Local Government Energy Audit Report

Carroll Street DCC

April 2, 2025

Prepared for:
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Trenton, New Jersey 08609

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Disclaimer

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

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

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

Incentive values provided in this report are estimated based on the utility-run Prescriptive and Custom Rebate program at the beginning of the fiscal year. Incentive levels are not guaranteed. Please review all available utility program incentives and eligibility requirements prior to selecting and installing any energy conservation measures. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice.

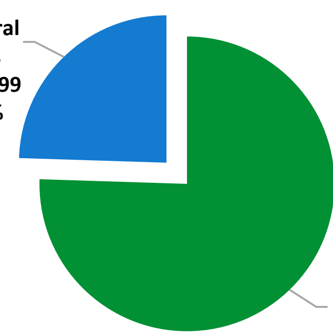
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

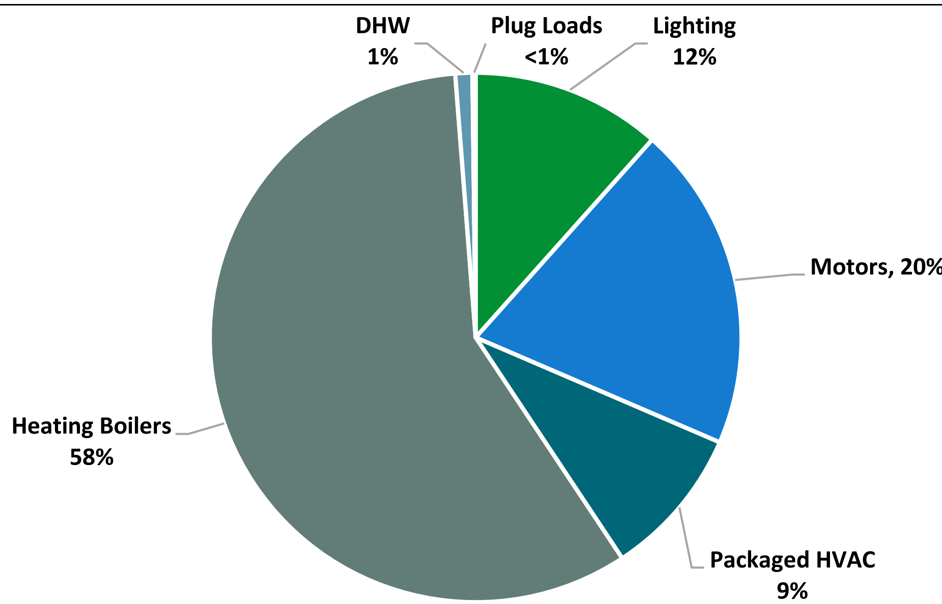
Table of Contents

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Carroll Street DCC. 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 Energy Utilities	Costs: $66,531 Electricity: 268,842 kWh Natural Gas: 15,988 Therms	
ENERGY STAR® Benchmarking Score	40 *(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.



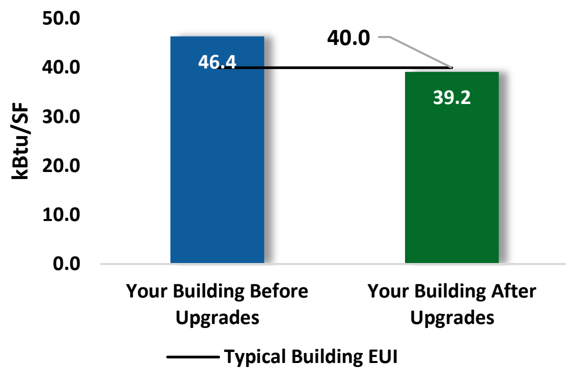
Energy Use by System

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.

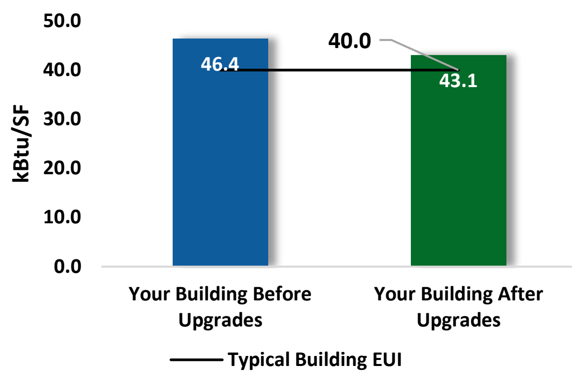
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$486,880
Potential Rebates & Incentives[1]	$62,740
Annual Cost Savings	$21,894
Annual Energy Savings	Electricity: 117,624 kWh Natural Gas: -82 Therms N/A: 0 N/A: 0
Greenhouse Gas Emission Savings	59 Tons
Simple Payback	19.4 Years
Site Energy Savings (All Utilities)	16%



Scenario 2: Cost Effective Package[2]

Installation Cost	$122,580
Potential Rebates & Incentives	$45,740
Annual Cost Savings	$10,459
Annual Energy Savings	Electricity: 56,603 kWh Natural Gas: -115 Therms N/A: 0 N/A: 0
Greenhouse Gas Emission Savings	28 Tons
Simple Payback	7.3 Years
Site Energy Savings (all utilities)	7%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] All incentives are estimated from the utility-run Prescriptive and Custom Rebate program at the beginning of the fiscal year. Always contact your utility provider for details on all current programs.

[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			**40,650**	**41.2**	**-9**	**$7,507**	**$87,110**	**$16,680**	**$70,430**	**9.4**	**39,922**
ECM 1	Install LED Fixtures	Yes	2,529	0.2	0	$472	$2,590	$290	$2,300	4.9	2,540
ECM 2	Retrofit Fixtures with LED Lamps	Yes	38,121	40.9	-9	$7,035	$84,520	$16,390	$68,130	9.7	37,381
Lighting Control Measures			**12,578**	**13.8**	**-3**	**$2,321**	**$32,960**	**$28,840**	**$4,120**	**1.8**	**12,334**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	12,501	13.7	-3	$2,307	$32,120	$28,040	$4,080	1.8	12,258
ECM 4	Install High/Low Lighting Controls	Yes	77	0.1	0	$14	$840	$800	$40	2.8	76
Variable Frequency Drive (VFD) Measures			**58,477**	**21.8**	**0**	**$10,926**	**$256,900**	**$14,100**	**$242,800**	**22.2**	**58,886**
ECM 5	Install VFDs on Constant Volume (CV) Fans	No	55,592	21.5	0	$10,387	$238,200	$13,100	$225,100	21.7	55,981
ECM 6	Install VFDs on Heating Water Pumps	No	2,885	0.3	0	$539	$18,700	$1,000	$17,700	32.8	2,905
Unitary HVAC Measures			**2,543**	**3.2**	**3**	**$509**	**$107,400**	**$2,900**	**$104,500**	**205.3**	**2,948**
ECM 7	Install High Efficiency Air Conditioning Units	No	2,543	3.2	3	$509	$107,400	$2,900	$104,500	205.3	2,948
HVAC System Improvements			**1,903**	**0.0**	**0**	**$356**	**$2,410**	**$200**	**$2,210**	**6.2**	**1,916**
ECM 8	Install Programmable Thermostats	Yes	1,138	0.0	0	$213	$2,280	$180	$2,100	9.9	1,146
ECM 9	Install Pipe Insulation	Yes	765	0.0	0	$143	$130	$20	$110	0.8	770
Domestic Water Heating Upgrade			**1,472**	**0.0**	**0**	**$275**	**$100**	**$20**	**$80**	**0.3**	**1,482**
ECM 10	Install Low-Flow DHW Devices	Yes	1,472	0.0	0	$275	$100	$20	$80	0.3	1,482
TOTALS (COST EFFECTIVE MEASURES)			**56,603**	**55.0**	**-11**	**$10,459**	**$122,580**	**$45,740**	**$76,840**	**7.3**	**55,654**
TOTALS (ALL MEASURES)			**117,624**	**80.0**	**-8**	**$21,894**	**$486,880**	**$62,740**	**$424,140**	**19.4**	**117,489**

* - All incentives presented in this table are estimated from the utility run Prescriptive and Custom Rebate program at the beginning of the fiscal year. Always contact your utility provider for details on all current programs.

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

All Evaluated Energy Improvements[3]

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

[3] 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 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.

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decision 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. To qualify for the program, sites must have an average annual demand above 200 kW.

Energy Management

The Energy Management program provides the organizational tools, systems, and processes necessary for achieving continuous energy performance improvement. The program is made up of different pathways. These subprograms offer a comprehensive mix of custom energy savings measures such as basic HVAC tune-ups, building systems tune-ups, controls' calibration, diagnostic testing, and installation of measures to enhance a building's energy performance and savings. To qualify for the program, sites must have an average annual demand above 200 kW.

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 for the largest energy consumers in the state. Customers in this category spend about $5 million a year on energy bills. This program 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 Carroll Street DCC. 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 November 19, 2024, TRC performed an energy audit at Carroll Street Document Control Center (DCC) located in Trenton, New Jersey. TRC met with Jerome Arlt to review the facility operations and help focus our investigation on specific energy-using systems.

The Carroll Street DCC is a one-story, 54,200 square foot warehouse built in 1950. The building is used to store files from the New Jersey Department of Environmental Protection (DEP), Treasury office, and firehouse. Spaces include storage rooms, restrooms, corridors, mechanical rooms, and lobby. The building is occupied intermittently by staff. The building is conditioned by rooftop units that provide cooling via DX coils and air handling units. The warehouse is heated by the hot water boiler that serves baseboard heaters and provides hot water to the air handling units. Additionally, there is a gas-fired York rooftop unit that helps meet the building heating requirements. The building is illuminated by a mix of linear fluorescent and incandescent lamps that are controlled by wall switches. Two storage tank water heaters provide water to sinks and toilets across the facility.

Recent Improvements and Facility Concerns

All the lighting in the building is legacy lighting; no LEDs were observed other than in the exit signs. Facility staff are interested in relamping the facility to LED lamps and installing lighting controls. Several of the rooftop units are abandoned in place and no longer operational. The thermostats are mercury based, and the facility expressed interest in installing digital thermostats.

2.2 Building Occupancy

The facility is open Monday through Friday but is only occupied intermittently. There are no full-time staff. Janitorial services and maintenance are performed once a week during regular business hours

Building Name	Weekday/Weekend	Operating Schedule
DEP 77 Carroll Street	Weekday	8:00 AM - 4:00 PM
	Weekend	NA

Building Occupancy Schedule

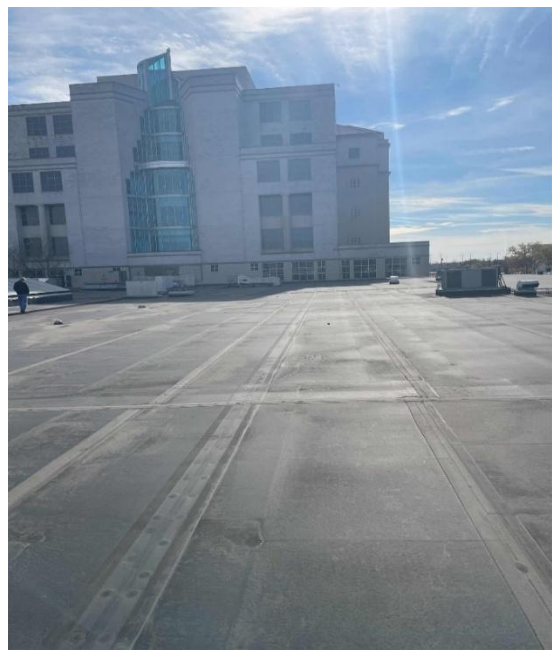
2.3 Building Envelope

The building is made of brick, and the exterior walls are in fair condition. The roof is flat and covered with a black rubber membrane and is in good condition. The roof was refurbished in March 2011. The roof enclosed conditioned and semi-conditioned spaces (e.g., a space that is not intentionally heated but escaping heat from HVAC equipment caused the space to be conditioned.) The roof is supported by steel trusses..

