Local Government Energy Audit Report

Thorne Middle School

February 14, 2024

Prepared for:
Middletown Township Public Schools
70 Murphy Road
Port Monmouth, New Jersey 07758

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

Disclaimer

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

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

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

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

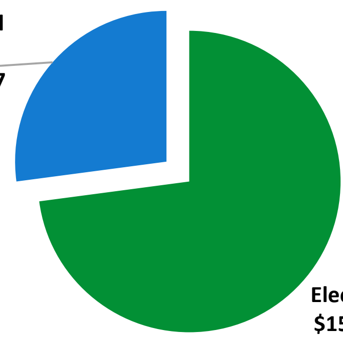
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $209,310 Electricity: 1,514,607 kWh Natural Gas: 33,507 Therms	
ENERGY STAR® Benchmarking Score	38 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

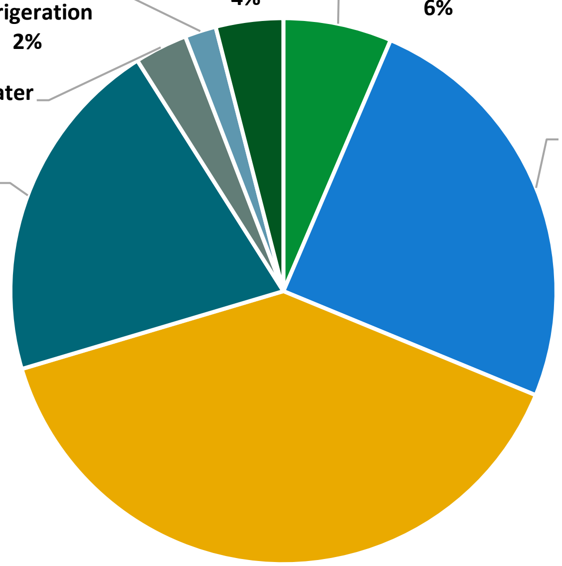


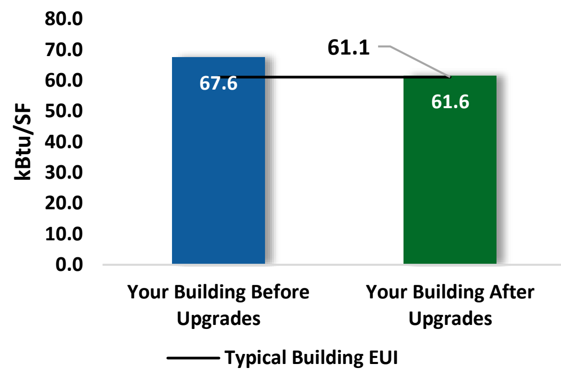
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

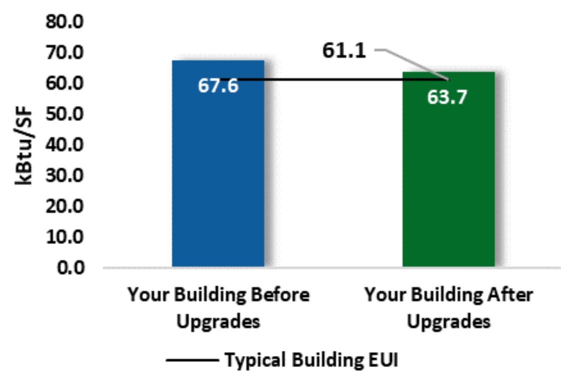
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$642,777
Potential Rebates & Incentives[1]	$16,743
Annual Cost Savings	$19,947
Annual Energy Savings	Electricity: 165,509 kWh Natural Gas: 1,934 Therms
Greenhouse Gas Emission Savings	95 Tons
Simple Payback	31.4 Years
Site Energy Savings (All Utilities)	9%



Scenario 2: Cost Effective Package[2]

Installation Cost	$61,702
Potential Rebates & Incentives	$1,437
Annual Cost Savings	$12,217
Annual Energy Savings	Electricity: 93,821 kWh Natural Gas: 1,633 Therms
Greenhouse Gas Emission Savings	57 Tons
Simple Payback	4.9 Years
Site Energy Savings (all utilities)	6%



On-site Generation Potential

Photovoltaic	None
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			**2,034**	**0.5**	**0**	**$198**	**$920**	**$149**	**$771**	**3.9**	**1,998**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	2,034	0.5	0	$198	$920	$149	$771	3.9	1,998
Lighting Control Measures			**4,554**	**0.8**	**-1**	**$443**	**$6,676**	**$1,775**	**$4,901**	**11.1**	**4,475**
ECM 2	Install Occupancy Sensor Lighting Controls	No	3,019	0.5	-1	$293	$5,326	$725	$4,601	15.7	2,967
ECM 3	Install High/Low Lighting Controls	Yes	1,535	0.3	0	$149	$1,350	$1,050	$300	2.0	1,508
Unitary HVAC Measures			**66,029**	**33.6**	**0**	**$6,652**	**$549,920**	**$14,581**	**$535,339**	**80.5**	**66,491**
ECM 4	Install High Efficiency Heat Pumps	No	66,029	33.6	0	$6,652	$549,920	$14,581	$535,339	80.5	66,491
HVAC System Improvements			**5,809**	**0.0**	**31**	**$1,105**	**$26,203**	**$52**	**$26,151**	**23.7**	**9,442**
ECM 5	Implement Demand Control Ventilation (DCV)	No	2,640	0.0	31	$785	$25,829	$0	$25,829	32.9	6,251
ECM 6	Install Pipe Insulation	Yes	3,169	0.0	0	$319	$374	$52	$322	1.0	3,191
Domestic Water Heating Upgrade			**5,070**	**0.0**	**0**	**$511**	**$222**	**$111**	**$111**	**0.2**	**5,105**
ECM 7	Install Low-Flow DHW Devices	Yes	5,070	0.0	0	$511	$222	$111	$111	0.2	5,105
Food Service & Refrigeration Measures			**1,496**	**0.2**	**0**	**$151**	**$2,702**	**$75**	**$2,627**	**17.4**	**1,507**
ECM 8	Replace Refrigeration Equipment	Yes	1,496	0.2	0	$151	$2,702	$75	$2,627	17.4	1,507
Custom Measures			**80,517**	**0.0**	**164**	**$10,889**	**$56,134**	**$0**	**$56,134**	**5.2**	**100,292**
ECM 9	Retro-Commissioning Study	Yes	57,129	0.0	164	$8,533	$50,428	$0	$50,428	5.9	76,740
ECM 10	Replace Electric Water Heater with Heat Pump Water Heater	Yes	23,388	0.0	0	$2,356	$5,706	$0	$5,706	2.4	23,552
TOTALS (COST EFFECTIVE MEASURES)			**93,821**	**0.9**	**163**	**$12,217**	**$61,702**	**$1,437**	**$60,265**	**4.9**	**113,602**
TOTALS (ALL MEASURES)			**165,509**	**35.1**	**193**	**$19,947**	**$642,777**	**$16,743**	**$626,034**	**31.4**	**189,310**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

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

Direct Install

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

Engineered Solutions

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

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

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

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

2 Existing Conditions

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

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

2.1 Site Overview

On July 19, 2023, TRC performed an energy audit at Thorne Middle School located in Port Monmouth, New Jersey. TRC met with facility staff to review the facility operations and help focus our investigation on specific energy-using systems.

Thorne Middle School located at 70 Murphy Road is a public middle school serving students in sixth through eighth grades. The facility is a two-story, 129,069 square foot building originally built in 1960 and expanded in 1974 and 2000 to accommodate additional classrooms and a library. Spaces include classrooms, gymnasium, offices, cafeteria, media center, corridors, stairwells, commercial kitchen, restrooms, storage, and mechanical spaces.

Facility lighting systems consist mostly of LED tube sources. The building is 100% heated and cooled, mainly by a mix of geothermal water source heat pumps (WSHPs) and roof mounted packaged units (RTUs) supplemented by two condensing hot water boilers. The building has a passenger elevator and a gas-fired backup generator. Solar photovoltaic arrays with a 330-kW capacity were installed on the flat roof section of the building in 2018 through a power purchase agreement (PPA).

<u>Recent Improvements and Facility Concerns</u>

Facility concerns include the geothermal system's failing bore field and the aging water source heat pumps which have reached the end of their useful life and require high maintenance.

In 2015, the facility implemented interior and exterior lighting retrofits through the Energy Savings Improvement Program (ESIP) and performed a substantial mechanical HVAC systems upgrade. Two condensing boilers, cooling tower, and 14 RTUs were installed as part of the HVAC mechanical upgrade. Additionally, all the building electric transformers have been replaced with energy efficient transformers.

It should be noted that since the time of the site visits many improvements have been made, which has resulted in better facility performance and higher ENERGY STAR scores.

Geothermal System

2.2 Building Occupancy

Thorne Middle School operates on a ten-month schedule. During a typical weekday, the middle school is occupied by 627 students and 106 staff. There are some Saturday activities and after school programs in summer. Thorne Middle School is shut down around 11:00 PM after the cleaning process.

It should be noted that the energy and economic analysis for the facilities is based on the use of the building during the utility billing period, and that results will vary based on changes to building.

Building Name	Weekday/Weekend	Operating Schedule
Thorne Middle School - General Operating Hours	Weekday	6:00 AM - 11:00 PM
	Weekend	Closed
Thorne Middle School - Classes Hours	Weekday	7:30 AM - 2:30 PM
	Weekend	Closed

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are constructed of concrete masonry unit (CMU) block over structural steel with a brick veneer façade, with gypsum drywall and painted CMU interior finish. The level of exterior wall insulation is unknown. The building has a flat roof finished with grey membrane. The roof was replaced in 2015 and is in good condition.

Windows are double paned units with aluminum frames. Operable and fixed window weather seals are in fair and good condition. The main entrance doors are aluminum framed glass. Exit doors are mostly FRP (fiberglass-reinforced polymer) rated and are in good and fair condition. Degraded window and door seals increase drafts and outside air infiltration.

2000 Addition Walls - Media Center

1974 Addition Walls

Flat Roof

Entrance Doors *Old Exit Door*

2.4 Lighting Systems

Lighting systems throughout the building have been retrofitted with LED sources, primarily with linear LED tubes. Workroom 105 is lit with 4-foot linear fluorescent lamps, and the media center contains a few. The boys and girls coach offices are lit with 2-foot linear T8 lamps. A small number of compact fluorescent lamps (CFLs) are found in the entrances while the old shower rooms use incandescent lamps.

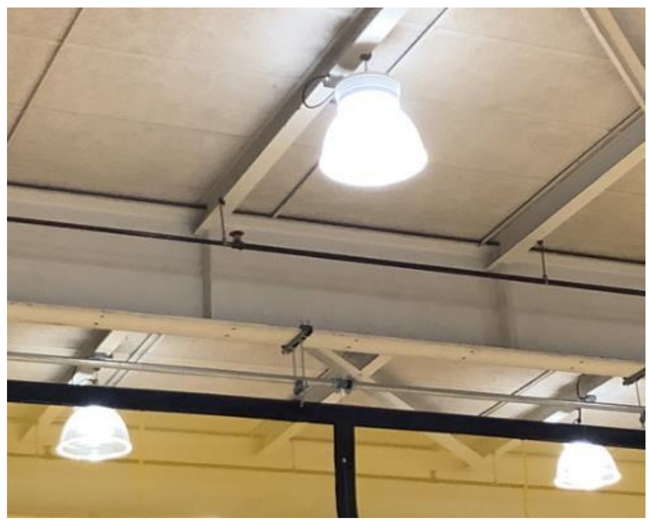
Linear LED tubes fixture types include 1-lamp, 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot-long troffer, recessed, and surfaced mounted fixtures. The gymnasium is lit with LED fixtures. LED lamps are used in conjunction with linear LED tubes in some restrooms, various corridors, and in the media center.

Most fixtures are in good condition. Interior lighting levels were generally sufficient. All exit signs are LED. Light fixtures in spaces are primarily controlled by occupancy sensors that are either ceiling or wall mounted except for spaces including storage rooms, restrooms, stairwells, small offices, old weight room, and garage where light fixtures are controlled by manual wall switches.

Exterior perimeter and entrance fixtures have mainly been replaced with LED fixtures and are controlled by photocells. There are two, 400-Watt metal wall pole mounted fixtures controlled by photocells.

Linear LED Tubes Fixtures

2-Foot LED Tubes Fixture



LED Fixtures

LED Lamp *Occupancy Sensors*

Exterior LED Fixtures

2.5 Air Handling Systems

Unitary Heating Equipment

The kitchen is served by a heating and ventilation unit (HV-2) located in the storage room. The unit is equipped with a 2 hp constant volume fan motor and a gas-fired section. The unit appears in good condition.

Building spaces including entrances, stairs, boiler room, and book storage room are heated by electric resistance heaters that are controlled by local thermostats. The units are either floor mounted or suspended from the ceiling. Storage room 57B and the kiln room are served by electric duct heaters. We could not verify if the electric duct heaters are currently working; the components do not appear to be connected to BAS.

A 1-ton Fujitsu split system air source heat pump conditions portion of the main office. It is in good condition and relatively efficient.

Heating and Ventilation (HV-2) - Kitchen

Electric Resistance Heaters

Water Source Heat Pumps (WSHPs)

Various building spaces including classrooms, offices, and other small spaces are heated and cooled by a mix of 105 Tetco and Water Furnace water source heat pumps (WSHPs) of various sizes. The units are mainly above ceiling mounted except for some wall mounted units that are in the style of typical classroom vertical unit ventilators. The WSHPs vary in heating and cooling capacities between 3.41 MBh and 74.10 MBh and between 0.58 tons and 5 tons, respectively. The WSHPs have reached the extent of their useful life. They have been evaluated for replacement.

