity per Unit (Tons) | Manufacturer | Model | Remaining Useful Life | ECM # | Install High Efficiency Chillers? | Chiller Quantity | System Type | Constant/ Variable Speed | Cooling Capacity (Tons) | Full Load Efficiency (kW/Ton) | IPLV Efficiency (kW/Ton) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Cooling System | 2 | Air-Cooled Screw Chiller | 140.00 | McQuay | AGS140CH12-ER10 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Space Heating Boiler Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Output Capacity per Unit (MBh) | Manufacturer | Model | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Output Capacity per Unit (MBh) | Heating Efficiency | Heating Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room | Heating System | 2 | Condensing Hot Water Boiler | 4,412 | De Dietrich | GTE 521 A | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Demand Control Ventilation Recommendations

| | | Recommendation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Affected | ECM # | Number of Zones | Cooling Capacity of Controlled System (Tons) | Electric Heating Capacity of Controlled System (kBtu/hr) | Output Heating Capacity of Controlled System (MBh) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | RTU1 - Auditorium | 7 | 2.00 | 30.00 | 0.00 | 200.00 | 0.0 | 600 | 2 | $96 | $2,719 | $0 | 28.4 |

## Pipe Insulation Recommendations

| | | Recommendation Inputs | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Affected | ECM # | Length of Uninsulated Pipe (ft) | Pipe Diameter (in) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost ($) | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room | Domestic Hot Water | 8 | 20 | 2.50 | 0.0 | 0 | 14 | $120 | $144 | $40 | 0.9 |
| Boiler Room | Domestic Hot Water | 8 | 15 | 2.00 | 0.0 | 0 | 12 | $102 | $108 | $30 | 0.8 |

## 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 |
| Boiler Room | Domestic Hot Water | 1 | Boiler | Lars | Mighty Therm2 400 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## 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 |
| West New York Public School No. 2 | 9 | 22 | Faucet Aerator (Lavatory) | 2.20 | 0.50 | 0.0 | 0 | 10 | $89 | $158 | $88 | 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) | Bohn | ADT090AEW / MOH010D73CF | | No | No | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Medium Temp Freezer (0F to 30F) | Bohn | LET120BEW / MOH031L63C | | No | No | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## 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 |
| Main Lobby | 2 | Refrigerator Chest | Powers | 569 | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 2 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | True | TR2R-2S | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.) | Habco | ESM28 | Yes | | 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 - 28 Pans) | Vulcan | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 2 | Gas Convection Oven (Full Size) | Vulcan | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 2 | Insulated Food Holding Cabinet (Full Size) | Cres Cor | | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Gas Rack Oven (Single) | Vulcan | | No | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Gas Fryer | Vulcan | | 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 |
| West New York Public School No. 2 | 7 | Coffee Machine | 500 | No | | |
| West New York Public School No. 2 | 149 | Desktop | 120 | No | | |
| West New York Public School No. 2 | 4 | Fan (Large) | 200 | No | | |
| West New York Public School No. 2 | 720 | Laptop | 50 | No | | |
| West New York Public School No. 2 | 6 | Microwave | 1,000 | No | | |
| West New York Public School No. 2 | 1 | Deli Slicer | 345 | No | | |
| West New York Public School No. 2 | 5 | Paper Shredder | 146 | No | | |
| West New York Public School No. 2 | 80 | Printer (Medium/Small) | 450 | No | | |
| West New York Public School No. 2 | 3 | Printer/Copier (Large) | 600 | No | | |
| West New York Public School No. 2 | 7 | Refrigerator (Mini) | 175 | No | | |
| West New York Public School No. 2 | 3 | Refrigerator (Residential) | 340 | No | | |
| West New York Public School No. 2 | 4 | Serving Table (Chilled/Heated) | 3,400 | No | | |
| West New York Public School No. 2 | 59 | Smart Board | 215 | Yes | | |
| West New York Public School No. 2 | 10 | Television | 224 | No | | |
| West New York Public School No. 2 | 1 | Toaster Oven | 600 | No | | |
| West New York Public School No. 2 | 1 | Water Cooler | 192 | No | | |
| West New York Public School No. 2 | 1 | Water Fountain | 370 | No | | |
| West New York Public School No. 2 | 1 | Server | 2,000 | No | | |

# APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

**87**

ENERGY STAR® Score[1]

### West New York Public School No. 2

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 133,510
**Built:** 1972

**For Year Ending:** December 31, 2019
**Date Generated:** October 18, 2021

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

### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| West New York Public School No. 2<br>5200 Broadway Avenue<br>West New York, New Jersey 07093 | West New York Board of Education<br>6028 Broadway<br>West New York, NJ 07093<br>(201) 553-4000 | Dean Austin<br>6028 Broadway<br>West New York, NJ 07093<br>(201) 553-4000 x 30063<br>daustin@wnyschools.net |

**Property ID:** 15336983

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

**Site EUI**
41 kBtu/ft²

**Source EUI**
76.4 kBtu/ft²

| Annual Energy by Fuel | |
|---|---|
| Electric - Solar (kBtu) | 575,133 (10%) |
| Natural Gas (kBtu) | 2,327,299 (43%) |
| Electric - Grid (kBtu) | 2,566,688 (47%) |

| National Median Comparison | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 66.4 |
| National Median Source EUI (kBtu/ft²) | 123.9 |
| % Diff from National Median Source EUI | -38% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 415 |

### Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

**Licensed Professional**

____ _____
,
(___)___-_____
_____

Professional Engineer or Registered Architect Stamp (if applicable)

# APPENDIX C: GLOSSARY

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

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

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