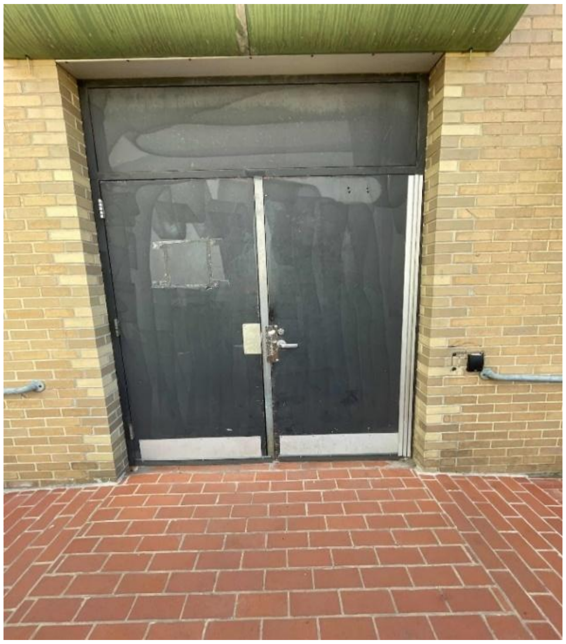
Most of the windows are single paned with aluminum frame. The glass-to-frame seals and the operable window weather seals are in fair to poor condition. There is evidence of wear on some of the window frames. There are also skylights with aluminum frames that are in good condition.

Exterior doors have aluminum frames and are in fair condition with undamaged door seals. There are two uninsulated overhead garage doors in the loading bay in fair condition. Degraded window and door seals increase drafts and outside air infiltration.

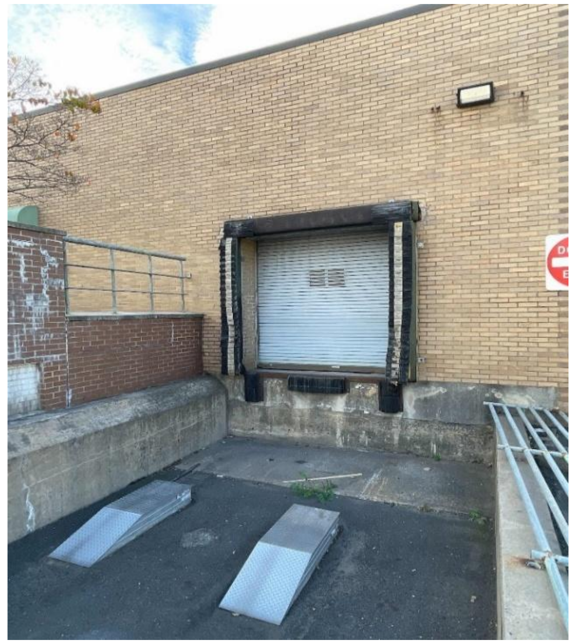
Exterior Windows



Wall and Roof



Exterior Door



Overhead Garage Door

Skylight

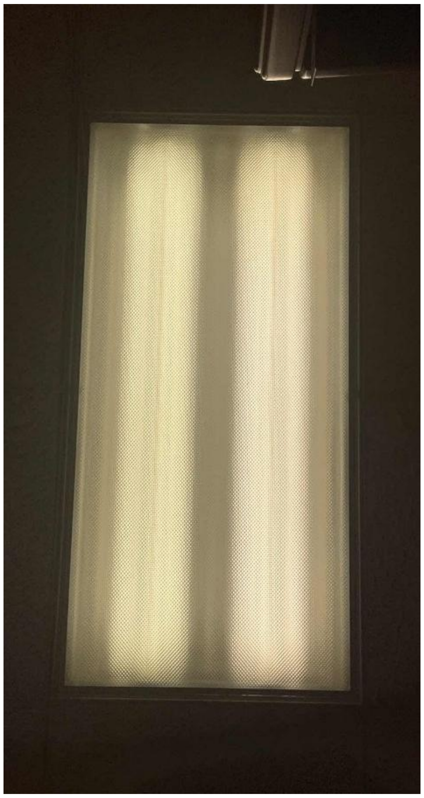
Exterior Windows

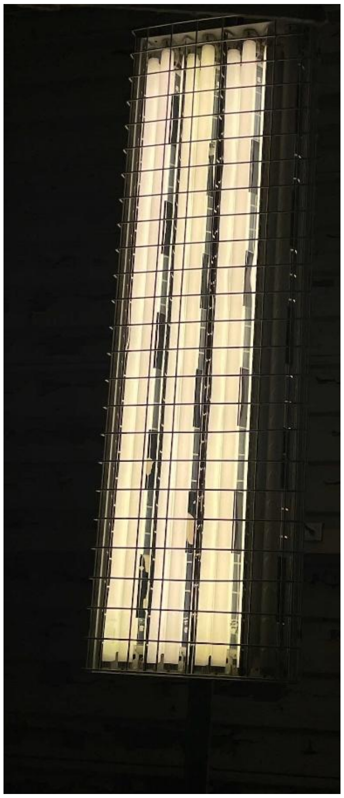
2.4 Lighting Systems

The primary interior lighting system uses different linear fluorescent T8 lamps. There are a significant number of 3 foot, 4 foot, and 8-foot T8 lamps throughout the facility. Fixture types include 2-lamp, 4-lamp, or 8-lamp, 3-foot, 4-footk or 8-foot-long troffer, surface mounted, and prismatic acrylic lens fixtures and 2-foot fixtures with U-bend tube lamps. Additionally pendant and recessed incandescent lamps are distributed throughout the facility.

The DEP storage room has four manually controlled high-bay metal halide high-intensity discharge (HID) lamps. All exit signs are LED. Most fixtures are in good condition and the interior lighting levels were generally sufficient. All interior lighting fixtures are controlled by manual wall switch.

The exterior lighting consists of LED wall packs and cobra head parking lot lights. The wall mounted LED wall packs are controlled by photocell. The parking lot lights incorporate photocell-controlled metal halide HID lamps. All the exterior fixtures are in fair condition. The lenses of the parking lot lights are yellowed and are evaluated for replacement.

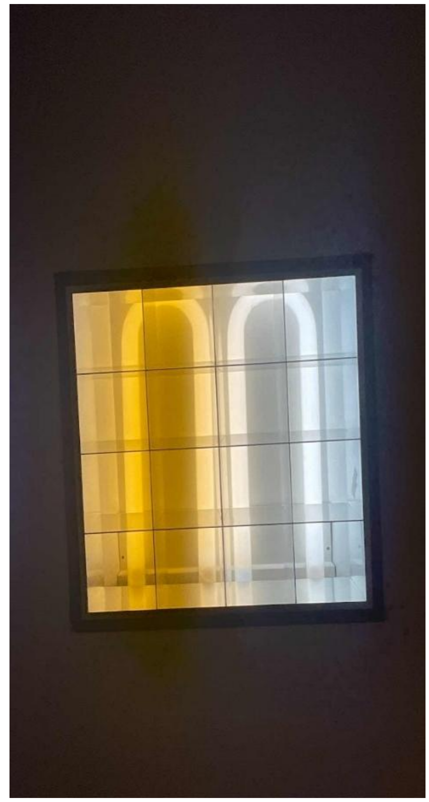




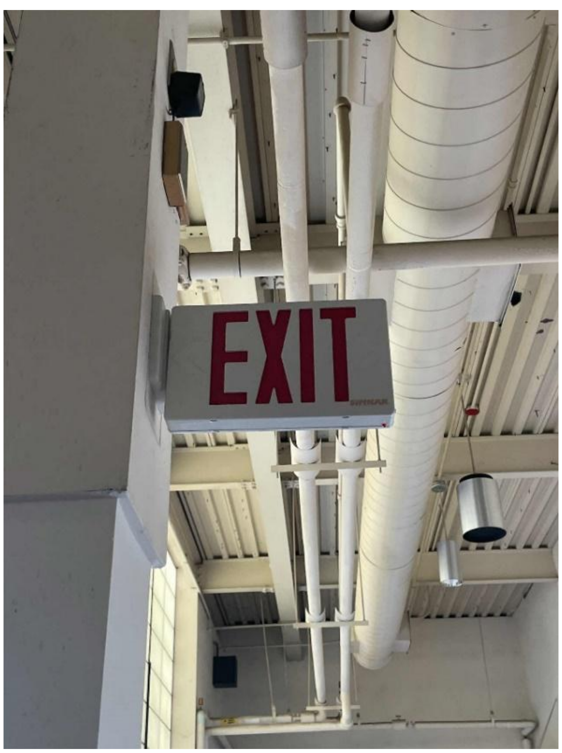
Typical Linear Fluorescent T8 Fixtures

Metal Halide *Incandescent*

Incandescent Lamps



8-foot Linear Fluorescent *3-foot Linear Fluorescent* *T8 U-Bend*



LED Exit Sign *Wall Switch*

Exterior Parking Lot Metal Halide

LED Wall Pack

2.5 Air Handling Systems

<u>Packaged Units</u>

The fireman's storage room, DEP warehouse, Treasury warehouse, and scanning room are served by split system condensing units. The units provide DX cooling to the warehouse and have cooling capacities that range from 1.5 tons to 20 tons. The Trane units all serve air handling unit cooling coils.

The loading dock RTU has a cooling capacity of 20 tons and a heating capacity of 240 kBtu, the only unit that provides cooling and gas-fired heating.

The units serving the loading dock and scanning room are both operating beyond their useful life. The remaining units are in fair condition but are nearing the end of their useful life.

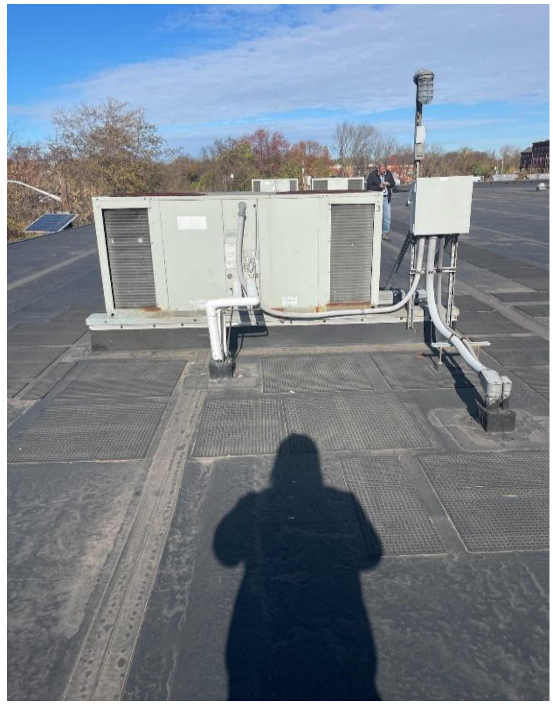
Unit	Area Served	Tons Cooling	Heating Capacity *
Trane TTA180	Fireman's Storage AHU	1.50	None
Trane TTA180	DEP Warehouse (Old Health Dept) AHU	1.50	None
Trane TTA180	DEP Warehouse (Old Health Dept) AHU	1.50	None
Mammoth	Scanning Room	16.00	None
York DM240	Loading Dock	20.00	240 kBtu
Trane TTA180	Treasury Warehouse (Old Heath Dept) AHU	1.50	None
Trane TTA180	Treasury Warehouse (Old Heath Dept) AHU	1.50	None
York	Treasury Warehouse (Old Museum) AHU	20.00	None
Trane TTA180	Treasury Warehouse (Old Museum) AHU	1.50	None

* Condensing units feed to air handling units equipped with heating coils.

Refer to Appendix A for detailed information about each unit.