The distribution system is a standard closed loop where the loop piping runs inside the building and includes a heat adder (condensing boilers), cooling tower (heat rejecter), pumps, heat exchangers, and controls. The WSHPs are equipped with fractional hp supply fans to condition the respective spaces. The system is controlled by the building automation system (BAS).

- Cooling Mode (Summer Operation):

Each refrigerant to water heat exchanger transfers the heat from the cooling tower load plus the heat of compression into the common water loop. This process raises the temperature of the loop. When the loop temperature approaches the upper temperature limit, the heat rejector (cooling tower) is staged to remove heat from the loop. It will maintain a maximum desired water temperature. Individual WSHP units will cycle on and off to satisfy their respective zone temperatures.

- Heating Mode (Winter Operation):

Each refrigerant to water heat exchanger acts as an evaporator and absorbs heat from the water loop. This lowers the temperature of the loop. When loop temperature approaches the lower limit of about 60˚F, the heat adder is staged to add heat to the loop, maintaining a minimum loop water temperature of 60˚F. Individual WSHP units' cycle on and off to satisfy their respective zone temperatures.

- Intermediate Season:

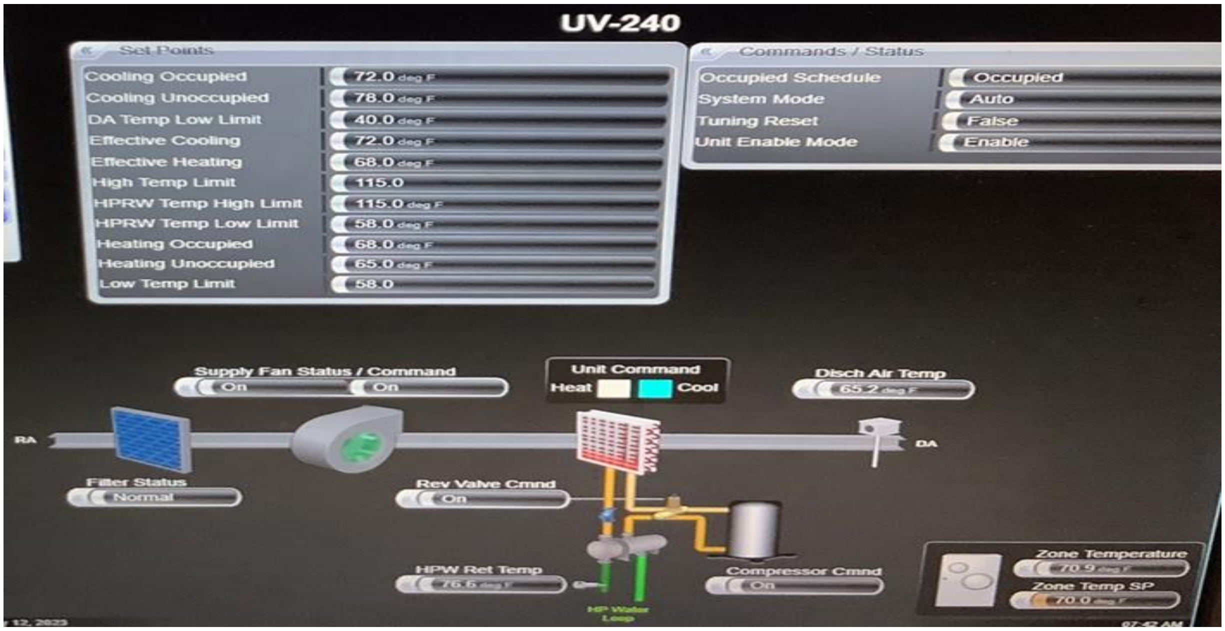
Some units may be in the cooling mode (adding heat to the common water loop) while others are in the heating mode (absorbing heat from the loop). During this condition, the loop may be in equilibrium and not require heat to be added or rejected. The loop water temperature is allowed to vary within the approximate desired range.

The following table provides summary information about the WSHPs:

Location	Areas Served	Cooling Capacity (Ton)	Heating Capacity (MBh)	Quantity	Condition
Various Spaces	Horizontal WSHP - Various Spaces	0.67	9.40	6	Poor
Various Spaces	Horizontal WSHP - Various Spaces	1.00	14.60	2	Poor
Various Spaces	Horizontal WSHP - Various Spaces	1.50	20.50	4	Poor
Various Spaces	Horizontal WSHP - Various Spaces	2.00	29.60	37	Poor
Main Office	Horizontal WSHP - HP-102	2.50	32.90	1	Poor
Various Spaces	Horizontal WSHP - Various Spaces	3.00	36.50	20	Poor
Various Spaces	Horizontal/Vertical WSHP - Various Spaces	3.50	45.60	6	Poor
Various Spaces	Vertical WSHP - Various Spaces	4.00	55.60	2	Poor

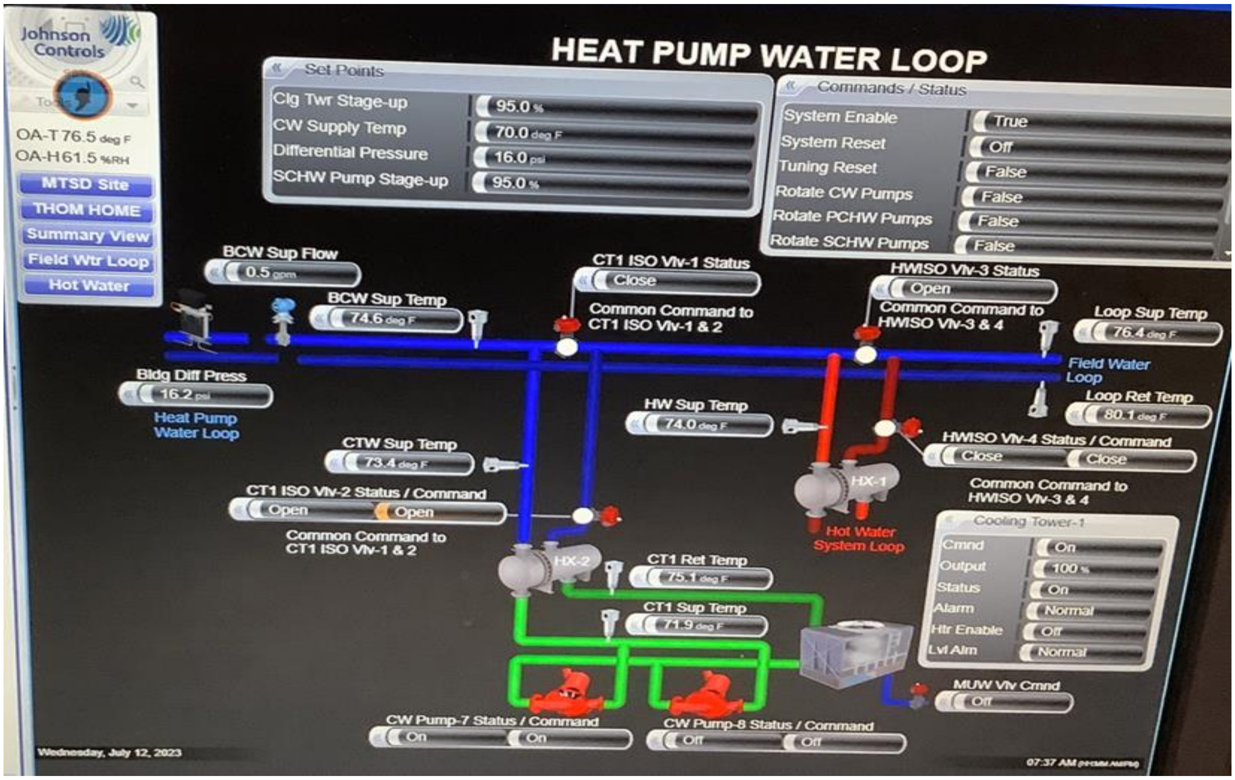
Location	Areas Served	Cooling Capacity (Ton)	Heating Capacity (MBh)	Quantity	Condition
Various Spaces	Vertical WSHP - Various Spaces	4.50	63.50	4	Poor
Computer Room 129	Computer Room 129 - HP-129	5.00	74.10	1	Poor
Various Spaces	Console WSHP - Various Spaces	0.58	3.41	4	Poor
Corridor C3	Console WSHP - CHP-C13	0.75	6.82	1	Poor
Various Spaces	Console WSHP - Various Spaces	1.00	6.82	5	Poor
Various Spaces	Console WSHP - Various Spaces	1.25	10.24	11	Poor
Corridor C1	Console WSHP - CHP-C10	1.50	13.24	1	Poor

Tetco Unit Ventilator WHSP



BAS Screenshot - Tetco Unit Ventilator WSHP

Tetco Horizontal WSHP



BAS Screenshot - Unit Ventilator WSHP

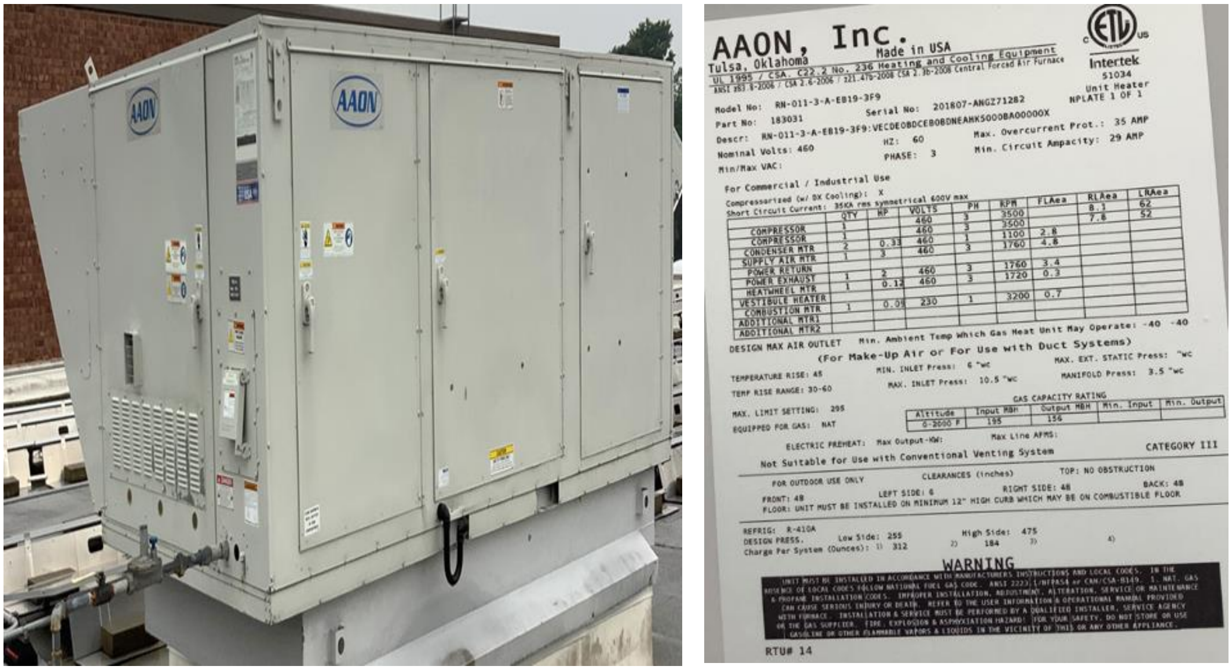
Packaged Units

Larger building spaces including the gymnasium, library, cafeteria, locker rooms, and first and second floor spaces are conditioned by 14 AAON packaged roof top units (RTUs). They provide cooling through direct expansion coil and are equipped with gas-fired furnace sections. These units vary in cooling capacity between 6 tons and 25 tons with heating capacities between 49.0 MBh and 218.7 MBh. The units are equipped with economizers, and supply fan and return fan motors that are controlled by variable frequency drives (VFDs). Some units are equipped with heat wheels that transfer heat and humidity between the return and supply air. This brings the supply air closer in temperature and humidity to the return air, reducing the load on the heating and cooling systems.