York YC240

Mammoth RTU

Trane TTA180 RTUs


Trane TTA180 RTUs

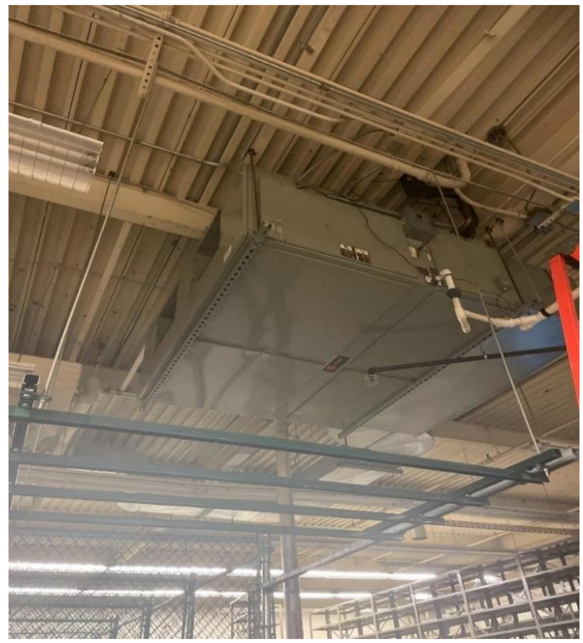
Trane TTA180 RTUs

York DM240 RTU

Air Handling Units (AHUs)

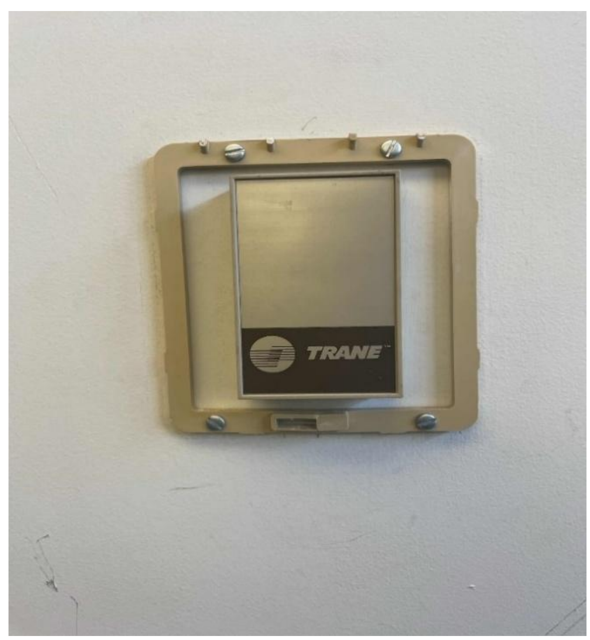
The building is conditioned by several air handling units. These units are equipped with a supply fan motor, heating coil, and refrigerant coil for cooling. The supply fan motors are 2 hp, standard efficiency, and operate at constant speed. The DEP warehouse, Treasury warehouse, and fireman's storage are conditioned by the air handling units that are connected to the rooftop condensing units in a split system configuration. The heating coil is supplied by the hot water boiler, which is described in the section that follows. The temperature is controlled by local thermostats.

DEP Trane Air Handling Unit



Treasury Warehouse Trane Air Handling Unit

Fireman's Storage Air Handling Unit



Thermostat

Unitary Heating Equipment

The DEP warehouse, loading bay, and Treasury storage are heated by hot water unit heaters. These units are controlled by wall mounted manual thermostats and hot water is provided by the boiler.

Unit Heaters

2.6 Heating Hot Water Systems

Two Buderus 1009 KBtu/hr. hot water boilers serve the building's heating load. The burners are non-modulating with a nominal efficiency of 83%. The boilers are configured in a lead-lag control scheme. Both boilers are required under high load conditions. Installed in the late 1990's, they are in fair condition. There is no service contract in place.

The hydronic distribution system is a two-pipe, heating-only system.

The boilers are configured in a constant flow primary distribution with two, 1.5 hp and one, 0.75 hp constant speed hot water pumps operating with a lead-lag control scheme.

The boilers provide hot water to fin tube radiators, air handling units, and hot water unit heaters throughout the building. The boiler supply and return pipes are well insulated.

Buderus Boiler

Heating Hot Water Pumps

2.7 Domestic Hot Water

Hot water is produced by one, 30 gallon and one, 20-gallon, 2.5 kW electric storage water heater. The domestic hot water pipes are not insulated. These units provide water to restrooms faucets and toilets.

30-Gallon Storage Tank Water Heater

20-Gallon Storage Tank Water Heater

2.8 Plug Load and Vending Machines

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

There are three dehumidifiers, fans, and a water cooler that make up the facility plug load. Plug load at this facility is minimal due to low occupancy.

Dehumidifier

Water-Cooler

Fan

2.9 Water-Using Systems

Water is provided by Trenton Water Works, the municipal water supply company. Potable water is used for drinking, cleaning, sanitary fixtures, and building conditioning Water leaks were not observed/reported. EPA WaterSense® has set maximum flow rates for sanitary fixtures. They are: 1.28 gallons per flush (gpf) for toilets, 0.5 gpf for urinals, 1.5 gallons per minute (gpm) for lavatory faucets, and 2.0 gpm for showerheads. There are restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gpm or higher.

Toilet

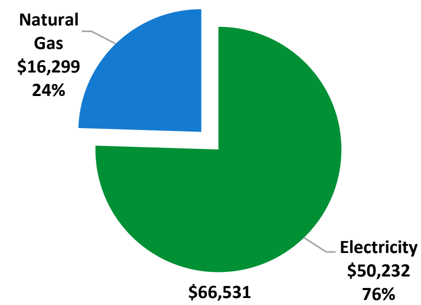
Sink

Urinal

3 Energy Use and Costs

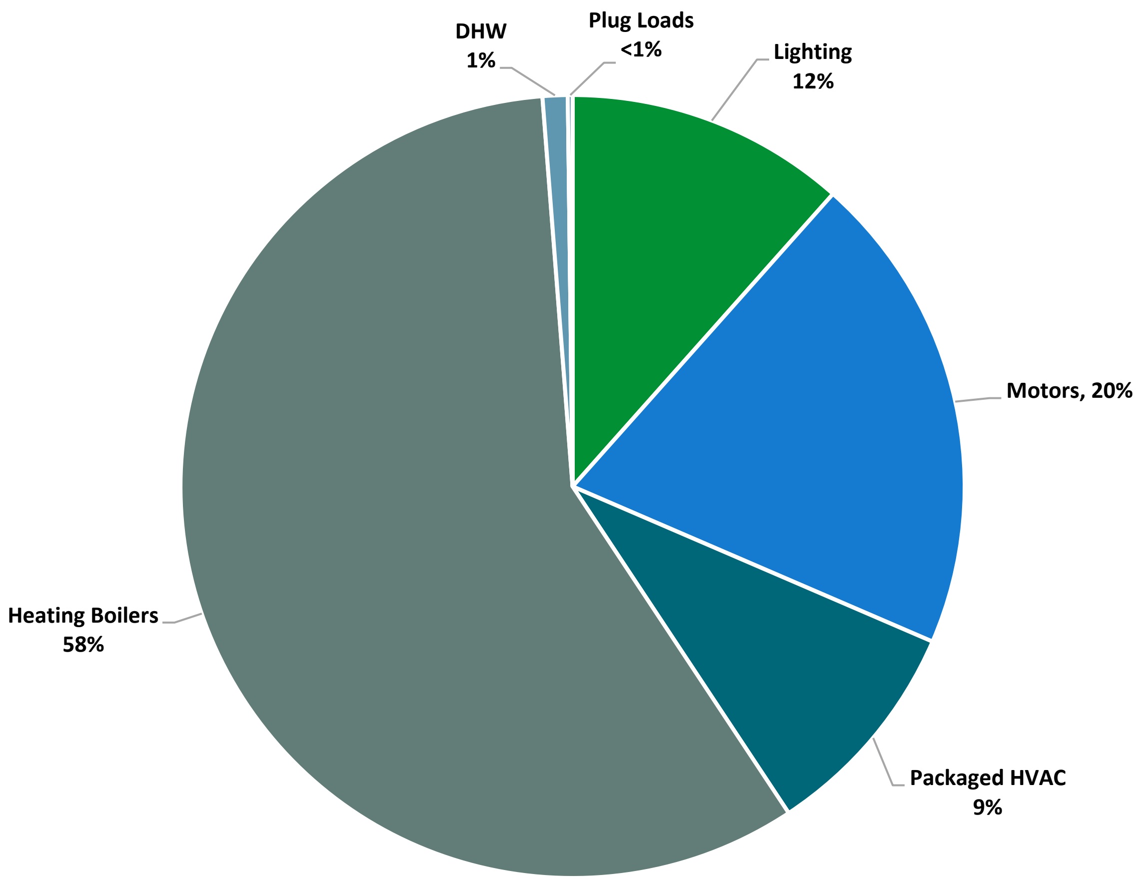
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	268,842 kWh	$50,232
Natural Gas	15,988 Therms	$16,299
Total		**$66,531**



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.

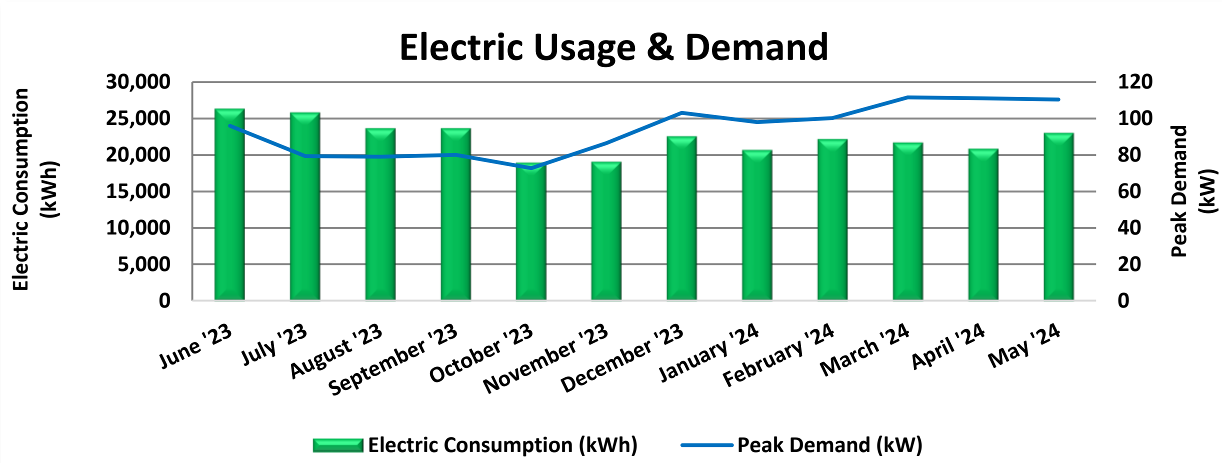
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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



Energy Balance by System

3.1 Electricity

PSE&G delivers electricity under rate class Large Power & Lighting Secondary (LPLS). Electric production is provided by DE, a third-party supplier.



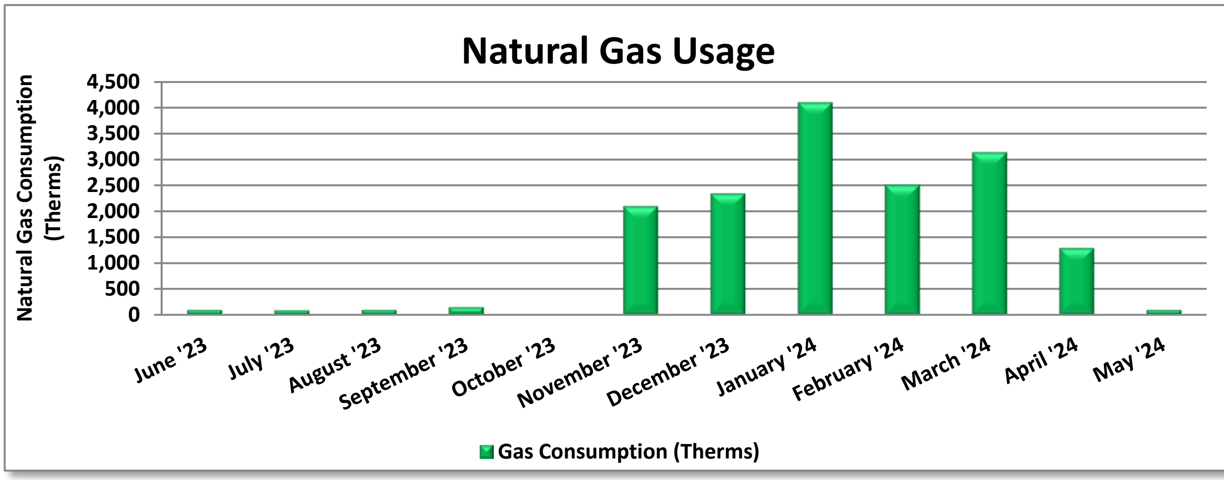
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/26/23	32	26,355	96	$467	$5,534
7/26/23	30	25,866	79	$392	$5,246
8/24/23	29	23,671	79	$391	$4,926
9/25/23	32	23,680	80	$396	$4,943
10/25/23	30	18,984	73	$359	$3,458
11/22/23	28	19,126	87	$429	$3,541
12/26/23	34	22,590	103	$511	$4,119
1/25/24	30	20,723	98	$487	$3,511
2/26/24	32	22,187	100	$497	$3,710
3/26/24	29	21,744	112	$553	$3,721
4/25/24	30	20,883	111	$551	$3,622
5/24/24	29	23,033	111	$550	$3,902
Totals	**365**	**268,842**	**112**	**$5,584**	**$50,232**
Annual	**365**	**268,842**	**112**	**$5,584**	**$50,232**

Notes:

- Peak demand of 112 kW occurred in March '24.
- Average demand over the past 12 months was 94 kW.
- The average electric cost over the past 12 months was $0.187/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class Large Volume Gas (LVG). Natural gas supply is provided by NRG, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
7/13/23	30	95	$174
8/11/23	29	88	$267
9/12/23	32	97	$276
10/11/23	29	149	$332
11/8/23	28	0	$180
12/12/23	34	2,095	$2,472
1/12/24	31	2,341	$2,495
2/12/24	31	4,099	$3,562
3/13/24	30	2,510	$2,248
4/12/24	30	3,135	$2,797
5/13/24	31	1,288	$1,249
6/12/24	30	92	$248
Totals	**365**	**15,988**	**$16,299**
Annual	**365**	**15,988**	**$16,299**

Notes:

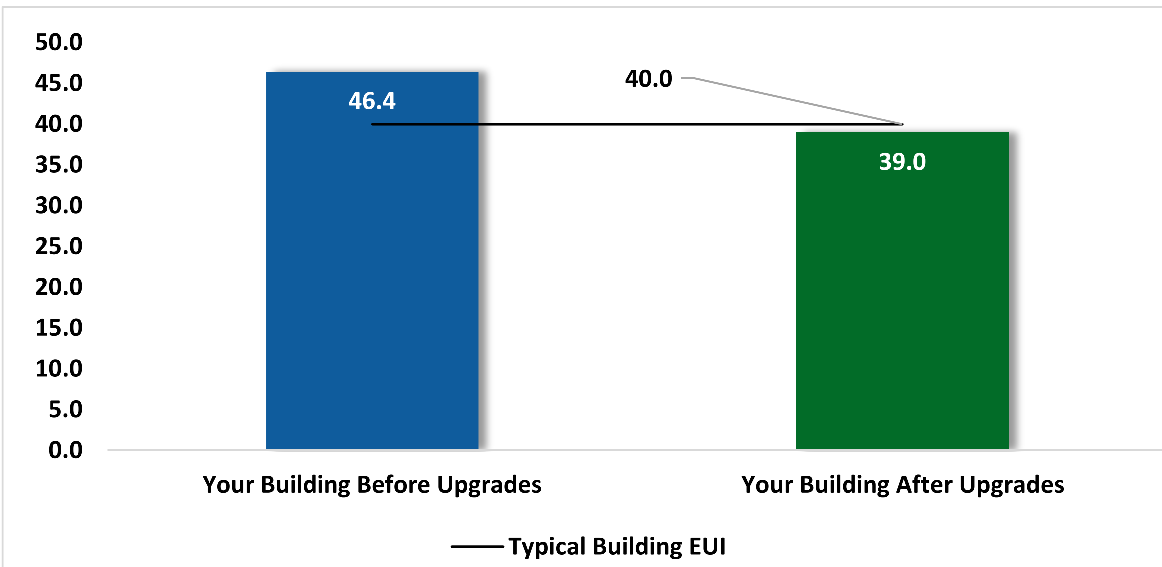
- The average gas cost for the past 12 months is $1.019/therm, which is the blended rate used throughout the analysis.

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	40



Energy Use Intensity Comparison[4]

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

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

[4] Based on all evaluated ECMs

Tracking your Energy Performance

Keeping track of your energy and water use on a monthly basis is one of the best ways to keep utility costs in check and keep your facility operating efficiently. 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.

3.4 Understanding Your Utility Bills

The State of New Jersey Department of the Public Advocate provides detailed information on how to read natural gas and electric bills. Your bills contain important information including account numbers, meter numbers, rate schedules, meter readings, and the supply and delivery charges. Gas and electric bills both provide comparisons of current energy consumption with prior usage.

Sample bills, with annotation, may be viewed at:
https://www.nj.gov/rpa/docs/Understanding_Electric_Bill.pdf
https://www.nj.gov/rpa/docs/Understanding_Gas_Bill.pdf

Why Utility Bills Vary

Utility bills vary from one month to another for many reasons. For this reason, assessing the effects of your energy savings efforts can be difficult.

Billing periods vary, typically ranging between 28 and 33 days. Electric bills provide the kilowatt-hours (kWh) used per month while gas bills provide therms (or hundreds of cubic feet - CCF) per month consumption information. Monthly consumption information can be helpful as a tool to assess your efforts to reduce energy, particularly when compared to monthly usage from a similar calendar period in a prior year.

Bills typically vary seasonally, often with more gas consumed in the winter for heating, and more electricity used in the summer when air conditioning is used. Facilities with electric heating may experience higher electricity use in the winter. Seasonal variance will be impacted by the type of heating and cooling systems used. Normal seasonal fluctuations are further impacted by the weather. Extremely cold or hot weathers causes HVAC equipment to run longer, increasing usage. Other monthly fluctuations in usage can be caused by changes in building occupancy. Utility bills provide a comparison of usage between the current period and comparable billing month period of the prior year. Year-to-year monthly use comparisons can point to trends with energy savings for measures/projects that were implemented within the timeframe, but these comparisons do not account for changing weather of occupancy patterns.

The price of fuel and purchased power used to produce and delivery electricity and gas fluctuates. Any increase or decrease in these costs will be reflected in your monthly bill. Additionally, billing rates occasionally change after justification and approval of the NJBPU. For this reason, it is more useful to review energy use rather than cost when assessing energy use trends or the impact of energy conservation measures implemented.

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 estimated from the investor-owned utility run Prescriptive and Custom Rebate program at the beginning of the fiscal year. Some measures and proposed upgrades may be eligible for higher incentives than those shown. The incentives in the summary tables should be used for high-level planning purposes only. 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			**40,650**	**41.2**	**-9**	**$7,507**	**$87,110**	**$16,680**	**$70,430**	**9.4**	**39,922**
ECM 1	Install LED Fixtures	Yes	2,529	0.2	0	$472	$2,590	$290	$2,300	4.9	2,540
ECM 2	Retrofit Fixtures with LED Lamps	Yes	38,121	40.9	-9	$7,035	$84,520	$16,390	$68,130	9.7	37,381
Lighting Control Measures			**12,578**	**13.8**	**-3**	**$2,321**	**$32,960**	**$28,840**	**$4,120**	**1.8**	**12,334**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	12,501	13.7	-3	$2,307	$32,120	$28,040	$4,080	1.8	12,258
ECM 4	Install High/Low Lighting Controls	Yes	77	0.1	0	$14	$840	$800	$40	2.8	76
Variable Frequency Drive (VFD) Measures			**58,477**	**21.8**	**0**	**$10,926**	**$256,900**	**$14,100**	**$242,800**	**22.2**	**58,886**
ECM 5	Install VFDs on Constant Volume (CV) Fans	No	55,592	21.5	0	$10,387	$238,200	$13,100	$225,100	21.7	55,981
ECM 6	Install VFDs on Heating Water Pumps	No	2,885	0.3	0	$539	$18,700	$1,000	$17,700	32.8	2,905
Unitary HVAC Measures			**2,543**	**3.2**	**3**	**$509**	**$107,400**	**$2,900**	**$104,500**	**205.3**	**2,948**
ECM 7	Install High Efficiency Air Conditioning Units	No	2,543	3.2	3	$509	$107,400	$2,900	$104,500	205.3	2,948
HVAC System Improvements			**1,903**	**0.0**	**0**	**$356**	**$2,410**	**$200**	**$2,210**	**6.2**	**1,916**
ECM 8	Install Programmable Thermostats	Yes	1,138	0.0	0	$213	$2,280	$180	$2,100	9.9	1,146
ECM 9	Install Pipe Insulation	Yes	765	0.0	0	$143	$130	$20	$110	0.8	770
Domestic Water Heating Upgrade			**1,472**	**0.0**	**0**	**$275**	**$100**	**$20**	**$80**	**0.3**	**1,482**
ECM 10	Install Low-Flow DHW Devices	Yes	1,472	0.0	0	$275	$100	$20	$80	0.3	1,482
TOTALS			**117,624**	**80.0**	**-8**	**$21,894**	**$486,880**	**$62,740**	**$424,140**	**19.4**	**117,489**

* - All incentives presented in this table are estimated from the utility run Prescriptive and Custom Rebate program at the beginning of the fiscal year. Always contact your utility provider for details on all current programs.

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

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		**40,650**	**41.2**	**-9**	**$7,507**	**$87,110**	**$16,680**	**$70,430**	**9.4**	**39,922**
ECM 1	Install LED Fixtures	2,529	0.2	0	$472	$2,590	$290	$2,300	4.9	2,540
ECM 2	Retrofit Fixtures with LED Lamps	38,121	40.9	-9	$7,035	$84,520	$16,390	$68,130	9.7	37,381
Lighting Control Measures		**12,578**	**13.8**	**-3**	**$2,321**	**$32,960**	**$28,840**	**$4,120**	**1.8**	**12,334**
ECM 3	Install Occupancy Sensor Lighting Controls	12,501	13.7	-3	$2,307	$32,120	$28,040	$4,080	1.8	12,258
ECM 4	Install High/Low Lighting Controls	77	0.1	0	$14	$840	$800	$40	2.8	76
HVAC System Improvements		**1,903**	**0.0**	**0**	**$356**	**$2,410**	**$200**	**$2,210**	**6.2**	**1,916**
ECM 8	Install Programmable Thermostats	1,138	0.0	0	$213	$2,280	$180	$2,100	9.9	1,146
ECM 9	Install Pipe Insulation	765	0.0	0	$143	$130	$20	$110	0.8	770
Domestic Water Heating Upgrade		**1,472**	**0.0**	**0**	**$275**	**$100**	**$20**	**$80**	**0.3**	**1,482**
ECM 10	Install Low-Flow DHW Devices	1,472	0.0	0	$275	$100	$20	$80	0.3	1,482
TOTALS		**56,603**	**55.0**	**-11**	**$10,459**	**$122,580**	**$45,740**	**$76,840**	**7.3**	**55,654**

* - All incentives presented in this table are estimated from the utility run Prescriptive and Custom Rebate program at the beginning of the fiscal year. Always contact your utility provider for details on all current programs.