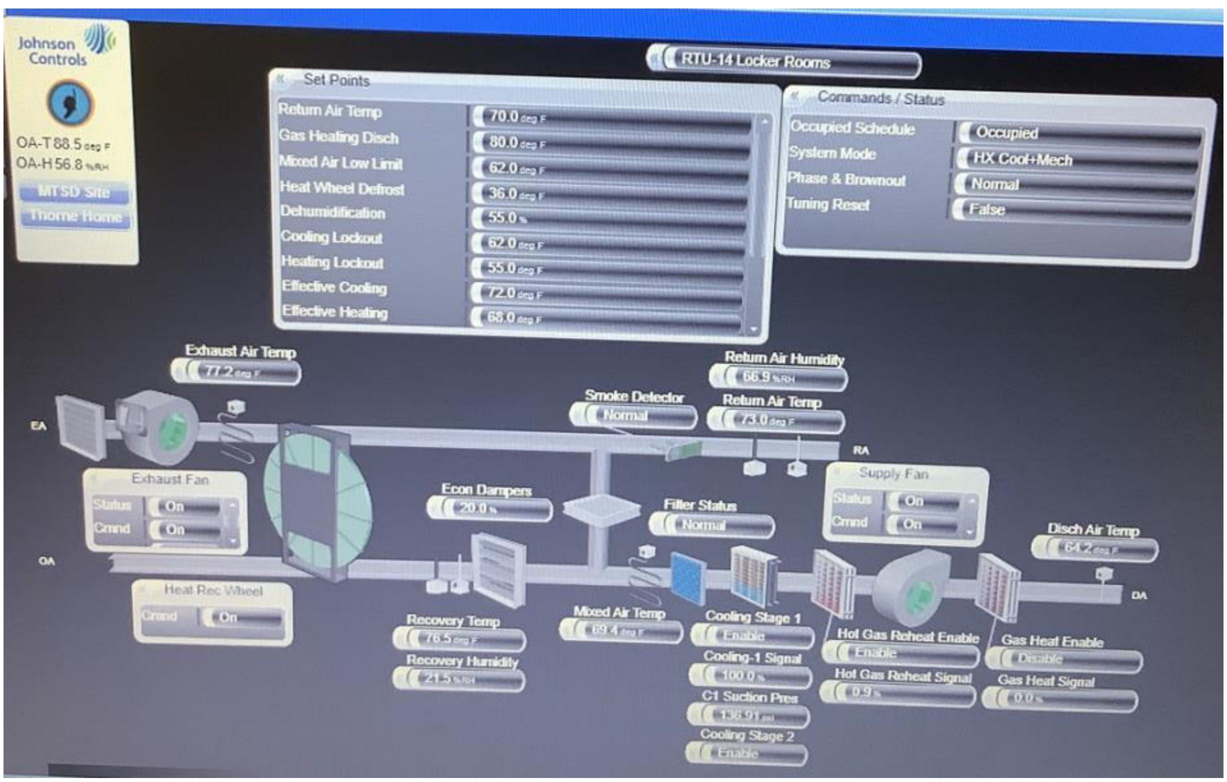
Air distribution is provided to supply air registers by ducts concealed above the ceilings. The RTUs are in good condition and are controlled by the BMS. The building air distribution setpoints are 72°F for cooling and 68°F for heating when occupied, and 65°F for cooling and 78°F for heating when unoccupied.

The following table provides summary information about the package units:

Location	Unit (ID)	Area Served	Cooling Capacity (Ton)	Heating Capacity (MBh)	Condition
Roof	RTU-1	Cafeteria	20.00	218.70	Good
Roof	RTU-2	Stage	6.00	72.90	Good
Roof	RTU-3	Library	25.00	218.70	Good
Roof	RTU-4	Gymnasium North	20.00	218.70	Good
Roof	RTU-5	Gymnasium South	20.00	218.70	Good
Roof	RTU-7	1st & 2nd Floors	16.00	218.70	Good
Roof	RTU-8	1st & 2nd Floors	18.00	218.70	Good
Roof	RTU-9	1st & 2nd Floors	6.00	120.00	Good
Roof	RTU-10	1st & 2nd Floors	16.00	218.70	Good
Roof	RTU-11	1st & 2nd Floors	7.00	72.90	Good
Roof	RTU-12	Nurse Office	8.00	168.00	Good
Roof	RTU-13	Art Room	8.00	120.00	Good
Roof	RTU-14	Locker Rooms	11.00	156.00	Good
Roof	RTU-15	Media Rooms	3.00	49.00	Good



RTU-14 – Locker Rooms



BAS Screenshot - RTU-14

2.6 General Building Exhaust Air Systems

Building spaces including restrooms, kitchen, IT room, kiln room, pump room, and custodial room are exhausted by motor driven exhaust fans. Equipment is in good condition and controlled by manual switches.

Typical Facility Exhaust Fans

2.7 Heating Hot Water Systems

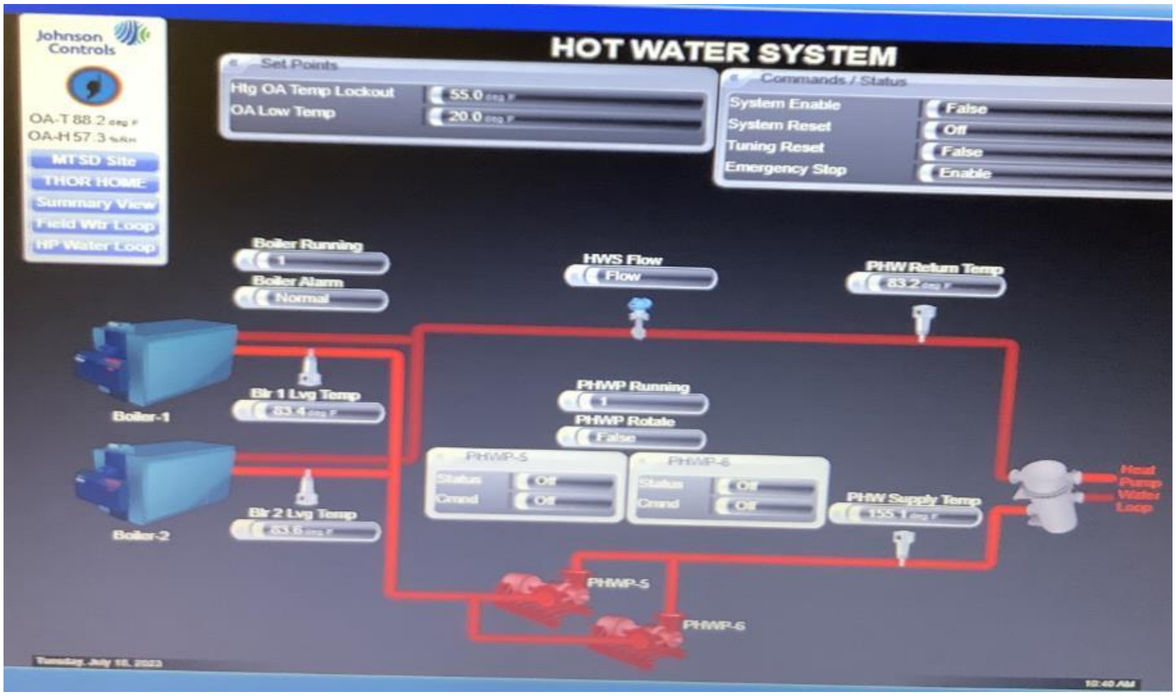
Two AERCO 2337 MBh output condensing hot water boilers are used as heat adders to supplement the WSHP heating loop when the loop temperature approaches the lower limit. The burners are fully modulating with a nominal efficiency of 93.5%. The boilers are configured in an automated lead-lag control scheme. Installed in 2015, the boilers are in good condition.

The hydronic distribution system is a two-pipe heating and cooling system with a hot water loop connected to a heat exchanger. Two, 5 hp based mounted variable speed pumps (P5 and P6) distribute heating hot water to WSHPs. The heating hot water loop is controlled by the BMS. The building occupied cooling and heating temperature setpoints are 68°F and 72°F, respectively. Unoccupied cooling and heating setpoints are 78°F and 65°F, respectively.

Overall water circulation and distribution details are provided in the following section.

AERCO Condensing Boilers

Hot Water Pumps - P5 and P6



BMS Screenshot - Heating Hot Water Loop

2.8 Condenser Water Systems

The condenser water system consists of a one-cell cooling tower equipped with a 25 hp variable speed drive fan. Installed in 2017, the cooling tower is in good condition. There are two, 15 hp variable flow condenser water pumps (P7 and P8) and a plate heat exchanger system, all located in the boiler room. The plate heat exchanger separates the hot medium from the cold. It transfers heat energy from one fluid to another and these fluids (hot water and condenser water) never encounter each other due to being separated by the heat exchanger.

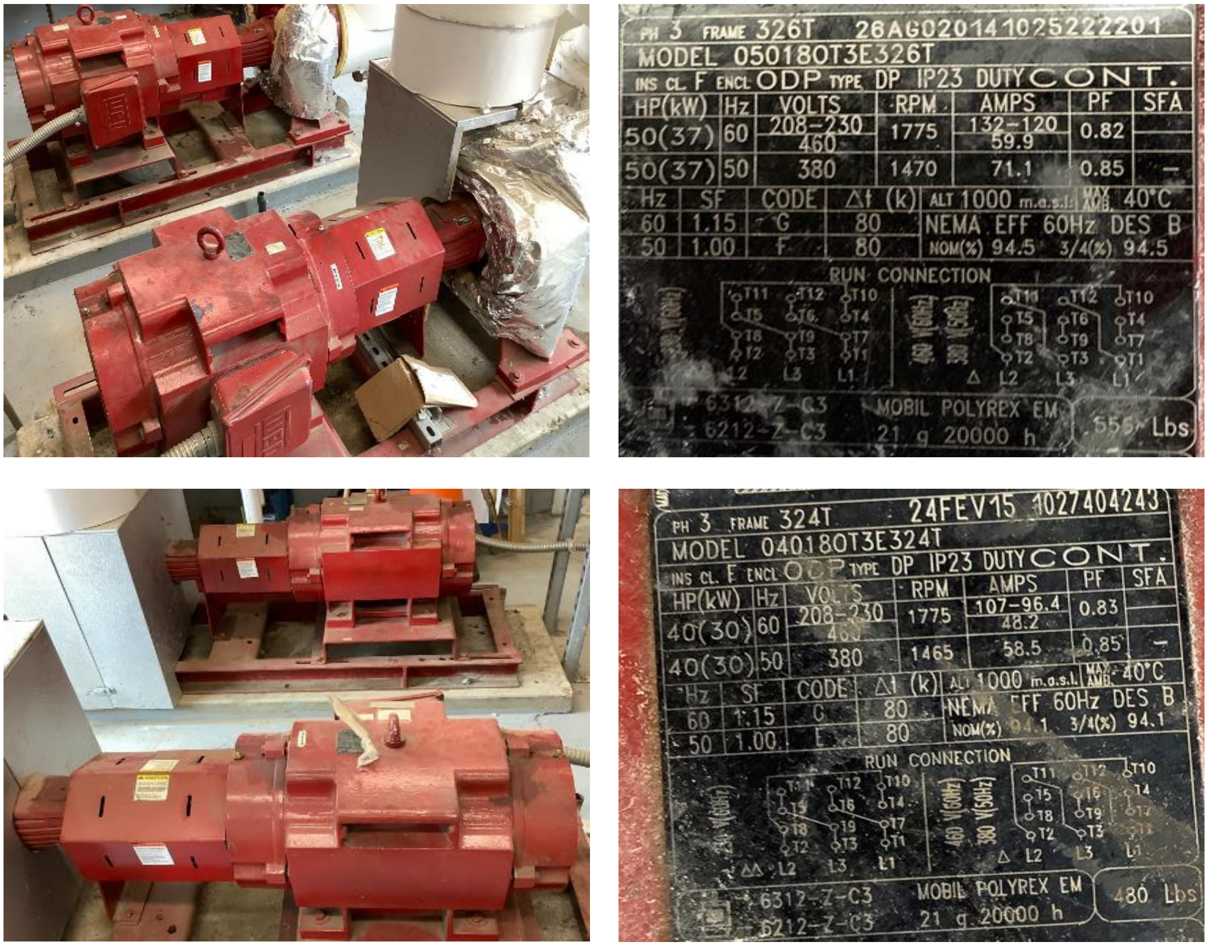
WSHP units are connected to a water distribution loop which circulates water throughout the building to transfer heat from one area to another. This common water loop provides what is essentially a heat-recovery system. Depending on zone temperature requirements, units that are providing heating extract heat from loop water while units providing cooling reject heat to the loop.

The geothermal water circulation system is comprised of two sets of based mounted pumps. There are two, 50 hp variable flow pumps (P1 and P2) that supply water from the field and two, 40 hp variable flow pumps (P3 and P4) that circulate water to WSHP units. The pumps are configured in an automated lead-lag control scheme. The condenser water loop and geothermal water loop are controlled by the BMS.