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

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		**40,650**	**41.2**	**-9**	**$7,507**	**$87,110**	**$16,680**	**$70,430**	**9.4**	**39,922**
ECM 1	Install LED Fixtures	2,529	0.2	0	$472	$2,590	$290	$2,300	4.9	2,540
ECM 2	Retrofit Fixtures with LED Lamps	38,121	40.9	-9	$7,035	$84,520	$16,390	$68,130	9.7	37,381

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

ECM 1: Install LED Fixtures

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

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

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

Affected Building Areas: metal halide in DEP storage and parking lot lighting

ECM 2: Retrofit Fixtures with LED Lamps

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

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

Affected Building Areas: all interior lighting

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		**12,578**	**13.8**	**-3**	**$2,321**	**$32,960**	**$28,840**	**$4,120**	**1.8**	**12,334**
ECM 3	Install Occupancy Sensor Lighting Controls	12,501	13.7	-3	$2,307	$32,120	$28,040	$4,080	1.8	12,258
ECM 4	Install High/Low Lighting Controls	77	0.1	0	$14	$840	$800	$40	2.8	76

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

Affected Building Areas: restrooms, Treasury storage, old museum Treasury storage old health department, storage rooms, records room, electrical room, fireman's storage room, mechanical room, and receiving room

ECM 4: Install High/Low Lighting Controls

We evaluated installing 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: corridors and lobby

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**58,477**	**21.8**	**0**	**$10,926**	**$256,900**	**$14,100**	**$242,800**	**22.2**	**58,886**
ECM 5	Install VFDs on Constant Volume (CV) Fans	55,592	21.5	0	$10,387	$238,200	$13,100	$225,100	21.7	55,981
ECM 6	Install VFDs on Heating Water Pumps	2,885	0.3	0	$539	$18,700	$1,000	$17,700	32.8	2,905

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

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

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

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

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

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

Affected Air Handlers: AHU 1, 2, 3, 4, 5, 6, and 7

ECM 6: Install VFDs on Heating Water Pumps

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

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

Affected Pumps: 1.5 hp Marathon Electric heating hot water pumps

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**2,543**	**3.2**	**3**	**$509**	**$107,400**	**$2,900**	**$104,500**	**205.3**	**2,948**
ECM 7	Install High Efficiency Air Conditioning Units	2,543	3.2	3	$509	$107,400	$2,900	$104,500	205.3	2,948

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 York and Mammoth RTU's are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 7: Install High Efficiency Air Conditioning Units

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

Affected Units: Mammoth RTU and York DM240 RTU

4.5 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**1,903**	**0.0**	**0**	**$356**	**$2,410**	**$200**	**$2,210**	**6.2**	**1,916**
ECM 8	Install Programmable Thermostats	1,138	0.0	0	$213	$2,280	$180	$2,100	9.9	1,146
ECM 9	Install Pipe Insulation	765	0.0	0	$143	$130	$20	$110	0.8	770

ECM 8: Install Programmable Thermostats

Replace manual thermostats with programmable thermostats, which provide energy savings by reducing heating and cooling energy usage when a room is unoccupied. Manual thermostats are generally adjusted to a single heating and cooling setpoint and left at that setting regardless of occupancy, and they provide the same level of heating and cooling regardless of whether the space is being used. Programmable thermostats can maintain different temperature settings for different times of day and for different days of the week. By reducing heating temperature setpoints and raising cooling temperature setpoints when spaces are unoccupied, the operation of the HVAC equipment is reduced while maintaining comfortable space temperatures for building usage.

Note that the space is used intermittently. We recommend you configure thermostats to maintain a high cooling space temperature (say 80°F) and a low heating temperature (say 65°F) during potential work hours (8:00 AM until 4:00 PM) and have facility staff use temporary overrides when using the building. Outside of work hours, temperature deadbands could be increased for further savings.

ECM 9: Install Pipe Insulation

Install insulation on domestic hot water system piping. Distribution system thermal losses are dependent on system fluid temperature, the size of the distribution system, and the extent and condition of piping insulation. When the insulation has been damaged due to exposure to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated, system thermal efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Affected Systems: domestic hot water piping

4.6 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**1,472**	**0.0**	**0**	**$275**	**$100**	**$20**	**$80**	**0.3**	**1,482**
ECM 10	Install Low-Flow DHW Devices	1,472	0.0	0	$275	$100	$20	$80	0.3	1,482

ECM 10: 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

4.7 Measures for Future Consideration

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

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

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

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

VRF Systems

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

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

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

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

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

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

5 ENERGY EFFICIENT BEST PRACTICES

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

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

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

Energy Tracking with ENERGY STAR Portfolio Manager

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

Doors and Windows

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

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.

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

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.

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.

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

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

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

Boiler Maintenance

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

Label HVAC Equipment

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

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

Water Heater Maintenance

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

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

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

Procurement Strategies

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

6 Water Best Practices

Getting Started

The commercial and institutional sector is the second largest consumer of publicly supplied water in the United States, accounting for 17% of the withdrawals from public water supplies[6]. In New Jersey, excluding water used for power generation, approximately 80% of total water use was attributed to potable supply during the period of 2009 to 2018. Water withdrawals for potable supply have not changed noticeably during the period from 1990 to 2018[7].

Water management planning serves as the foundation for any successful water reduction effort. It is the first step a commercial or institutional facility owner or manager should take to achieve and sustain long-term water savings. Understanding how water is used within a facility is critical for the water management planning process. A water assessment provides a comprehensive account of all known water uses at the facility. It allows the water management team to establish a baseline from which progress and program success can be measured. It also enables the water management team to set achievable goals and identify and prioritize specific projects based on the relative savings opportunities and project cost-effectiveness.

Water conservation devices may significantly reduce your water and sewer usage costs. Any reduction in water use reduces grid-level electricity use since a significant amount of electricity is used to treat and deliver water from reservoirs to end users.

For more information regarding water conservation or additional details regarding the practices shown below go to the EPA's WaterSense website[8] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[9] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Leak Detection and Repair

Identifying and repairing leaks and other water use anomalies within a facility's water distribution system or from processes or equipment can keep a facility from wasting significant quantities of water. Examples of common leaks include leaking toilets and faucets, drip irrigation malfunctions, stuck float valves, and broken distribution lines. Reading meters, installing failure abatement technologies, and conducting visual and auditory inspections are important best practices to detect leaks. Train building occupants, employees, and visitors to report any leaks that they detect. To reduce unnecessary water loss, detected leaks should be repaired quickly. Repairing leaks in water distribution that is pressurized by on-site pumps or in heated or chilled water piping will also reduce energy use.

Toilets and Urinals

Toilets and urinals are considered sanitary fixtures and are found in most facilities. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously flushing, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment

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[6] Estimated from analyzing data in: Solley, Wayne B,. et al, "Estimated Use of Water in the United States in 1995", U.S Geological Survey Circular 1200, (1998)

[7] https://dep.nj.gov/wp-content/uploads/dsr/trends-water-supply.pdf

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

[9] https://shorturl.at/mQ8o0

and the frequency of use, it may be cost effective to replace older inefficient fixtures with current generation WaterSense labeled equipment.

Commercial facilities typically use tank toilets or wall-mount flushometers. Educate and inform users with restroom signage and other means to avoid flushing inappropriate objects. For tank toilets, periodically check to ensure fill valves are working properly and that water level is set correctly. Annually test toilets to ensure the flappers are not worn or allowing water to seep from the tank into the bowl and down the sewer. Control stops and piston valves on flushometer toilets should be checked at least annually.

Most urinals use water to flush liquid. These standard single-user fixtures are present in most facilities. Non-water urinals use a specially designed trap that allows liquid waste to drain out of the fixture through a trap seal, and into the drainage system. Flushing urinals should be inspected at least annually for proper valve and sensor operation. For non-water urinals, follow maintenance practices as directed by the manufacturer to ensure products perform as expected. Non-water urinals can be considered during urinal replacement, however, review the condition and design of the existing plumbing system and the expected usage patterns to ensure that these products will provide the anticipated performance.

Faucets and Showerheads

Faucets and showerheads are sanitary fixtures that generally dispense heated water. Reducing water use by these fixtures translates into a reduction of site fuel or electric use depending on how water is heated. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously dripping, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older fixtures with current generation WaterSense labeled equipment.

Faucets are used for a variety of purposes, and standard flow rates are dictated by the intended use. Public use lavatory faucets and kitchen faucets are subject to maximum flow rates while service sinks are not. Periodically inspect faucet aerators for scale buildup to ensure flow is not being restricted. Clean or replace the aerator or other spout end device as needed. Check and adjust automatic sensors (where installed) to ensure they are operating properly to avoid faucets running longer than necessary. Post materials in restrooms and kitchens to ensure user awareness of the facility's water-efficiency goals. Remind users to turn off the tap when they are done and to consider turning the tap off during sanitation activities when it is not being used. Consider installing lavatory and kitchen faucet fixtures with reduced flow. Federal standards limit kitchen and restroom faucet flows to 2.2 gpm. To qualify for a WaterSense label a faucet cannot exceed 1.5 gpm.

Effective in 1992, the maximum allowable flow rate for all showerheads sold in the United States is 2.5 gpm. Since this standard was enacted, many showerheads have been designed to use even less water. WaterSense labeled equipment is designed to use 2.0 gpm, or less. For optimum showerhead efficiency, the system pressure should be tested to make sure that it is between 20 and 80 pounds per square inch (psi). Verify that plumbing lines are routed through a shower valve to prevent water pressure fluctuations. Periodically inspect showerheads for scale buildup to ensure flow is not being restricted. In general, replace showerheads with 2.5 gpm flow rates or higher with WaterSense labeled models. Note: Use of poor performing replacement reduced flow showerheads may result in increased use if the duration of use is increased to compensate for reduced performance. WaterSense labeled showerheads are independently certified to meet or exceed minimum performance requirements for spray coverage and force.

7 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.

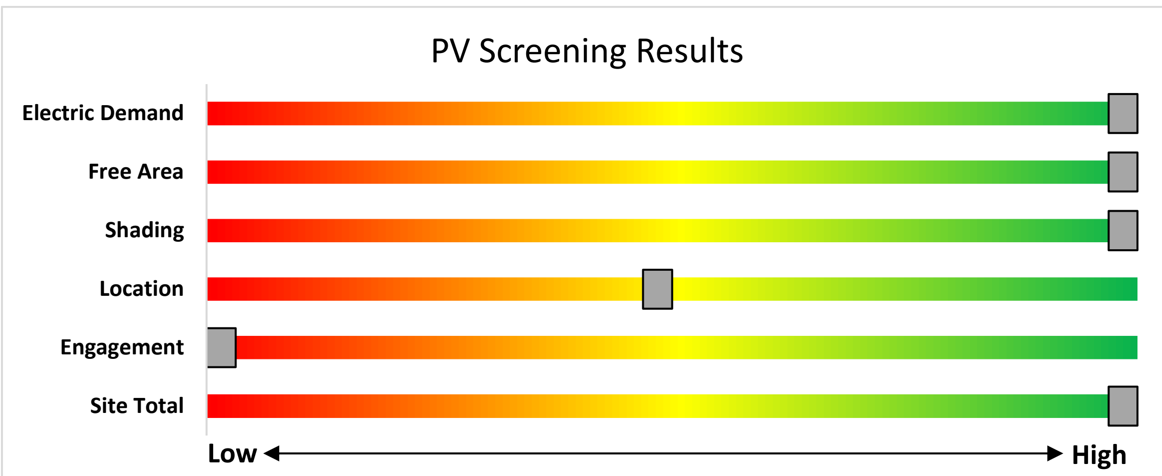
7.1 Solar Photovoltaic

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

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

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

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



Potential	High	
System Potential	94	kW DC STC
Electric Generation	111,989	kWh/yr
Displaced Cost	$20,920	/yr
Installed Cost	$366,600	

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

7.2 Combined Heat and Power

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

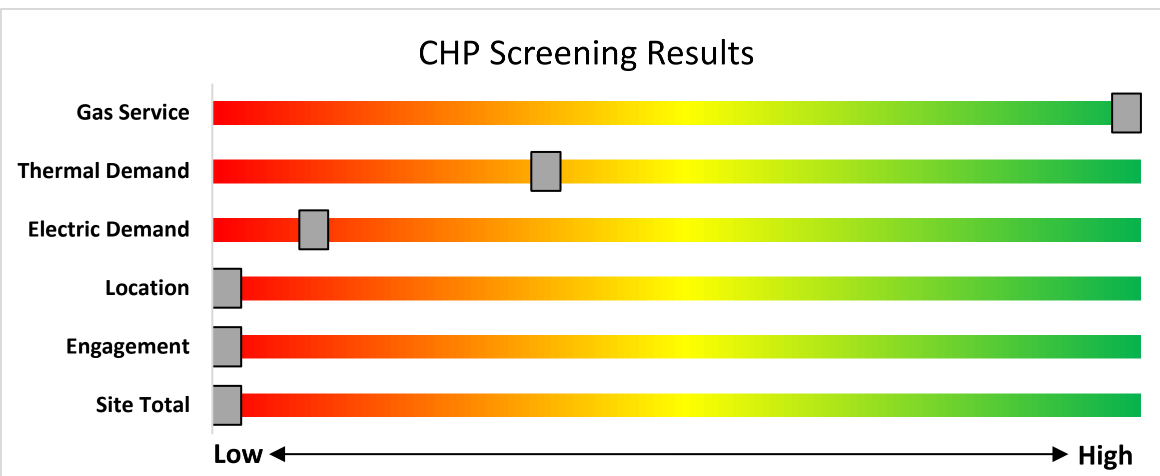
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