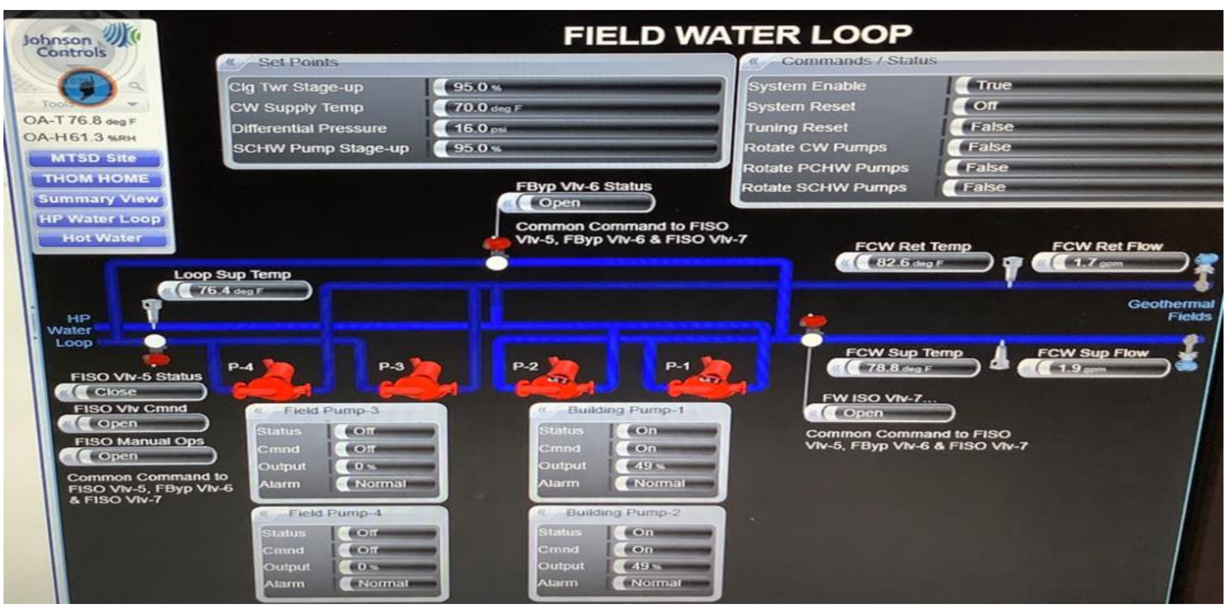
EVAPCO Cooling Tower

Heat Exchanger 2

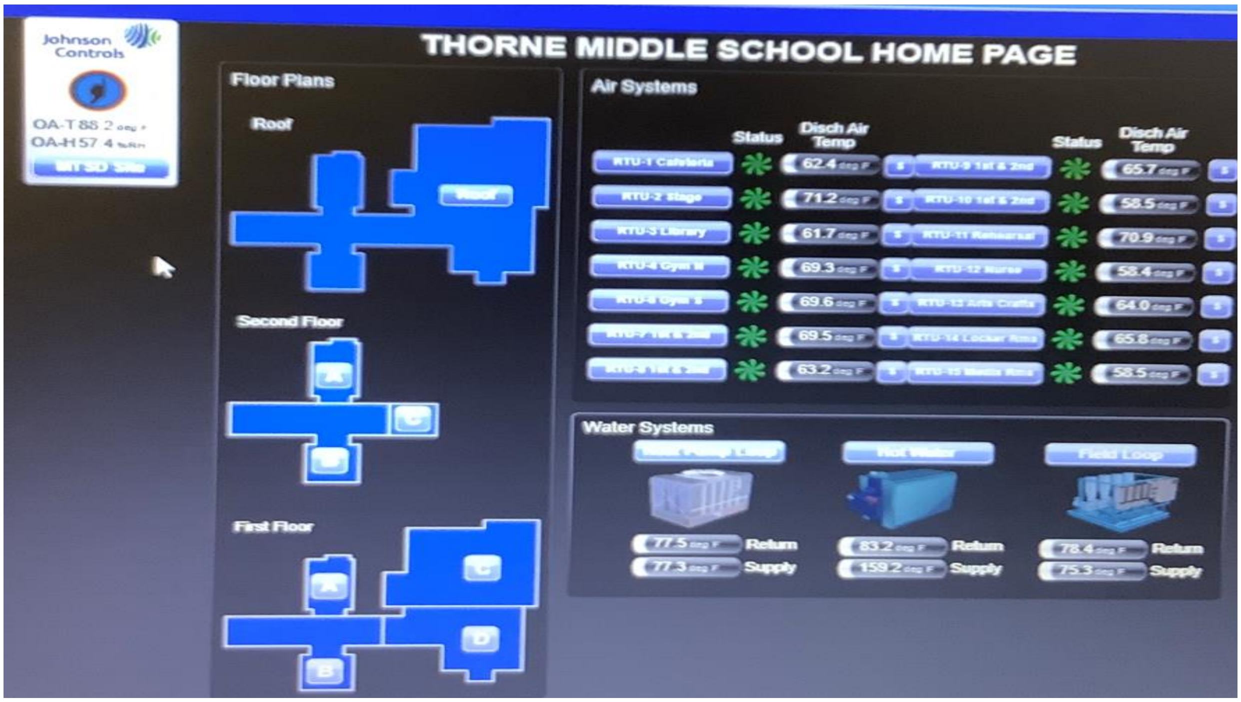
15 hp Variable Flow Condenser Water Pumps



50 hp (P1 and P2) and 40 hp (P3 and P4) Variable Flow WSHP Circulation Pumps



Geothermal Water Loop



Johnson BMS Home Page

2.10 Domestic Hot Water

Domestic hot water is produced by four electric storage tank water heaters located in various spaces. The units vary in storage tank capacity between 40 gallons and 85 gallons, and input heating capacities between 4.5 kW and 36 kW. The units are in good condition. A domestic hot water pipe insulation measure has been evaluated for some units.

The 50-gallon and 80-gallon heaters located in the same storage room have been evaluated for replacement with heat pump water heaters. The remaining water heaters were also assessed for replacement, however, since the units are in spaces that are poorly vented, we do not believe these are good candidates for replacement with heat pump water heaters.

Electric Storage Tank Water Heaters

2.11 Food Service Equipment

The facility houses a kitchen. The cooking system consists of a mix of gas and electric equipment that is used to prepare breakfast and lunch for students. Most cooking is done using gas-fired convection ovens. Some bulk prepared foods are held in two full-size electric holding cabinets. The cooking equipment is in good condition and well maintained.

The kitchen has no dishwasher.

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

Electric and Gas-Fired Cooking Equipment

2.12 Refrigeration

The facility has four commercial stand-up refrigerators and one freezer located in the kitchen. The units have solid doors except the Master-Bilt unit which has glass doors. There are also four small refrigerator chests and one freezer chest.

Equipment is standard efficiency and in good condition except for the refrigerator chest located in the storage room and the 23 cubic feet stand-up refrigerator in the kitchen that appear in poor and fair condition, respectively and have been evaluated for replacement.

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

Stand-Up Refrigerator

Old Refrigerator Chest

2.13 Plug Load and Vending Machines

There are 119 computer workstations throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smartboards and projectors. Additional loads typically associated with secondary schools include televisions and kiln. There is some miscellaneous plug load equipment in the kitchen.

There are also typical office loads such as scanner/copiers, small printers, microwaves, and mini fridges. There are approximately eight residential-style refrigerators throughout the building that are in good condition.

There is one glass fronted refrigerated and one non-refrigerated vending machine in the cafeteria, and one refrigerated vending machine in the workroom. Vending machines are not equipped with control systems except the unit located in the work room.

Scanner/Copier

Residential-Style Refrigerator

Refrigerated & Non-Refrigerated Vending Machines

2.14 Water-Using Systems

There are several restrooms with toilets, urinals, and sinks. Faucet flows are rated as 1.5 gallons (gpm), and usage is relatively low. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.0 gpf.

Typical Restroom Sinks

2.15 On-Site Generation

Thorne Middle School has roof mounted photovoltaic (PV) arrays with 330 kW capacity that provided 404,769 kWh of electricity from August 2021 to July 2022. The panels cover over 90% of the flat roof area. The solar PV provides approximately 27% of the electricity used at the facility in this analysis period.

The facility has a gas-fired backup generator that is used to power the servers and the building emergency lights during power outages.

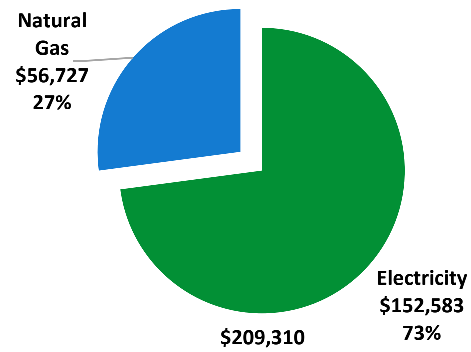
Solar PV Arrays

Inverter

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	1,514,607 kWh	$152,583
Natural Gas	33,507 Therms	$56,727
Total		**$209,310**



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

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

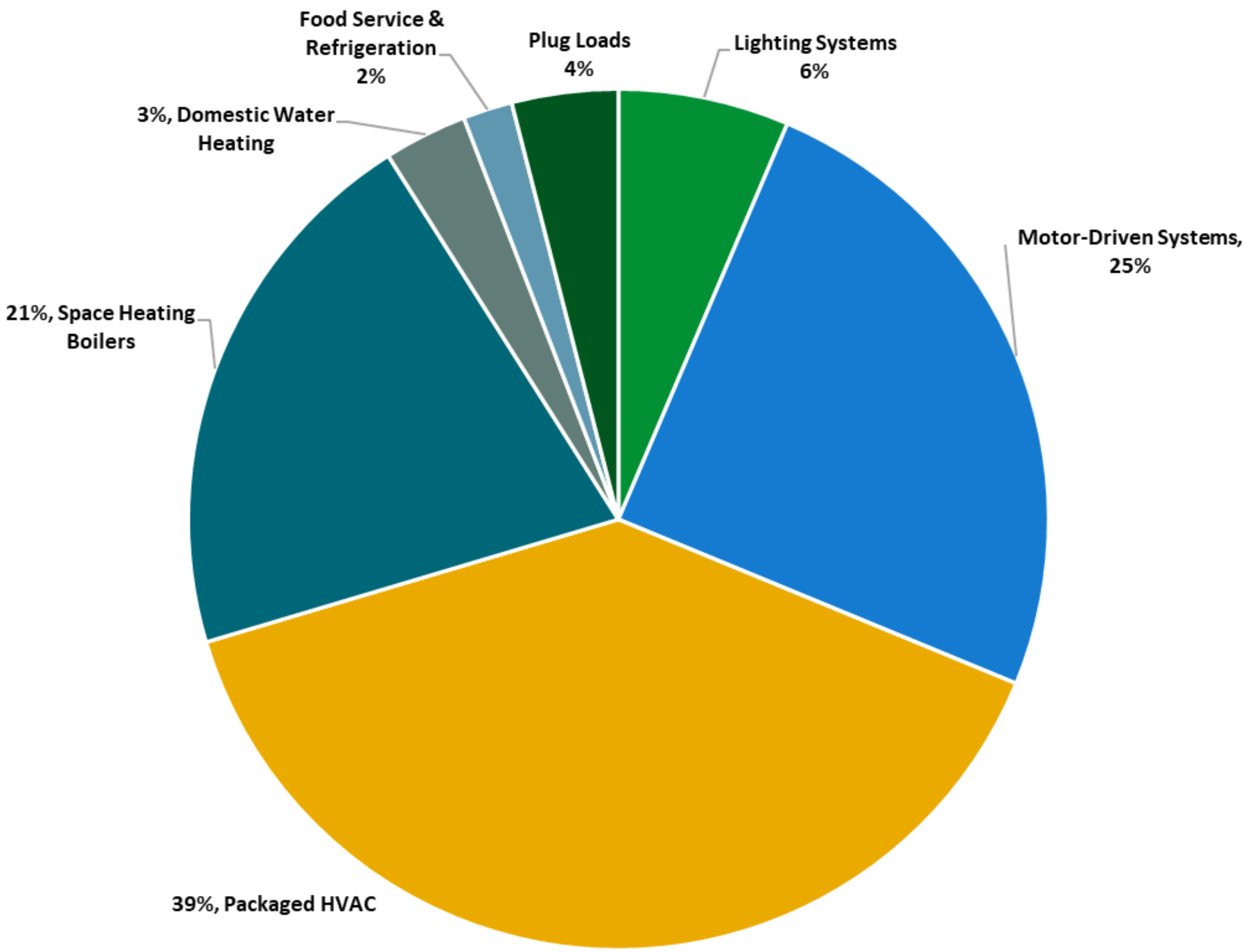
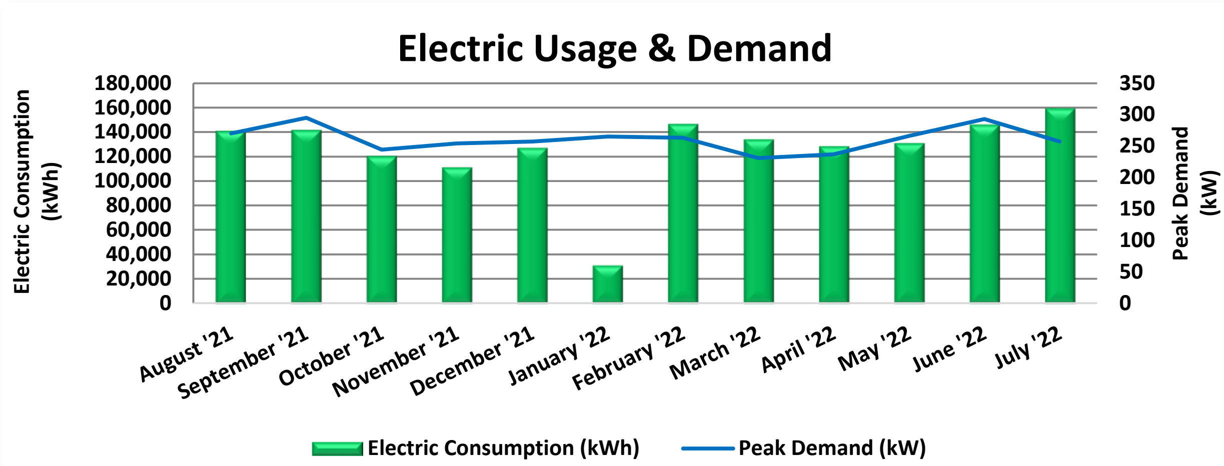


Figure 4 - Energy Balance

3.1 Electricity

JCP&L delivers electricity under rate class General Service Secondary 3 Phase JC_GS3_01D, with electric production provided by EDF, a third-party supplier.



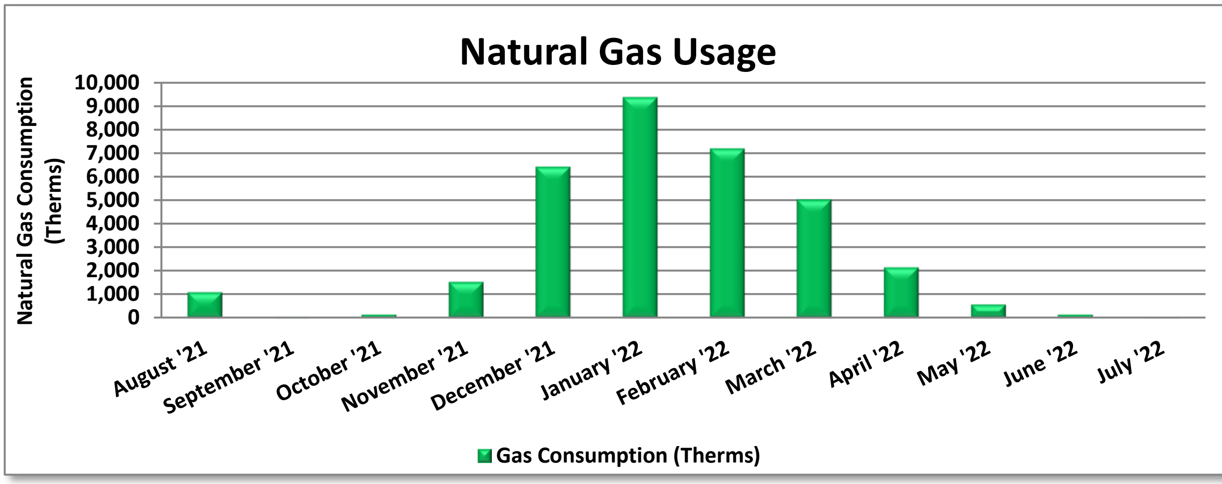
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
8/30/21	32	140,600	270	$1,790	$12,685
9/30/21	31	141,299	295	$1,820	$12,832
10/29/21	29	120,178	244	$1,506	$11,319
11/30/21	32	110,976	254	$1,570	$11,049
12/28/21	28	126,830	257	$1,586	$12,829
1/30/22	33	31,324	265	$1,958	$14,029
2/28/22	29	146,108	263	$1,941	$14,312
3/31/22	31	133,634	231	$1,705	$12,332
5/2/22	32	128,169	237	$1,749	$11,536
6/1/22	30	130,760	266	$2,108	$12,096
7/1/22	30	145,616	293	$2,321	$13,327
7/29/22	28	159,113	257	$2,035	$14,237
Totals	**365**	**1,514,607**	**295**	**$22,089**	**$152,583**
Annual	**365**	**1,514,607**	**295**	**$22,089**	**$152,583**

Notes:

- Peak demand of 295 kW occurred in September '21.
- Average demand over the past 12 months was 261 kW.
- The average electric cost over the past 12 months was $0.101/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 Middletown Solar LLC. All the electricity generated on-site is used on-site.

3.2 Natural Gas

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



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
8/20/21	28	1,096	$1,645
9/22/21	33	33	$724
10/21/21	29	146	$1,336
11/19/21	29	1,542	$2,590
12/22/21	33	6,408	$7,338
1/25/22	34	9,366	$13,825
2/23/22	29	7,194	$11,187
3/24/22	29	5,027	$8,165
4/25/22	32	2,151	$4,447
5/24/22	29	572	$2,408
6/24/22	31	154	$1,809
7/25/22	31	1	$1,563
Totals	**367**	**33,691**	**$57,038**
Annual	**365**	**33,507**	**$56,727**

Notes:

- The average gas cost for the past 12 months is $1.693/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy, and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	38

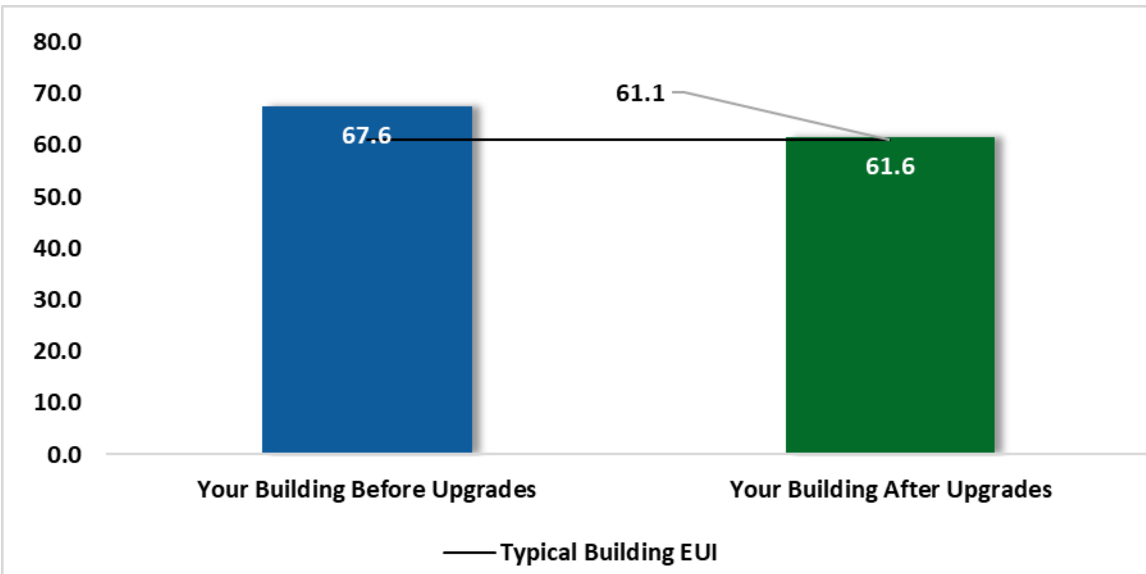


Figure 5 - Energy Use Intensity Comparison[3]

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

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**2,034**	**0.5**	**0**	**$198**	**$920**	**$149**	**$771**	**3.9**	**1,998**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	2,034	0.5	0	$198	$920	$149	$771	3.9	1,998
Lighting Control Measures			**4,554**	**0.8**	**-1**	**$443**	**$6,676**	**$1,775**	**$4,901**	**11.1**	**4,475**
ECM 2	Install Occupancy Sensor Lighting Controls	No	3,019	0.5	-1	$293	$5,326	$725	$4,601	15.7	2,967
ECM 3	Install High/Low Lighting Controls	Yes	1,535	0.3	0	$149	$1,350	$1,050	$300	2.0	1,508
Unitary HVAC Measures			**66,029**	**33.6**	**0**	**$6,652**	**$549,920**	**$14,581**	**$535,339**	**80.5**	**66,491**
ECM 4	Install High Efficiency Heat Pumps	No	66,029	33.6	0	$6,652	$549,920	$14,581	$535,339	80.5	66,491
HVAC System Improvements			**5,809**	**0.0**	**31**	**$1,105**	**$26,203**	**$52**	**$26,151**	**23.7**	**9,442**
ECM 5	Implement Demand Control Ventilation (DCV)	No	2,640	0.0	31	$785	$25,829	$0	$25,829	32.9	6,251
ECM 6	Install Pipe Insulation	Yes	3,169	0.0	0	$319	$374	$52	$322	1.0	3,191
Domestic Water Heating Upgrade			**5,070**	**0.0**	**0**	**$511**	**$222**	**$111**	**$111**	**0.2**	**5,105**
ECM 7	Install Low-Flow DHW Devices	Yes	5,070	0.0	0	$511	$222	$111	$111	0.2	5,105
Food Service & Refrigeration Measures			**1,496**	**0.2**	**0**	**$151**	**$2,702**	**$75**	**$2,627**	**17.4**	**1,507**
ECM 8	Replace Refrigeration Equipment	Yes	1,496	0.2	0	$151	$2,702	$75	$2,627	17.4	1,507
Custom Measures			**80,517**	**0.0**	**164**	**$10,889**	**$56,134**	**$0**	**$56,134**	**5.2**	**100,292**
ECM 9	Retro-Commissioning Study	Yes	57,129	0.0	164	$8,533	$50,428	$0	$50,428	5.9	76,740
ECM 10	Replace Electric Water Heater with Heat Pump Water Heater	Yes	23,388	0.0	0	$2,356	$5,706	$0	$5,706	2.4	23,552
TOTALS			**165,509**	**35.1**	**193**	**$19,947**	**$642,777**	**$16,743**	**$626,034**	**31.4**	**189,310**

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

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**2,034**	**0.5**	**0**	**$198**	**$920**	**$149**	**$771**	**3.9**	**1,998**
ECM 1	Retrofit Fixtures with LED Lamps	2,034	0.5	0	$198	$920	$149	$771	3.9	1,998
Lighting Control Measures		**1,535**	**0.3**	**0**	**$149**	**$1,350**	**$1,050**	**$300**	**2.0**	**1,508**
ECM 3	Install High/Low Lighting Controls	1,535	0.3	0	$149	$1,350	$1,050	$300	2.0	1,508
HVAC System Improvements		**3,169**	**0.0**	**0**	**$319**	**$374**	**$52**	**$322**	**1.0**	**3,191**
ECM 6	Install Pipe Insulation	3,169	0.0	0	$319	$374	$52	$322	1.0	3,191
Domestic Water Heating Upgrade		**5,070**	**0.0**	**0**	**$511**	**$222**	**$111**	**$111**	**0.2**	**5,105**
ECM 7	Install Low-Flow DHW Devices	5,070	0.0	0	$511	$222	$111	$111	0.2	5,105
Food Service & Refrigeration Measures		**1,496**	**0.2**	**0**	**$151**	**$2,702**	**$75**	**$2,627**	**17.4**	**1,507**
ECM 8	Replace Refrigeration Equipment	1,496	0.2	0	$151	$2,702	$75	$2,627	17.4	1,507
Custom Measures		**80,517**	**0.0**	**164**	**$10,889**	**$56,134**	**$0**	**$56,134**	**5.2**	**100,292**
ECM 9	Retro-Commissioning Study	57,129	0.0	164	$8,533	$50,428	$0	$50,428	5.9	76,740
ECM 10	Replace Electric Water Heater with Heat Pump Water Heater	23,388	0.0	0	$2,356	$5,706	$0	$5,706	2.4	23,552
TOTALS		**93,821**	**0.9**	**163**	**$12,217**	**$61,702**	**$1,437**	**$60,265**	**4.9**	**113,602**

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

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

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**2,034**	**0.5**	**0**	**$198**	**$920**	**$149**	**$771**	**3.9**	**1,998**
ECM 1	Retrofit Fixtures with LED Lamps	2,034	0.5	0	$198	$920	$149	$771	3.9	1,998

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

ECM 1: Retrofit Fixtures with LED Lamps

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

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

Affected Building Areas: fluorescent fixtures with T8 tubes in the work room, media center, and coach restrooms; CFL lamps entrances and incandescent lamps in old shower rooms

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		**4,554**	**0.8**	**-1**	**$443**	**$6,676**	**$1,775**	**$4,901**	**11.1**	**4,475**
ECM 2	Install Occupancy Sensor Lighting Controls	3,019	0.5	-1	$293	$5,326	$725	$4,601	15.7	2,967
ECM 3	Install High/Low Lighting Controls	1,535	0.3	0	$149	$1,350	$1,050	$300	2.0	1,508

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

ECM 2: Install Occupancy Sensor Lighting Controls

We evaluated installing 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: small offices, restrooms, kitchen, old shower, and weight rooms

ECM 3: Install High/Low Lighting Controls

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

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

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

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

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

Affected Building Areas: main entrance and stairs

4.3 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**66,029**	**33.6**	**0**	**$6,652**	**$549,920**	**$14,581**	**$535,339**	**80.5**	**66,491**
ECM 5	Install High Efficiency Heat Pumps	66,029	33.6	0	$6,652	$549,920	$14,581	$535,339	80.5	66,491

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

ECM 4: Install High Efficiency Heat Pumps

We evaluated replacing standard efficiency heat pumps with high efficiency heat pumps. A higher EER or SEER rating indicates a more efficient cooling system, and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours.

Affected Units: all water source heat pumps

4.4 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		**5,809**	**0.0**	**31**	**$1,105**	**$26,203**	**$52**	**$26,151**	**23.7**	**9,442**
ECM 5	Implement Demand Control Ventilation (DCV)	2,640	0.0	31	$785	$25,829	$0	$25,829	32.9	6,251
ECM 6	Install Pipe Insulation	3,169	0.0	0	$319	$374	$52	$322	1.0	3,191

ECM 5: Implement Demand Control Ventilation (DCV)

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

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

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

Affected Building Areas: gymnasium, cafeteria, library, and locker rooms

ECM 6: Install Pipe Insulation

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

Affected Systems: domestic hot water piping for both storage room units and for the Rheem system located in a janitor's closet

4.5 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		**5,070**	**0.0**	**0**	**$511**	**$222**	**$111**	**$111**	**0.2**	**5,105**
ECM 8	Install Low-Flow DHW Devices	5,070	0.0	0	$511	$222	$111	$111	0.2	5,105

ECM 7: Install Low-Flow DHW Devices

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

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

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

4.6 Food Service & Refrigeration Equipment

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**1,496**	**0.2**	**0**	**$151**	**$2,702**	**$75**	**$2,627**	**17.4**	**1,507**
ECM 8	Replace Refrigeration Equipment	1,496	0.2	0	$151	$2,702	$75	$2,627	17.4	1,507

ECM 8: Install Low-Flow DHW Devices

Replace existing commercial stand-up refrigerator and a refrigerator chest with new ENERGY STAR rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

4.7 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**80,517**	**0.0**	**164**	**$10,889**	**$56,134**	**$0**	**$56,134**	**5.2**	**100,292**
ECM 9	Retro-Commissioning Study	57,129	0.0	164	$8,533	$50,428	$0	$50,428	5.9	76,740
ECM 10	Replace Electric Water Heater with Heat Pump Water Heater	23,388	0.0	0	$2,356	$5,706	$0	$5,706	2.4	23,552

ECM 9: Retro-Commissioning Study

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

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

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

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

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

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in HVAC control improvements. Based on industry standards and previous project experience, the potential energy savings may be up to 15% of existing HVAC energy use. We estimate the cost of retro-commissioning studies and control improvements of $0.40 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to perform the study. For the purposes of this report, we have conservatively estimated savings to be 5.0% of the HVAC energy consumption baseline.