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

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

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

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



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/

8 Sustainable Energy Pathways

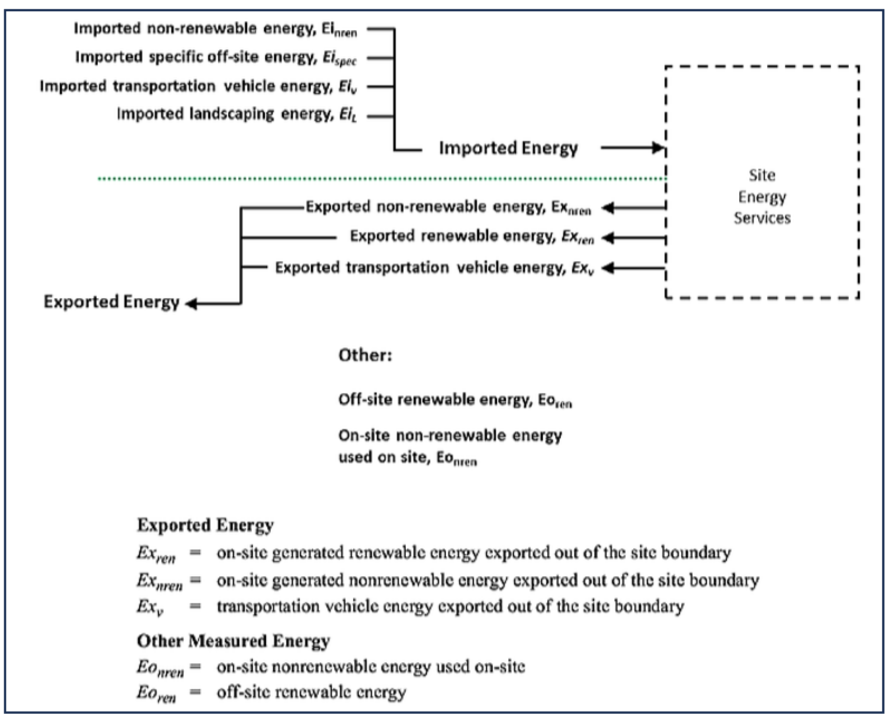
Visions for a climate friendly future include a healthy mix of approaches in all facets where energy is consumed. Strategies for commercial buildings typically include a mix of supply side measures (sustainable generation), and reduced consumption through efficiency upgrades and right-sizing.

The concept of “Zero Net Energy” combines both strategies to bring building energy usage in balance with sustainable production. “Electrification” is a strategy that seeks to minimize the use of fossil fuel at the building so that fuel can be substituted with clean-generated electricity. Electric vehicle (EV) charging, supplied at the building level, can bring help clean fuel to the transportation sector.

8.1 Zero Net Energy and Zero Net Carbon Facilities

In 2015 the United States Department of Energy (US DOE) released a definition of a zero net energy building as “an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy”[10]. This definition also applies to campuses, portfolios, and communities. In 2023 ASHRAE published Standard 228, which establishes requirements for determining whether a building or group of buildings meets a definition of “zero net energy” or a definition of “zero net carbon” during building operation.”[11].

A facilities energy use can be calculated as site energy or source energy. Site energy is similar to what is measured by utility meters, while source energy includes energy used to extract and process fuels and losses during energy distribution. Source energy quantities used in the standard’s zero net energy formula are calculated by multiplying the site energy use (or energy exports from the site) by source energy conversion factors in the standard.



Energy Flows Across a Site Boundary (ANSI/ASHRAE Standard 228-2023)

[10] A Common Definition for Zero Energy Buildings, US DOE, September 2015
[11] ANSI/ASHRAE Standard 228-2023 Foreword

ANSI/ASHRAE Standard 228-2023, Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance, contains a method of evaluating a building, or group of buildings, to determine if they have achieved "zero net energy" and/or "zero net carbon" operation. Standard 228 can be used during the design and operation phases of new and existing buildings to track energy and carbon performance during the building lifetime to verify whether the annual net energy use and the carbon emissions are zero. Various factors such as weather, building occupancy and overall building condition can impact the buildings energy and carbon use. The methodologies provided in Standard 228 can be used to track a building's energy and carbon use over time to determine if the building is maintaining "zero net" status.

8.2 Electrification

The US DOE reports that, "Electrification converts an energy-consuming device, system, or sector from non-electric sources of energy to electricity. It's an emerging economy-wide decarbonization strategy that is beginning to impact the electric power industry. Electrification is not necessarily the goal, rather a means to achieving a community goal such as reducing greenhouse gas emissions or lowering energy costs. For utilities, the goal—or the benefits—of electrification might be to support system optimization, improve efficiencies, and increase resiliency. Ultimately, people and businesses will choose beneficial electric technologies"[12].

Electrification can help reduce carbon in the atmosphere by reducing the use of fossil fuels at the building level. In many cases, the substitution of fossil fuel burning equipment with electrification technologies can save money. Electrification can foster a more robust or resilient power grid overall by providing utilities more flexibility in load management.

Many opportunities exist for facility managers when replacing fossil fuel equipment through electrification, however, opportunities should be evaluated on a per building basis. Opportunities may include heat pump hot water heaters, heat pump space heating, chilled water systems, and specific process system improvements.

For best results, consider electrification as a "whole systems" building approach. This approach may include generation and battery storage strategies as well as equipment substitution. Consider a wholistic electrification study for your building to help you choose your sustainable energy pathway!

8.3 EV Charging

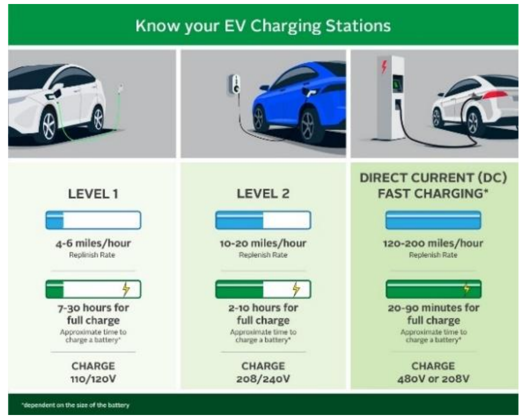
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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.

[12] What is Electrification? | Department of Energy

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.



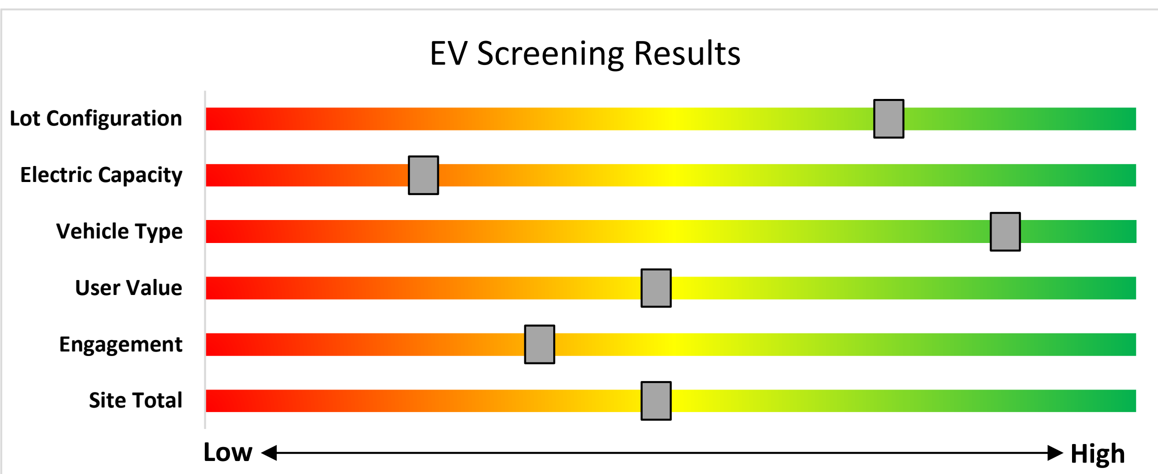
The preliminary assessment of EV charging at the facility shows that there is **medium potential** for adding EV chargers at the facility, based on potential costs of installation and other site factors.

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. The location and capacity of facility electric panels also impact charger installation costs. 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. Adding EV charging may have a negative financial impact due to increased electric demand charges.

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.



EV Charger Screening

Electric Vehicle Programs Available

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), Public Service Electric and Gas Company (PSE&G) or Jersey Central Power and Light (JCP&L), 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, PSE&G or JCP&L, up to 90% of the combined charger purchase and installation costs. Please check program eligibility requirements before purchasing EV charging equipment, as additional conditions on types of eligible chargers may apply for utility incentives.

EV Charging incentive information is available from Atlantic City Electric, PSE&G and JCP&L. 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

9 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 New Jersey.

NJBPU and NJCEP Administered Programs

- New Construction (residential, commercial, industrial, government)
- Large Energy Users
- Energy Savings Improvement Program (financing)
- State Facilities Initiative*
- Local Government Energy Audits
- Combined Heat & Power & Fuel Cells

*State facilities are also eligible for utility programs

Utility Administered Programs

- Existing buildings (residential, commercial, industrial, government)
- Efficient Products
  - Lighting & Marketplace
  - HVAC
  - Appliance Rebates
  - Appliance Recycling

9.1 New Jersey's Clean Energy Program

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. To qualify entities must have incurred at least $5 million in total 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 https://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[13]

<table>
<tr><th>Eligible Technology</th><th>Size (Installed Rated Capacity)</th><th>Incentive ($/Watt)[5]</th><th>% of Total Cost Cap per Project</th><th>$ Cap per Project</th></tr>
<tr><td rowspan="4">CHPs powered by non-renewable or renewable fuel source, or a combination:[4]
- Gas Internal Combustion Engine
- Gas Combustion Turbine
- Microturbine
Fuel Cells ≥60%</td><td>≤500 kW[1]</td><td>$2.00</td><td rowspan="2">30-40%[2]</td><td rowspan="2">$2 million</td></tr>
<tr><td>>500 kW - 1 MW[1]</td><td>$1.00</td></tr>
<tr><td>> 1 MW - 3 MW[1]</td><td>$0.55</td><td rowspan="2">30%</td><td rowspan="2">$3 million</td></tr>
<tr><td>>3 MW[1]</td><td>$0.35</td></tr>
<tr><td>Fuel Cells ≥40%</td><td>Same as above[1]</td><td>Applicable amount above</td><td>30%</td><td>$1 million</td></tr>
<tr><td rowspan="2">Waste Heat to Power (WHP)[3]
Powered by non-renewable fuel source.
Heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine)</td><td>≤1MW[1]</td><td>$1.00</td><td>30%</td><td>$2 million</td></tr>
<tr><td>> 1MW[1]</td><td>$.50</td><td>30%</td><td>$3 million</td></tr>
</table>

13

1 Incentives are tiered, which means the incentive levels vary based upon the installed rated capacity, as listed in the chart above. For example, a 4 MW CHP system would receive $2.00/watt for the first 500 kW, $1.00/watt for the second 500 kW, $0.55/watt for the next 2 MW and $0.35/watt for the last 1 MW (up to the caps listed).

2 The maximum incentive will be limited to 30% of total project. For CHP projects up to 1 MW, this cap will be increased to 40% where a cooling application is used or included with the CHP system (e.g. absorption chiller).

3 Projects will be eligible for incentives shown above, not to exceed the lesser of % of total project cost per project cap or maximum $ per project cap. Projects installing CHP or FC with WHP will be eligible for incentive shown above, not to exceed the lesser caps of the CHP or FC incentive. Minimum efficiency will be calculated based on annual total electricity generated, utilized waste heat at the host site (i.e. not lost/rejected), and energy input.

4 Systems fueled by a Class 1 Renewable Fuel Source, as defined by N.J.A.C. 14:8-2.5, are eligible for a 30% incentive bonus. If the fuel is mixed, the bonus will be prorated accordingly. For example, if the mix is 60/40 (60% being a Class 1 renewable), the bonus will be 18%. This bonus will be included in the final performance incentive payment, based on system performance and fuel mix consumption data. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

5 CHP-FC systems located at Critical Facility and incorporating blackstart and islanding technology are eligible for a 25% incentive bonus. This bonus incentive will be paid with the second/Installation incentive payment. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

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 https://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 (CSI) Program

The CSI Program opened on April 15, 2023, and will serve as the permanent program within the SuSI Program providing incentives to larger solar facilities. The CSI Program is open to qualifying grid supply solar facilities, non-residential net metered solar installations with a capacity greater than five megawatts ("MW"), and to eligible grid supply solar facilities installed in combination with energy storage. CSI eligible facilities will only be allowed to register in the CSI program upon award of a bid pursuant to N.J.A.C. 14:8-11.10.