ECM 10: Replace Electric Water Heater with Heat Pump Water Heater

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

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

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

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

The 50- and 80-gallon heaters located in the same storage room have been evaluated for replacement with heat pump water heaters.

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

5 Energy Efficient Best Practices

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

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

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

Energy Tracking with ENERGY STAR Portfolio Manager

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

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.

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

Lighting Controls

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

Motor Controls

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

Motor Maintenance

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

Thermostat Schedules and Temperature Resets

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

Economizer Maintenance

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

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

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

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

Boiler Maintenance

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

Optimize HVAC Equipment Schedules

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

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

Water 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

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 no potential for installing a PV array.

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

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

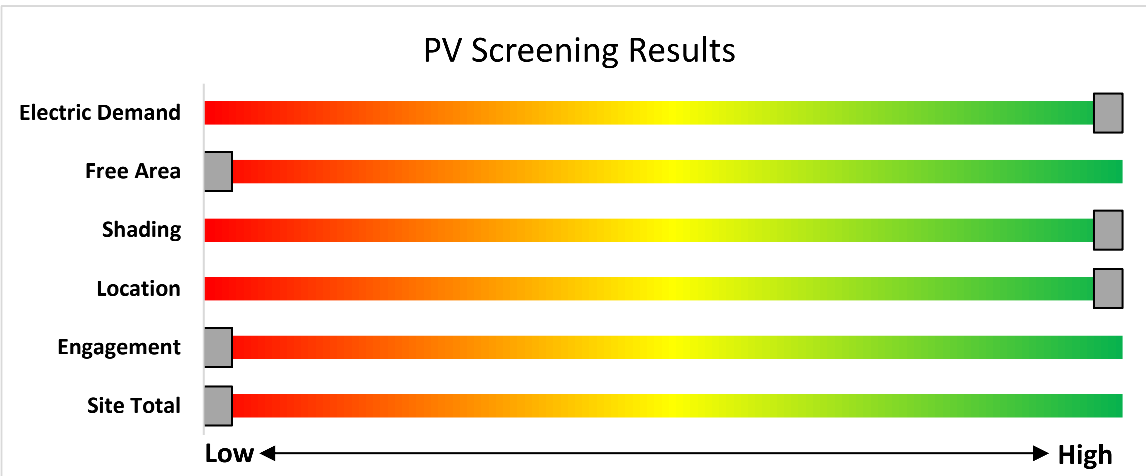


Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

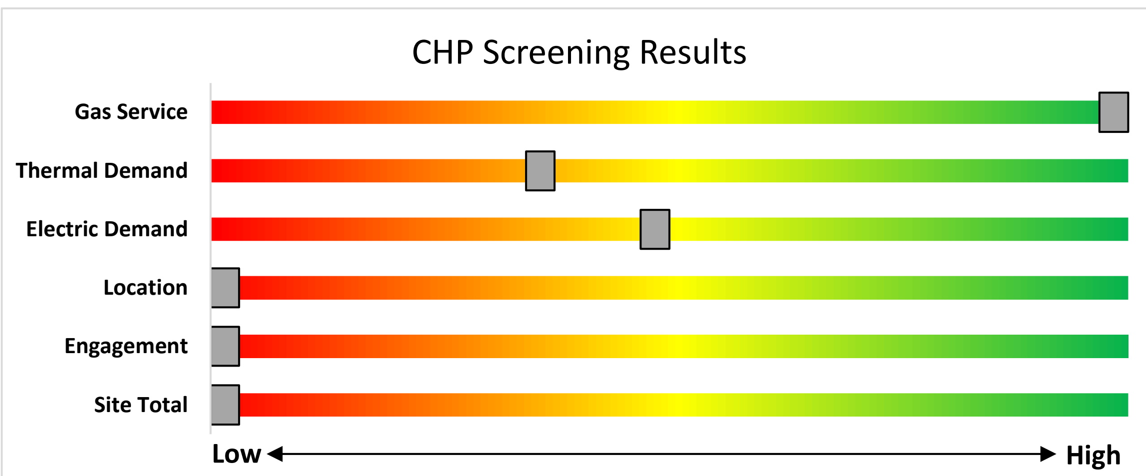


Figure 9 - Combined Heat and Power Screening

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

7 Electric Vehicles (EV)

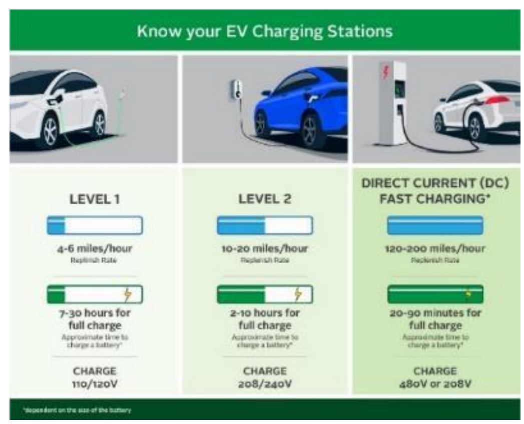
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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

7.1 Electric Vehicle Charging

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

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



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

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

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

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

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

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

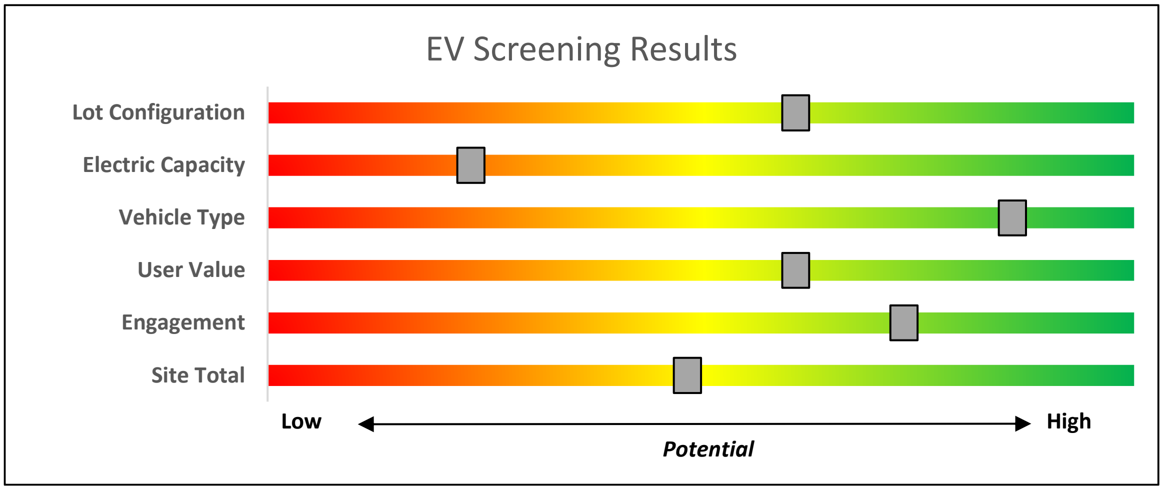


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

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

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

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

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

8 Project Funding and Incentives

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

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

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

Equipment Examples

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

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

Direct Install

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

Incentives

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

How to Participate

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

Engineered Solutions

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

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

8.2 New Jersey's Clean Energy Programs

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

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

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

Competitive Solar Incentive Program

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 Project Development

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

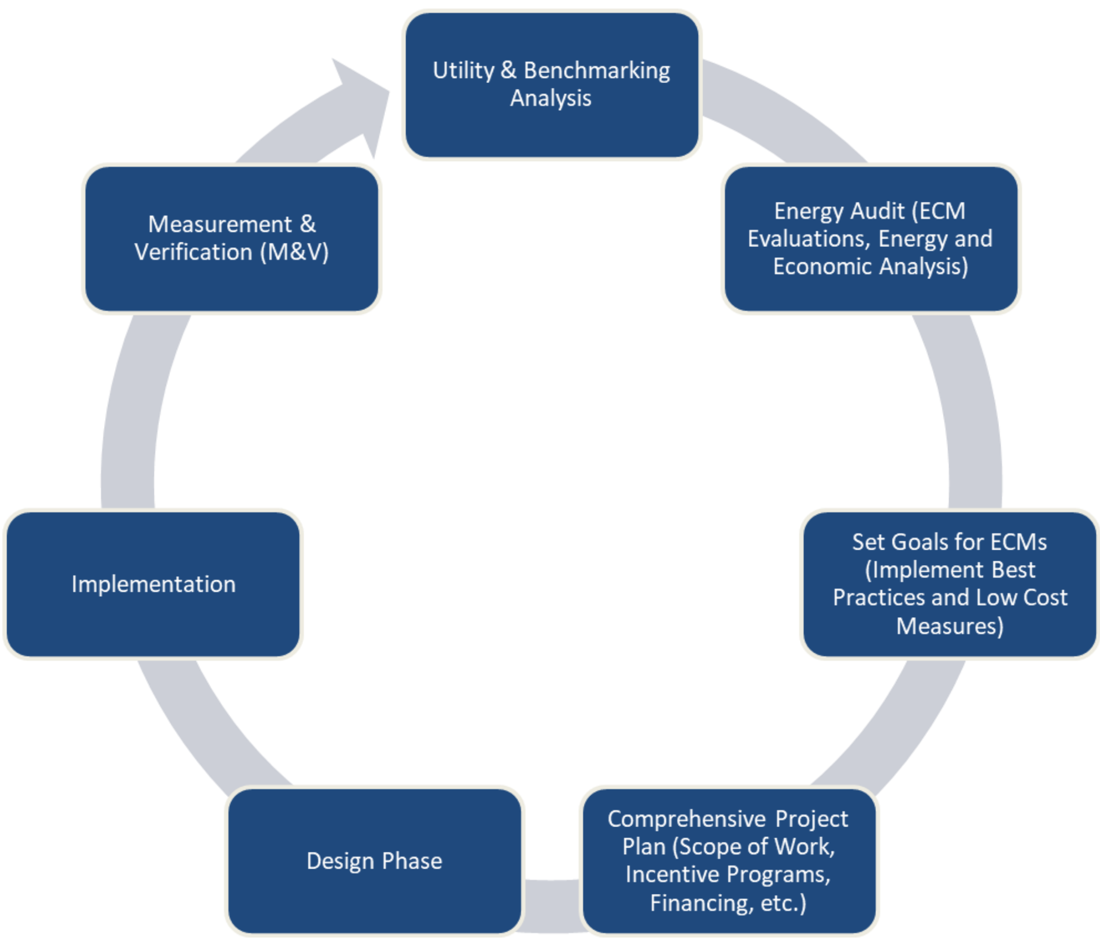


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[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 fluctuate monthly. The utility provides basic gas supply service to customers who choose not to buy from a third-party supplier for natural gas commodity.

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[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
Office	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	2	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	74	0	$7	$116	$20	13.4
Office Student Coordinator	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	2	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	148	0	$14	$270	$35	16.3
Art Room office	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	55	0	$5	$116	$20	17.8
Boiler Room	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Book Storage	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Book Storage	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Book Storage	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Book Storage	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Boys Coaches Office	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Boys Locker Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Boys Locker Room	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Break Room 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
Break Room Main Office	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Cafeteria	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	80	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	2,581		None	No	80	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 110	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 111	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 112	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 113	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 114	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 115	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 116	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 117	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 118	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 118	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	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
Classroom 142	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 142	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 143	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 143	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 144	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 144	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 146	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 146	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 210	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 212	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 213	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 214	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 214	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 215	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 216	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 217	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 218	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 220	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 222	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 223	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 224	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 225	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 226	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 227	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 228	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	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
Classroom 229	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 232	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 233	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 235	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 236	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 237	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 238	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 240	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Classroom 241	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Closet	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Closet	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Closet	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Closet	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Closet	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Closet Baseball	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Closet PFA	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Conference Room	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Main Office	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Main Office	6	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	S	26	2,581		None	No	6	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Cubs Way	7	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Cubs Way	36	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	36	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Cubs Way	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Cubs Way	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Houston Street	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 Houston Street	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	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
Corridor Houston Street	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Lions Lane	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Lions Lane	14	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	S	10	2,581		None	No	14	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Lions Lane	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Lions Lane	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	58	2,581		None	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Lions Lane	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Mane Street	10	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	10	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Mane Street	8	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	8	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Mane Street	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Mane Street	7	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	7	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Panthera Leo CT	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Panthera Leo CT	2	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	2	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Panthera Leo CT	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Panthera Leo CT	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Pride Path	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Pride Path	8	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	8	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Pride Path	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Pride Path	0	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	0	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Prowl Path	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Prowl Path	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Roaring Row	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Roaring Row	30	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	30	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Roaring Row	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Corridor Roaring Row	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Custodial Room	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	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
Electrical Room	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Electrical Room	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Electrical Room	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Electrical Room	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Electrical Room	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Elevator Room	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Entrance/Exit 10	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740		None	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,740	0.0	0	0	$0	$0	$0	0.0
Entrance/Exit 11	2	Compact Fluorescent: (2) 26W G25 Screw-In Lamps	Wall Switch	S	52	3,740	1	Relamp	No	2	LED Lamps: G25 Lamps	Wall Switch	37	3,740	0.0	123	0	$12	$101	$8	7.7
Entrance/Exit 13	1	Compact Fluorescent: (2) 26W G25 Screw-In Lamps	Wall Switch	S	52	3,740	1	Relamp	No	1	LED Lamps: G25 Lamps	Wall Switch	37	3,740	0.0	62	0	$6	$50	$4	7.7
Entrance/Exit 15	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Entrance/Exit 17	2	Compact Fluorescent: (2) 26W G25 Screw-In Lamps	Wall Switch	S	52	3,740	1	Relamp	No	2	LED Lamps: G25 Lamps	Wall Switch	37	3,740	0.0	123	0	$12	$101	$8	7.7
Entrance/Exit 19	2	Compact Fluorescent: (2) 26W G25 Screw-In Lamps	Wall Switch	S	52	3,740	1	Relamp	No	2	LED Lamps: G25 Lamps	Wall Switch	37	3,740	0.0	123	0	$12	$101	$8	7.7
Entrance/Exit 21	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740		None	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,740	0.0	0	0	$0	$0	$0	0.0
Entrance/Exit 22	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
Entrance/Exit 22	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740		None	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,740	0.0	0	0	$0	$0	$0	0.0
Entrance/Exit 4	1	Compact Fluorescent: (2) 26W G25 Screw-In Lamps	Wall Switch	S	52	3,740	1	Relamp	No	1	LED Lamps: G25 Lamps	Wall Switch	37	3,740	0.0	62	0	$6	$50	$4	7.7
Examination Room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Exterior Ground	1	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell		23	4,380		None	No	1	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell	23	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	25	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		29	4,380		None	No	25	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	29	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Ground	1	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell		25	4,380		None	No	1	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell	25	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Pole	2	Metal Halide: (1) 400W Lamp	Photocell		458	4,380		None	No	2	Metal Halide: (1) 400W Lamp	Photocell	458	4,380	0.0	0	0	$0	$0	$0	0.0
Faculty Lunch Room 219	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	2,581		None	No	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	0	0	$0	$0	$0	0.0
Faculty Work Room 221	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Fitness Room 145	29	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	29	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Garage	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	2	None	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.1	481	0	$47	$270	$35	5.0

	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
Work Room 105	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,581	1	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.2	749	0	$73	$292	$80	2.9
Girls Coaches Office	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	111	0	$11	$270	$35	21.8
Girls Locker Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Girls Locker Room	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	2,581		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	0	0	$0	$0	$0	0.0
Girls Locker Room	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Guidance	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
Guidance	13	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	13	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Guidance 147	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	2	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	74	0	$7	$116	$20	13.4
Guidance Closet	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Guidance Conference Room	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Guidance Office 1	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	87	0	$8	$270	$35	27.9
Guidance Office 2	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	87	0	$8	$270	$35	27.9
Guidance Office 3	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	43	0	$4	$116	$20	22.8
Guidance Office 4	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	43	0	$4	$116	$20	22.8
Guidance Office 5	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	43	0	$4	$116	$20	22.8
Guidance Office 6	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	43	0	$4	$116	$20	22.8
Guidance Office 7	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Gym Storage	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500	2	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.0	59	0	$6	$116	$0	20.1
Gymnasium	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Gymnasium	22	LED - Fixtures: High-Bay	Occupancy Sensor	S	220	2,581		None	No	22	LED - Fixtures: High-Bay	Occupancy Sensor	220	2,581	0.0	0	0	$0	$0	$0	0.0
Janitorial	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Janitorial	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Janitorial	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Janitorial Closet	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Janitorial Closet	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kiln Room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
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	16	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,740	2	None	Yes	16	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.1	347	0	$34	$540	$70	13.9
Kitchen closet	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	1,500		None	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,500	0.0	0	0	$0	$0	$0	0.0
Kitchen Restroom	1	Compact Fluorescent: (1) 23W A19 Screw-In Lamp	Wall Switch	S	23	3,740	1	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	17	3,740	0.0	25	0	$2	$17	$1	6.8
Kitchen Storage	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Librarian	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Main Entrance	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	3	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,581	0.0	148	0	$14	$225	$140	5.9
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	19	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	19	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Manifold Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Media Center	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Media Center	14	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	14	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Media Center	115	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	115	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Media Center	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,740	1	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	272	0	$26	$73	$20	2.0
Nurse 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
Nurse Office	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Nurse Office	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Office	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Office - IT	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	111	0	$11	$270	$35	21.8
Office Brian Currie	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Office Lindsay Larson	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Office Teachers	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,581		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,581	0.0	0	0	$0	$0	$0	0.0
Office Teachers	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Old Shower Boys Room	2	Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	1,500	1, 2	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	10	1,035	0.1	192	0	$19	$150	$22	6.9

	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
Old Shower Girls Room	2	Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	1,500	1, 2	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	10	1,035	0.1	192	0	$19	$150	$22	6.9
Old Shower Girls Room	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Old Weight Room	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Prep Room 119A	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	2,581		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	0	0	$0	$0	$0	0.0
Prep Room 120A	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	2,581		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	0	0	$0	$0	$0	0.0
Pump Room	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	37	0	$4	$116	$20	26.7
Restroom	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Boys	3	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740	2	None	Yes	3	LED Lamps: (1) 15W G25 Screw-In Lamp	Occupancy Sensor	15	2,581	0.0	57	0	$6	$0	$0	0.0
Restroom - Boys	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	111	0	$11	$270	$35	21.8
Restroom - Boys	3	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740	2	None	Yes	3	LED Lamps: (1) 15W G25 Screw-In Lamp	Occupancy Sensor	15	2,581	0.0	57	0	$6	$0	$0	0.0
Restroom - Boys	7	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	129	0	$13	$270	$35	18.7
Restroom - Boys	2	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740	2	None	Yes	2	LED Lamps: (1) 15W G25 Screw-In Lamp	Occupancy Sensor	15	2,581	0.0	38	0	$4	$0	$0	0.0
Restroom - Boys	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	148	0	$14	$270	$35	16.3
Restroom - Classroom 134	2	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740		None	No	2	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Female	1	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740		None	No	1	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Female	7	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	129	0	$13	$270	$35	18.7
Restroom - Female Faculty	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	S	11	3,740		None	No	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Female Faculty	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Female Faculty	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	S	11	3,740		None	No	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Female Faculty	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Girls	3	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740	2	None	Yes	3	LED Lamps: (1) 15W G25 Screw-In Lamp	Occupancy Sensor	15	2,581	0.0	57	0	$6	$0	$0	0.0
Restroom - Girls	7	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	129	0	$13	$270	$35	18.7
Restroom - Girls	2	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740	2	None	Yes	2	LED Lamps: (1) 15W G25 Screw-In Lamp	Occupancy Sensor	15	2,581	0.0	38	0	$4	$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
Restroom - Girls	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	111	0	$11	$270	$35	21.8
Restroom - Girls	1	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	S	15	3,740		None	No	1	LED Lamps: (1) 15W G25 Screw-In Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Girls	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	2	None	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,581	0.0	148	0	$14	$270	$35	16.3
Restroom - Girls Locker Room	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Men Faculty	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	S	11	3,740		None	No	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Men Faculty	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Men Faculty	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	S	11	3,740		None	No	1	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom - Men Faculty	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom Boys Coaches	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,740	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,740	0.0	66	0	$6	$33	$6	4.1
Restroom Boys Locker Room	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom Classroom 114	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom Faculty	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Restroom Girls Coaches	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,740	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,740	0.0	66	0	$6	$33	$6	4.1
Roof	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,740		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,740	0.0	0	0	$0	$0	$0	0.0
Room 231	3	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	S	30	2,581		None	No	3	LED Lamps: (2) 15W G25 Screw-In Lamps	Occupancy Sensor	30	2,581	0.0	0	0	$0	$0	$0	0.0
Room 231	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	S	17	2,581		None	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,581	0.0	0	0	$0	$0	$0	0.0
Server Room	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Shower Room Coaches	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,740		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,740	0.0	0	0	$0	$0	$0	0.0
Shower Room Girls Coaches (	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,740		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,740	0.0	0	0	$0	$0	$0	0.0
Stage	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
Stage	10	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,740		None	No	10	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,740	0.0	0	0	$0	$0	$0	0.0
Stage Foyer	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 Foyer	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,740	0.0	0	0	$0	$0	$0	0.0
Stairs Exit 2	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 Exit 2	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	3	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,581	0.0	222	0	$22	$225	$210	0.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Stairs Exit 5	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 Exit 5	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	3	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,581	0.0	185	0	$18	$225	$175	2.8
Stairs Exit 8	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 Exit 8	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740	3	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,581	0.0	185	0	$18	$225	$175	2.8
Stairs Exit3	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 Exit3	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,740	3	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,581	0.0	55	0	$5	$0	$0	0.0
Stairs Exit3	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	3,740	3	None	Yes	4	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,581	0.1	296	0	$29	$225	$140	3.0
Stairs Exit6	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	3,740	3	None	Yes	6	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,581	0.1	444	0	$43	$225	$210	0.3
Storage	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Storage	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Storage	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Storage Girls Locker Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Storage Art Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Storage Chairs	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	1,500		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,500	0.0	0	0	$0	$0	$0	0.0
Storage Girls Locker Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,500		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	0	0	$0	$0	$0	0.0
Vault	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,740		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,740	0.0	0	0	$0	$0	$0	0.0
Work Room 105	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

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
Boiler Room	Condenser Water Pump P7P8	2	Condenser Water Pump	15.0	93.0%	Yes			W	3,000		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hydronic Pumps P5P6	2	Heating Hot Water Pump	5.0	89.5%	Yes			W	2,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	WSHP Circulating Pumps P1P2 - Supply	2	Water-Source Heat Pump Circulation Pump	50.0	94.5%	Yes			W	3,500		No	94.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	WSHP Circulating Pumps P3P4 - Field Return	2	Water-Source Heat Pump Circulation Pump	40.0	94.1%	Yes			W	3,500		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Water Filtration Pump	1	Other	5.0	89.5%	No			W	2,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-13 - Art Room	1	Exhaust Fan	2.0	86.5%	Yes			W	3,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-13 - Art Room	1	Supply Fan	2.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Cafeteria	1	Supply Fan	5.0	89.5%	Yes			W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Cafeteria	1	Exhaust Fan	5.0	89.5%	Yes			W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Cafeteria	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Cafeteria	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-9 - 1st & 2nd Floors	1	Supply Fan	2.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-9 - 1st & 2nd Floors	1	Exhaust Fan	2.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-10 - 1st & 2nd Floors	1	Supply Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-10 - 1st & 2nd Floors	1	Exhaust Fan	5.0	89.5%	Yes			W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-10 - 1st & 2nd Floors	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-10 - 1st & 2nd Floors	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-12 - Nurse Office	1	Exhaust Fan	2.0	86.5%	Yes			W	3,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-12 - Nurse Office	1	Supply Fan	1.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-7 - 1st & 2nd Floors	1	Supply Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	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
Roof	RTU-7 - 1st & 2nd Floors	1	Exhaust Fan	5.0	89.5%	Yes			W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-7 - 1st & 2nd Floors	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-7 - 1st & 2nd Floors	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2 - Stage	1	Supply Fan	2.0	86.5%	Yes			W	3,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2 - Stage	1	Exhaust Fan	1.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-11 - 1st & 2nd Floors	1	Exhaust Fan	2.0	86.5%	Yes			W	3,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-11 - 1st & 2nd Floors	1	Supply Fan	1.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4 - Gymnasium North	1	Supply Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4 - Gymnasium North	1	Exhaust Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4 - Gymnasium North	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4 - Gymnasium North	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-15 - Media Rooms	1	Supply Fan	1.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-15 - Media Rooms	1	Exhaust Fan	1.0	85.5%	Yes			W	3,000		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5 - Gymnasium South	1	Supply Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5 - Gymnasium South	1	Exhaust Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5 - Gymnasium South	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5 - Gymnasium South	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-14 - Locker Rooms	1	Supply Fan	3.0	89.5%	Yes			W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-14 - Locker Rooms	1	Exhaust Fan	2.0	86.5%	Yes			W	3,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-8 - 1st & 2nd Floors	1	Supply Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	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
Roof	RTU-8 - 1st & 2nd Floors	1	Exhaust Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-8 - 1st & 2nd Floors	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-8 - 1st & 2nd Floors	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3 - Library	1	Supply Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3 - Library	1	Exhaust Fan	7.5	91.7%	Yes			W	3,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3 - Library	1	Other	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3 - Library	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Cooling Tower Fan	1	Cooling Tower Fan	25.0	93.6%	Yes			W	3,000		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Storage Room	Kitchen - HV-2	1	Supply Fan	2.0	84.0%	Yes			W	3,000		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kiln Room - Supply Fan	1	Supply Fan	0.3	65.0%	No			W	3,000	4	No	69.5%	Yes	1	0.1	360	0	$36	$2,989	$50	80.9
Boiler Room	Hydronic Pumps P5P6	2	Heating Hot Water Pump	5.0	89.5%	Yes			W	2,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen Hood	2	Kitchen Hood Exhaust Fan	0.8	70.0%	No			W	5,250		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-1 - Restrooms	1	Exhaust Fan	0.5	70.0%	No			W	3,000		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-2 - Restrooms	1	Exhaust Fan	0.3	65.0%	No			W	3,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen	1	Exhaust Fan	0.3	65.0%	No			W	3,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	IT Room	1	Exhaust Fan	0.3	65.0%	No			W	3,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-5 - Kiln Room	1	Exhaust Fan	0.3	65.0%	No			W	3,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Pump Room	1	Exhaust Fan	0.3	65.0%	No			W	3,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-9 - Custodial Room	1	Exhaust Fan	0.5	70.0%	No			W	3,000		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Restroom	1	Exhaust Fan	0.5	70.0%	No			W	3,000		No	70.0%	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	Sump Pump	1	Other	0.3	65.0%	No			W	800		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Hydraunic Elevator	1	Other	15.0	80.0%	No			W	300		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	RTU-13 - Art Room	1	Package Unit	8.00	120.00	12.00	0.8 AFUE	AAON	RN-008-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Cafeteria	1	Package Unit	20.00	218.70	12.00	0.807407407407407 AFUE	AAON	RN-020-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-9 - 1st & 2nd Floors	1	Package Unit	6.00	120.00	12.00	0.8 AFUE	AAON	RN-006-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-10 - 1st & 2nd Floors	1	Package Unit	16.00	218.70	12.00	0.807407407407407 AFUE	AAON	RN-016-C-3	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-12 - Nurse Office	1	Package Unit	8.00	168.00	12.00	0.8 AFUE	AAON	RN-008-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-7 - 1st & 2nd Floors	1	Package Unit	16.00	218.70	12.00	0.807407407407407 AFUE	AAON	RNA-016-C-3	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2 - Stage	1	Package Unit	6.00	72.90	12.00	0.81 AFUE	AAON	RN-006-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-11 - 1st & 2nd Floors	1	Package Unit	7.00	72.90	12.00	0.81 AFUE	AAON	RN-007-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4 - Gymnasium North	1	Package Unit	20.00	218.70	12.00	0.807407407407407 AFUE	AAON	RN-020-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-15 - Media Center Rooms	1	Package Unit	4.00	49.00	12.00	0.816666666666667 AFUE	AAON	RN-004-3-W	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5 - Gymnasium South	1	Package Unit	20.00	218.70	12.00	0.807407407407407 AFUE	AAON	RN-020-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-14 - Locker Rooms	1	Package Unit	11.00	156.00	12.00	0.8 AFUE	AAON	RN-011-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-8 - 1st & 2nd Floors	1	Package Unit	18.00	218.70	12.00	0.807407407407407 AFUE	AAON	RN-018-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3 - Library	1	Package Unit	25.00	218.70	12.00	0.807407407407407 AFUE	AAON	RN-020-3-A	W		No							0.0	0	0	$0	$0	$0	0.0
Boiler Room	Boiler Room	1	Electric Resistance Heat		17.06		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Book Storage	Book Storage	1	Electric Resistance Heat		17.06		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Various Spaces	Various Spaces	11	Electric Resistance Heat		25.59		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Storage Room	Kitchen - HV-2	1	Forced Air Furnace		280.00		0.8 AFUE			W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Main Office	1	Split-System Air-Source HP	1.00	16.00	15.00	14 HSPF	Fujitsu	AOUG12LMAS1	W		No							0.0	0	0	$0	$0	$0	0.0
Various Spaces	Horizontal WSHP - Various Spaces	6	Water Source HP	0.67	9.40	12.00	3.1 COP	Tetco	ESII-0.8-H LS40	B	5	Yes	6	Water Source HP	0.67	9.40	14.00	4.8 COP	1.0	1,901	0	$191	$17,461	$180	90.3