The CSI program structure has separate categories, or tranches, to ensure that a range of solar project types, including those on preferred sites, are able to participate despite potentially different project cost profiles. The Board has approved four tranches for grid supply and large net metered solar and an additional fifth tranche for storage in combination with grid supply solar. The following table lists procurement targets for the first solicitation:

Tranche	Project Type	MW (dc) Targets
Tranche 1.	Basic Grid Supply	140
Tranche 2.	Grid Supply on the Built Environment	80
Tranche 3.	Grid Supply on Contaminated Sites and Landfills	40
Tranche 4.	Net Metered Non- Residential	40
Tranche 5.	*Storage Paired with Grid	160 MWh

*The storage tranche of 160 MWh corresponds to a 4-hour storage pairing of 40 MW of solar

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 on your building, visit the following link for more information: https://www.njcleanenergy.com/renewable-energy/SuSI

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 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.

Demand Response (DR) Energy Aggregator

Demand Response Energy Aggregator is a program designed to reduce the electric load when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Grid operators call upon curtailment service providers and commercial facilities to reduce electric usage during times of peak demand, making the grid more reliable and reducing transmission costs for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary, and participants receive payments whether or not their facility is called upon to curtail its electric usage.

Typically, an electric customer must be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with greater capability to quickly curtail their demand during peak hours receive higher payments. Customers with back-up generators on site may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in DR programs often find it to be a valuable source of revenue for their facility, because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature setpoints on thermostats (so that air conditioning units run less frequently) or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a DR activity in most situations.

The first step toward participation in a DR program is to contact a curtailment service provider. A list of these providers is available on the website of the independent system operator, PJM, and it includes contact information for each company, as well as the states where they have active business[14]. PJM also posts training materials for program members interested in specific rules and requirements regarding DR activity along with a variety of other DR program information[15].

Curtailment service providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities, and they may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

[14] http://www.pjm.com/markets-and-operations/demand-response.aspx.

[15] https://www.pjm.com/training.

9.2 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.

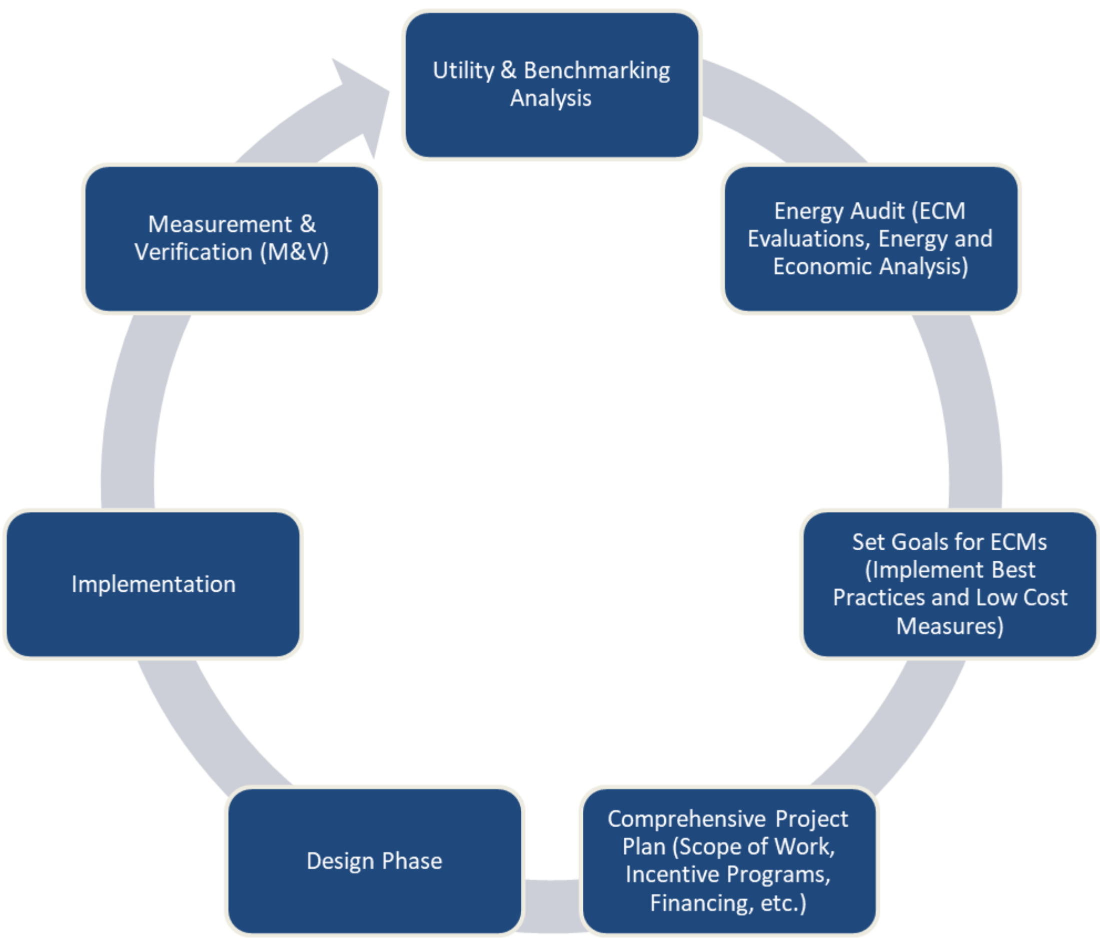
Engineered Solutions

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/EEP.

10 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.



Project Development Cycle

11 Energy Purchasing and Procurement Strategies

11.1 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[16].

11.2 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[17].

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

[17] 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
Corridor 1	7	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	780	2, 4	Relamp	Yes	7	LED Lamps: A19 Lamps	High/Low Control	10	538	0.3	324	0	$60	$460	$350	1.8
Corridor 2	1	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2	2	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	45	780	2	Relamp	No	2	LED Lamps: A19 Lamps	Wall Switch	7	780	0.1	60	0	$11	$50	$20	2.7
Corridor 3	2	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 3	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	538	0.2	200	0	$37	$580	$310	7.3
DEP Scanning Room Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	0.3	235	0	$43	$680	$200	11.0
DEP Storage	10	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	10	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
DEP Storage	32	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	780	2, 3	Relamp	Yes	32	LED Lamps: A19 Lamps	Occupancy Sensor	10	538	1.6	1,479	0	$273	$1,800	$1,120	2.5
DEP Storage	18	LED - Fixtures: High-Bay	Wall Switch	S	65	0	3	None	Yes	18	LED - Fixtures: High-Bay	Occupancy Sensor	65	0	0.3	0	0	$0	$660	$450	0.0
DEP Storage	582	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	582	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	20.9	19,443	-4	$3,588	$42,320	$19,880	6.3
DEP Storage	43	Linear Fluorescent - T8: 4' T8 (32W) - 8L	Wall Switch	S	256	780	2, 3	Relamp	Yes	43	LED - Linear Tubes: (8) 4' Lamps	Occupancy Sensor	116	538	6.5	6,020	-1	$1,111	$9,140	$3,050	5.5
DEP Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	0.4	353	0	$65	$860	$290	8.7
DEP Storage Room	1	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	60	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	780	0.0	41	0	$7	$30	$10	2.7
DEP Storage Room	4	Metal Halide: (1) 70W Lamp	Wall Switch	S	95	780	1, 3	Fixture Replacement	Yes	4	LED - Fixtures: Downlight Pendant	Occupancy Sensor	23	538	0.3	252	0	$46	$1,090	$140	20.4
DEP Storage Room O	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.4	334	0	$62	$840	$370	7.6
DEP Warehouse (Old Health Dept)	6	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
DEP Warehouse (Old Health Dept)	65	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	780	2, 3	Relamp	Yes	65	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	538	3.3	3,119	-1	$576	$9,040	$2,410	11.5
DEP Warehouse Records	4	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
DEP Warehouse Records	8	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	60	780	2, 3	Relamp	Yes	8	LED Lamps: A19 Lamps	Occupancy Sensor	9	538	0.4	342	0	$63	$530	$280	4.0
DEP Warehouse Records	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.6	601	0	$111	$1,570	$670	8.1
DEP Warehouse Records	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	1.5	1,413	0	$261	$2,780	$1,180	6.1
DEP Warehouse Scanning Room	4	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
DEP Warehouse Scanning Room	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.7	668	0	$123	$1,670	$740	7.5
Electrical Room 1	1	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	60	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	780	0.0	41	0	$7	$30	$10	2.7
Electrical Room 1	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.3	234	0	$43	$680	$260	9.7

	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
Exterior 2	12	LED - Fixtures: Wall Pack	Photocell		85	4,380		None	No	12	LED - Fixtures: Wall Pack	Photocell	85	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	5	Metal Halide: (1) 100W Lamp	Photocell		128	4,380	1	Fixture Replacement	No	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	23	4,380	0.0	2,300	0	$430	$1,830	$250	3.7
Fireman's Storage	3	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Fireman's Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	780	0.0	26	0	$5	$50	$10	8.3
Fireman's Storage	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.5	501	0	$92	$1,090	$510	6.3
Fireman's Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	0.4	353	0	$65	$860	$290	8.7
Gen Purpose Storage	15	Linear Fluorescent - T8: 3' T8 (25W) - 2L	Wall Switch	S	48	780	3	None	Yes	15	Linear Fluorescent - T8: 3' T8 (25W) - 2L	Occupancy Sensor	48	538	0.2	178	0	$33	$330	$330	0.0
Gen Purpose Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	0.1	118	0	$22	$330	$100	10.6
Gen Purpose Storage	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	538	0.1	125	0	$23	$680	$150	23.0
Gen Purpose Storage	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	538	0.1	62	0	$12	$330	$70	22.6
Janitorial Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	780	0.0	26	0	$5	$50	$10	8.3
Loading Bay	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.1	134	0	$25	$530	$150	15.4
Lobby 1	2	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Lobby 1	7	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	780	2, 4	Relamp	Yes	7	LED Lamps: A19 Lamps	High/Low Control	10	538	0.3	324	0	$60	$460	$350	1.8
Mechanical 1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.2	200	0	$37	$630	$220	11.1
Mechanical Boiler Room	1	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	780	0.0	44	0	$8	$30	$10	2.5
Mechanical Boiler Room	1	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	780	0.0	44	0	$8	$30	$10	2.5
Mechanical Boiler Room	1	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	100	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	15	780	0.1	68	0	$12	$30	$10	1.6
Mechanical Boiler Room	11	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	538	0.4	343	0	$63	$1,300	$410	14.0
Receiving Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	0.3	235	0	$43	$680	$200	11.0
Restroom - Unisex 1	1	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	45	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	7	780	0.0	30	0	$6	$30	$10	3.6
Restroom - Unisex 1	2	Linear Fluorescent - T8: 3' T8 (25W) - 2L	Wall Switch	S	48	780	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 3' Lamps	Occupancy Sensor	21	538	0.1	53	0	$10	$250	$70	18.3
Restroom - Unisex 2	1	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	45	780	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	7	780	0.0	30	0	$6	$30	$10	3.6
Restroom - Unisex 2	2	Linear Fluorescent - T8: 3' T8 (25W) - 2L	Wall Switch	S	48	780	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 3' Lamps	Occupancy Sensor	21	538	0.1	53	0	$10	$250	$70	18.3
Restroom - Unisex 3	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.3	301	0	$55	$790	$340	8.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Unisex 4	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.3	301	0	$55	$790	$340	8.1
Storage 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	780	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	538	0.1	100	0	$18	$280	$90	10.3
Storage 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	0.1	134	0	$25	$530	$150	15.4
Storage Close	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	780	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	538	0.1	118	0	$22	$330	$100	10.6
Treasury Storage (Old Museum Storage)	3	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Treasury Storage (Old Museum Storage)	2	Halogen Incandescent: (1) 65W A19 Screw-In Lamp	Wall Switch	S	65	780	2, 3	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	10	538	0.1	92	0	$17	$200	$70	7.6
Treasury Storage (Old Museum Storage)	58	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	780	2, 3	Relamp	Yes	58	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	538	2.1	1,938	0	$358	$4,250	$2,020	6.2
Treasury Warehouse (Old Heath Dept)	109	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	780	2, 3	Relamp	Yes	109	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	538	5.6	5,231	-1	$965	$15,050	$3,960	11.5
Treasury Warehouse (Old Museum)	3	Exit Signs: LED - 2 W Lamp	None		2	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Treasury Warehouse (Old Museum)	96	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	780	2, 3	Relamp	Yes	96	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	538	4.9	4,607	-1	$850	$13,240	$3,470	11.5