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Various Spaces	Horizontal WSHP - Various Spaces	2	Water Source HP	1.00	14.60	12.00	3.3 COP	Tetco	ESII-1.0-H LS40	B	5	Yes	2	Water Source HP	1.00	14.60	14.00	4.8 COP	0.4	838	0	$84	$6,654	$90	77.8
Various Spaces	Horizontal WSHP - Various Spaces	4	Water Source HP	1.50	20.50	12.00	3.35 COP	Tetco	ESII-1.5-H LS40	B	5	Yes	4	Water Source HP	1.50	20.50	15.00	4.5 COP	1.2	2,200	0	$222	$15,809	$408	69.5
Various Spaces	Horizontal WSHP - Various Spaces	37	Water Source HP	2.00	29.60	12.00	3.54 COP	Tetco	ESII-2.0-H LS54	B	5	Yes	37	Water Source HP	2.00	29.60	15.00	4.5 COP	15.7	24,389	0	$2,457	$169,362	$5,032	66.9
Main Office	Horizontal WSHP - HP-102	1	Water Source HP	2.50	32.90	12.00	3.65 COP	Tetco	ESII-2.5-H LS54	B	5	Yes	1	Water Source HP	2.50	32.90	15.00	4.5 COP	0.3	694	0	$70	$6,570	$170	91.5
Various Spaces	Horizontal WSHP - Various Spaces	20	Water Source HP	3.00	36.50	12.00	3.65 COP	Tetco	ESII-3.0-H LS54	B	5	Yes	20	Water Source HP	3.00	36.50	15.00	4.5 COP	6.0	15,901	0	$1,602	$147,242	$4,080	89.4
Various Spaces	Horizontal/Vertical WSHP - Various Spaces	6	Water Source HP	3.50	45.60	12.00	3.65 COP	Tetco	ESII-3.5-H LS54	B	5	Yes	6	Water Source HP	3.50	45.60	15.00	4.5 COP	2.6	5,796	0	$584	$47,924	$1,428	79.6
Various Spaces	Vertical WSHP - Various Spaces	2	Water Source HP	4.00	55.60	12.00	3.7 COP	Tetco	ESII-4.0-H LS54	B	5	Yes	2	Water Source HP	4.00	55.60	15.00	4.5 COP	1.2	2,195	0	$221	$17,225	$544	75.4
Various Spaces	Vertical WSHP - Various Spaces	4	Water Source HP	4.50	63.50	12.00	3.8 COP	Tetco	ESII-4.5-H LS54	B	5	Yes	4	Water Source HP	4.50	63.50	15.00	4.5 COP	2.6	4,540	0	$457	$36,951	$1,224	78.1
Computer Room 129	Computer Room 129 - HP-129	1	Water Source HP	5.00	74.10	12.00	3.8 COP	Tetco	ESII-5.0-H LS54	B	5	Yes	1	Water Source HP	5.00	74.10	15.00	4.5 COP	0.9	1,297	0	$131	$9,863	$340	72.9
Various Spaces	Console WSHP - Various Spaces	4	Water Source HP	0.58	3.41	12.00	2.9 COP	Water Furnace	CW007A	B	5	Yes	4	Water Source HP	0.58	3.41	14.00	4.8 COP	0.2	642	0	$65	$11,224	$105	171.9
Corridor C3	Console WSHP - CHP-C13	1	Water Source HP	0.75	6.82	12.00	3.1 COP	Water Furnace	CW009A	B	5	Yes	1	Water Source HP	0.75	6.82	14.00	4.8 COP	0.1	251	0	$25	$3,014	$34	117.9
Various Spaces	Console WSHP - Various Spaces	5	Water Source HP	1.00	6.82	12.00	3.2 COP	Water Furnace	CW012A	B	5	Yes	5	Water Source HP	1.00	6.82	14.00	4.8 COP	0.4	1,268	0	$128	$16,635	$225	128.5
Various Spaces	Console WSHP - Various Spaces	11	Water Source HP	1.25	10.24	12.00	3.3 COP	Water Furnace	CW015A	B	5	Yes	11	Water Source HP	1.25	10.24	14.00	4.8 COP	1.0	3,705	0	$373	$40,035	$619	105.6
Corridor C1	Console WSHP - CHP-C10	1	Water Source HP	1.50	13.24	12.00	3.35 COP	Water Furnace	CW018A	B	5	Yes	1	Water Source HP	1.50	13.24	15.00	4.5 COP	0.2	414	0	$42	$3,952	$102	92.4
Storage 57B	Electric Duct Heater - EDH-2	1	Electric Resistance Heat		49.47		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Storage 57B	Electric Duct Heater - EDH-3	1	Electric Resistance Heat		54.59		2 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Kiln Room	Electric Duct Heater - EDH-1	1	Electric Resistance Heat		20.47		3 COP			W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Hydronic Heating System - Boilers #1 & 2	2	Condensing Hot Water Boiler	2,338	AERCO	BMK 2500	W		No						0.0	0	0	$0	$0	$0	0.0

Demand Control Ventilation Recommendations

Location	Area(s)/System(s) Affected	Recommendation Inputs: 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)	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	RTU-1 - Cafeteria	6	4.00	20.00	0.00	218.70	0.0	550	7	$165	$5,438	$0	32.9
Roof	RTU-3 - Library	6	4.00	25.00	0.00	218.70	0.0	688	7	$179	$5,438	$0	30.3
Roof	RTU-4 - Gymnasium North	6	4.00	20.00	0.00	218.70	0.0	550	7	$165	$5,438	$0	32.9
Roof	RTU-5 - Gymnasium South	6	4.00	20.00	0.00	218.70	0.0	550	7	$165	$5,438	$0	32.9
Roof	RTU-14 - Locker Rooms	6	3.00	11.00	0.00	156.00	0.0	303	5	$110	$4,078	$0	37.2

Pipe Insulation Recommendations

Location	Area(s)/System(s) Affected	Recommendation Inputs: ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Storage Room	Domestic Hot Water System	6	10	0.50	0.0	686	0	$69	$119	$10	1.6
Storage Room	Domestic Hot Water System	6	18	1.00	0.0	1,909	0	$192	$215	$36	0.9
Janitorial Closet	Domestic Hot Water System	6	3	2.00	0.0	574	0	$58	$40	$6	0.6

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions: System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	Proposed Conditions: ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Janitorial	Thorne Middle School	1	Storage Tank Water Heater (> 50 Gal)	A O Smith	DSE 80A 200	W		No						0.0	0	0	$0	$0	$0	0.0
Storage Room	Thorne Middle School	1	Storage Tank Water Heater (> 50 Gal)	A O Smith	DEN-80 110	W		No						0.0	0	0	$0	$0	$0	0.0
Storage Room	Thorne Middle School	1	Storage Tank Water Heater (≤ 50 Gal)	A O Smith	ENS-50 110	W		No						0.0	0	0	$0	$0	$0	0.0
Stage	Thompson Middle School	1	Storage Tank Water Heater (≤ 50 Gal)	A O Smith	ENS-40 110	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
Restrooms	8	31	Faucet Aerator (Lavatory)	1.50	0.50	0.0	5,070	0	$511	$222	$111	0.2

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Freezer Chest			No		No	0.0	0	0	$0	$0	$0	0.0
Storage	1	Refrigerator Chest	Powers		No	8	Yes	0.1	1,026	0	$103	$1,326	$0	12.8
Kitchen	1	Refrigerator Chest	Powers		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Turbo Air	M3F47-2-N	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	Master-Bilt	R-49S	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Refrigerator Chest			No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Saturn	S-49F	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen	G20010	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)			No	8	Yes	0.1	470	0	$47	$1,376	$75	27.4
Kitchen	1	Refrigerator Chest			No		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Electric Convection Oven (Half Size)	Vulcan	Convotherm	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Convection Oven (Full Size)	Vulcan	VC55GD	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Crescor		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Warming Tables	Hatco		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Metro C5	3 Series	Yes		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
Various Spaces	7	Coffee Machine	800	No		
Various Spaces	8	Dehumidifier	244	No		
Various Spaces	119	Desktop	270	No		
Kiln Room	1	Kiln	9,984	No		
Various Spaces	15	Microwave	1,000	No		
Various Spaces	3	Other	1,200	No		
Various Spaces	32	Printer (Medium/Small)	225	No		
Various Spaces	5	Printer/Copier (Large)	600	No		
Various Spaces	18	Projector	240	No		
Various Spaces	20	Refrigerator (Mini)	225	No		
Various Spaces	8	Refrigerator (Residential)	450	No		
Various Spaces	64	Smart Board	45	No		
Various Spaces	7	Television	220	No		
Various Spaces	5	Toaster	800	No		

Vending Machine Inventory & Recommendations

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

Custom (High Level) Measure Analysis

Retro-Commissioning Study

Building Square Footage	126,069	**Fuel Utility Rate**	$16.930 MMBtu
Percent of Conditioned Area Impacted	100%	**Blended Electric Utility Rate**	$0.101 kWh

Existing Conditions						Proposed Conditions					Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	Remaining Useful Life	Total HVAC Motor Usage kWh	Total HVAC Electric Usage kWh	Total HVAC Fuel Usage MMBtu	Description	% Savings HVAC Motor Usage kWh	% Savings HVAC Electric Usage kWh	% Savings HVAC Fuel Usage MMBtu	Estimated Cost per Sqft	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Simple Payback w/ Incentives in Years
HVAC Controls Not Currently Optimized	HVAC Equipment & Systems	3	616,920	525,653	3,282	Retro-Commissioning Study	5%	5%	5%	$0.40	0.00	57,129	164	$8,533	$50,428	$0	$0	$0	$50,428	5.91	5.91

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

38

ENERGY STAR® Score[1]

Thorne Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 129,069
Built: 1960

For Year Ending: June 30, 2022
Date Generated: July 30, 2023

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Thorne Middle School 70 Murphy Road Port Monmouth, New Jersey 07758	Middletown Township Public Schools 63 Tindall Road Middletown, NJ 07748 (732) 706-6061	Adam Nasr 63 Tindall Road Middletown, NJ 07748 (732) 706-6061 X 1362 nasra@middletownk12.org

Property ID: 26000606

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
68.3 kBtu/ft²

Source EUI
126.7 kBtu/ft²

Annual Energy by Fuel	
Electric - Solar (kBtu)	1,361,330 (15%)
Electric - Grid (kBtu)	4,089,619 (46%)
Natural Gas (kBtu)	3,368,970 (38%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	61.1
National Median Source EUI (kBtu/ft²)	113.3
% Diff from National Median Source EUI	12%
Annual Emissions	
Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	654

Signature & Stamp of Verifying Professional

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

LP Signature: ____________________ Date: __________

Licensed Professional

____ ________
,
(___)____-______
____

Professional Engineer or Registered Architect Stamp
(if applicable)

APPENDIX C: GLOSSARY

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

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

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