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions: Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	Proposed Conditions: ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	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
Fireman's Storage	AHUs	4	Condensate Pump	0.08	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
DEP Warehouse Scanning Room	DEP Warehouse Scanning Room	1	Exhaust Fan	0.33	65.0%	No	GE		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exterior Roof	1	Exhaust Fan	0.33	65.0%	No	GE		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Gen Purpose Storage	Gen Purpose Storage	2	Exhaust Fan	0.05	65.0%	No	Dayton	2C713	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler Room	Heating Hot Water Loop	2	Heating Hot Water Pump	1.50	84.0%	No	Marathon Electric	BVM145TT	W	2,745	6	No	86.5%	Yes	2	0.3	2,885	0	$539	$18,700	$1,000	32.8
DEP Storage	DEP Storage	2	Other	2.00	80.0%	No			W	150		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
DEP Warehouse (Old Health Dept)	DEP Warehouse (Old Health Dept)	1	Other	0.33	65.0%	No			W	150		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
DEP Warehouse Scanning Room	DEP Warehouse Scanning Room	1	Supply Fan	0.33	65.0%	No	GE		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler Room	Heating Hot Water Loop	1	Heating Hot Water Pump	0.75	84.0%	No	Marathon Electric	BOE56	W	2,745		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
DEP Warehouse (Old Health Dept)	AHU-1 & 2	2	Supply Fan	2.00	80.0%	No	Trane Odyssey	TWE180	W	2,745	5	No	86.5%	Yes	2	1.3	4,359	0	$814	$20,800	$1,000	24.3
Fireman's Storage	AHU-3	1	Supply Fan	2.00	80.0%	No	Trane Odyssey	TWE180	W	2,745	5	No	86.5%	Yes	1	0.6	2,179	0	$407	$10,400	$500	24.3
Treasury Warehouse (Old Heath Dept)	AHU-4 & 5	2	Supply Fan	2.00	80.0%	No	Trane Odyssey	TWE180	W	2,745	5	No	86.5%	Yes	2	1.3	4,359	0	$814	$20,800	$1,000	24.3
Treasury Warehouse (Old Museum)	AHU-6 & 7	2	Supply Fan	2.00	80.0%	No	Trane Odyssey	TWE180	W	2,745	5	No	86.5%	Yes	2	1.3	4,359	0	$814	$20,800	$1,000	24.3
Roof	York RTU	1	Supply Fan	7.50	85.0%	No	York	DM240N24	W	2,745	5	No	91.0%	Yes	1	2.4	7,580	0	$1,416	$14,100	$1,200	9.1
Roof	York RTU	1	Exhaust Fan	0.75	70.0%	No	York	DM240N24	W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	York RTU	4	Exhaust Fan	0.75	70.0%	No	York	YC240C00A2	W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Boiler	2	Combustion Air Fan	0.50	70.0%	No	Marathon Electric	BVK56T3	W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Trane RTUs	12	Supply Fan	3.00	80.0%	No	Trane	TTA180B300	W	1,600	5	No	89.5%	Yes	12	12.1	23,990	0	$4,482	$137,200	$7,200	29.0
Roof	Trane RTUs	5	Exhaust Fan	1.50	70.0%	No	Trane	TTA180B300	W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Mammouth RTU	1	Supply Fan	7.50	80.0%	No	Mammouth		W	2,745	5	No	91.0%	Yes	1	2.6	8,766	0	$1,638	$14,100	$1,200	7.9

		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	Mammouth RTU	1	Exhaust Fan	5.00	70.0%	No	Mammouth		W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
DEP Warehouse (Old Health Dept)	DEP Warehouse (Old Health Dept)	1	Supply Fan	0.25	65.0%	No	Modine		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
DEP Warehouse Scanning Room	DEP Warehouse Scanning Room	2	Supply Fan	0.33	65.0%	No	Modine		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Loading Bay	Loading Bay	1	Supply Fan	0.33	65.0%	No	Modine		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Treasury Storage (Old Museum Storage)	Treasury Storage (Old Museum Storage)	1	Supply Fan	0.25	65.0%	No	Modine		W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	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/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
Exterior Roof	Fireman's Storage AHU	1	Split-System	1.50		11.00		Trane	TTA180B300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof	DEP Warehouse (Old Health Dept) AHU	1	Split-System	1.50		11.00		Trane	TTA180B300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof	DEP Warehouse (Old Health Dept) AHU	1	Split-System	1.50		11.00		Trane	TTA180B300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Scanning Room	1	Split-System	16.00		11.00		Mammouth		B	7	Yes	1	Package Unit	16.00		14.00		1.9	1,496	0	$280	$39,200	$1,300	135.6
Exterior Roof	Loading Dock	1	Split-System	20.00	240.00	11.00	0.8 Et	York	DM240N24Q	B	7	Yes	1	Package Unit	20.00	240.00	12.50	0.82 Et	1.3	1,047	3	$229	$68,200	$1,600	290.3
Exterior Roof	Treasury Warehouse (Old Heath Dept) AHU	1	Split-System	1.50		11.00		Trane	TTA180B300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Treasury Warehouse (Old Heath Dept) AHU	1	Split-System	1.50		11.00		Trane	TTA180B300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Treasury Warehouse (Old Museum) AHU	1	Split-System	1.50		11.00		Trane	TTA180B300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Treasury Warehouse (Old Museum) AHU	1	Split-System	20.00		11.00		York	YC240C00A2	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 (kBtu/hr)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (kBtu/hr)	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	DCC Storage Warehouse	2	Non-Condensing Hot Water Boiler	1,009	Buderus	GE515/8	W		No						0.0	0	0	$0	$0	$0	0.0

Programmable Thermostat Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Affected**	ECM #	Thermostat Quantity	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (kBtu/hr)	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
Fireman's Storage	Fireman's Storage	8	1.00	1.50			0.0	59	0	$11	$380	$10	33.6
DEP Warehouse (Old Health Dept)	DEP Warehouse (Old Health Dept)	8	1.00	3.00			0.0	118	0	$22	$380	$20	16.4
Treasury Warehouse (Old Heath Dept)	Treasury Warehouse (Old Heath Dept)	8	1.00	16.00			0.0	628	0	$117	$380	$100	2.4
Scanning Room	Scanning Room	8	1.00	2.00			0.0	78	0	$15	$380	$10	25.2
Loading Dock	Loading Dock	8	1.00	3.00			0.0	118	0	$22	$380	$20	16.4
Treasury Warehouse (Old Museum)	Treasury Warehouse (Old Museum)	8	1.00	3.50			0.0	137	0	$26	$380	$20	14.0

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Affected**	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
General Purpose Storage Mechanical Room	Domestic Hot Water	9	10	1.00	0.0	765	0	$143	$130	$20	0.8

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
General Purpose Storage Mechanical Room	Restrooms & Sinks	1	Storage Tank Water Heater (≤ 50 Gal)	A.O. Smith	ECT 30 200	W		No						0.0	0	0	$0	$0	$0	0.0
DEP Storage Room O	Restrooms & Sinks	1	Storage Tank Water Heater (≤ 50 Gal)	A.O. Smith		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	10	12	Faucet Aerator (Lavatory)	2.00	0.50	0.0	1,472	0	$275	$100	$20	0.3

Plug Load Inventory

	Existing Conditions					
Location	**Quantity**	**Equipment Description**	**Energy Rate (W)**	**ENERGY STAR Qualified?**	**Manufacturer**	**Model**
Treasury Storage (Old Museum Storage)	2	Dehumidifier	480	No		
Treasury Warehouse (Old Museum)	1	Fan (Ceiling)	150	No		
Treasury Storage (Old Museum Storage)	2	Fan (Portable)	150	No		
Treasury Warehouse (Old Museum)	1	Fan (Portable)	150	No		
DEP Warehouse Records	1	Dehumidifier	10,000	No		
Corridor 3	1	Water Cooler	80	No		

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

40

ENERGY STAR® Score[1]

TREAS_Document Control Center (Carroll Street DCC)

Primary Property Type: Non-Refrigerated Warehouse
Gross Floor Area (ft²): 54,200
Built: 1950

For Year Ending: May 31, 2024
Date Generated: December 31, 2024

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
TREAS_Document Control Center (Carroll Street DCC) 77 Carroll Street Trenton, New Jersey 08609	State of New Jersey 428 East State Street Trenton, NJ 08625 (609) 940-4129	New Jersey Board of Public Utilities State Energy Services 44 South Clinton Ave Trenton, NJ 08625 6096339666 BPU.EnergyServices@bpu.nj.gov

Property ID: 28625773
LBAM: 1181
UA: 1181-77 Carroll St (DCC)
Unique Building Identifier (UBID): 87G766CR+XV8-23-13-21-12

Energy Consumption and Energy Use Intensity (EUI)

Site EUI 46.5 kBtu/ft²	**Annual Energy by Fuel**		**Annual Emissions**	
	Electric - Grid (kBtu)	925,301 (37%)	Total (Location-Based) GHG Emissions (Metric Tons CO2e/ year)	166
	Natural Gas (kBtu)	1,595,443 (63%)		
Source EUI 78.7 kBtu/ft²	**National Median Comparison**		**Green Power**	
	National Median Site EUI (kBtu/ft²)	40	Green Power – Onsite (kWh)	N/A
	National Median Source EUI (kBtu/ft²)	67.7	Green Power – Offsite (kWh)	0
	% Diff from National Median Source EUI	16%	Percent of RECs Retained	N/A

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
ASHP	*Air source heat pump. A* space conditioning system that transfers heat between a building and the air outside the building using a vapor-compression refrigeration process.
BAS	*Building Automation System*. The automatic centralized control of a building's HVAC (heating, ventilation, and air conditioning), electrical, lighting, shading, access control, security systems, and other interrelated systems. Also known as building management system (BMS) or energy management system (EMS).
Blended Rate	Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your annual bill by the total annual energy use. For example, if your bill is $15,000, and you used 85,750 kilowatt-hours, your blended rate is 17.5 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.
DCV	*Demand control ventilation.* A control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupant ventilation needs.
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.
DHW	*Domestic hot water.* Heated potable water.
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.
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 a government-backed program that helps consumers and businesses identify and purchase energy-efficient projects, homes, and buildings. The ENERGY STAR program is managed by the EPA.
EPA	*United States Environmental Protection Agency*

EUI	*Energy Use Intensity. A* measurement of energy consumption per square foot. A standard metric for comparing buildings' energy performance.
EV	*Electric vehicle. A* transportation vehicle power directly by electricity.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
GHG	*Greenhouse gas gases.* 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	*Gallons 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* (alternate to MBtu)
KBtu/hr.	*Thousand Btu per hour*
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.
MBtu	*One thousand British thermal units (alternate to kBtu)*
Measure	A single activity, or installation of a single type of equipment, which is implemented in a building system to reduce total energy consumption.
MH	*Metal halide. A* type of HID lamp.
MMBtu	*One million British thermal units*

MV	*Mercury Vapor. A* type of HID lamp.
Net Zero	Refers to an energy-efficient building or campus where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy.
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.
Plug Load	Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug.
PPA	*Power Purchase Agreement*. A long-term contract between a customer and a third party to purchase electricity.
psia	*Pounds per square inch absolute pressure*
psig	*Pounds per square inch gauge*
PV	*Photovoltaic.* Refers to an electronic device capable of converting incident light directly into electricity (direct current); also known as a solar panel.
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.
US DOE	*United States Department of Energy*
VAV	*Variable air volume.* Heating, ventilation, and air conditioning (HVAC) systems that control air flow and temperature to meet building zone needs.
VFD	*Variable frequency drive. A* controller used to vary the speed of an electric motor, also VSD, *variable speed drive.*

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.
WSHP	*Water source heat pump. A* space conditioning system that transfers heat between a building and a water source using a vapor-compression refrigeration process.