Local Government Energy Audit Report

Central Supply, Liberty Grove Restroom, Potato Cellar, and Toll Booth

April 2, 2024

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Disclaimer

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

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

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

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

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

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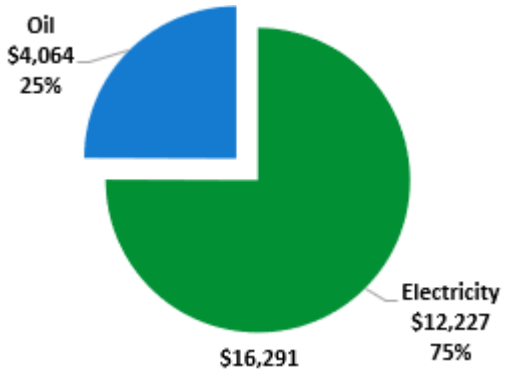
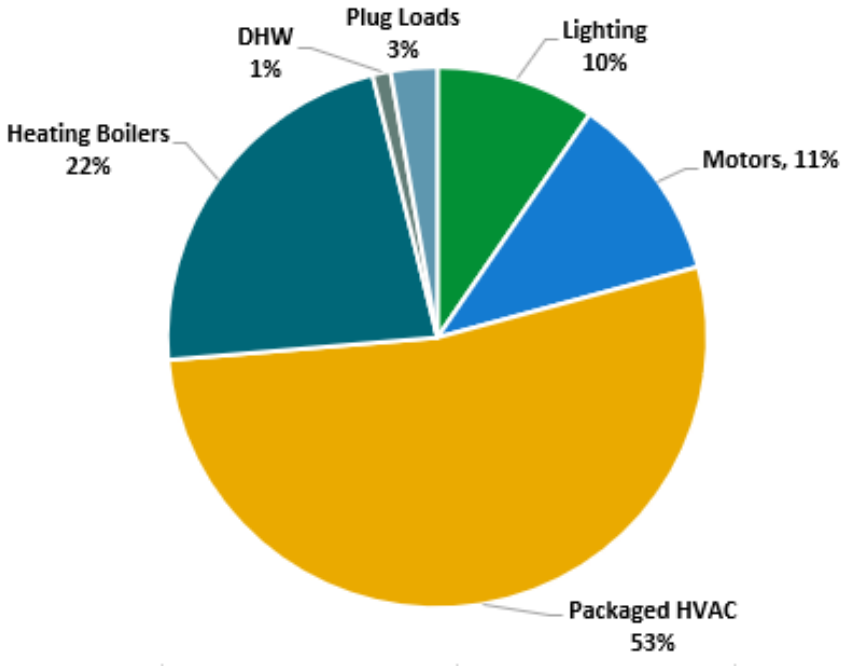
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for the Monmouth Battlefield State Park Central Supply Building, Liberty Grove Restroom, Potato Cellar, and Toll Booth. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $16,291 Electricity: 69,450 kWh No. 2 Fuel Oil: 1,173 Gallons	
ENERGY STAR® Benchmarking Score	N/A *(1-100 scale)*	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.



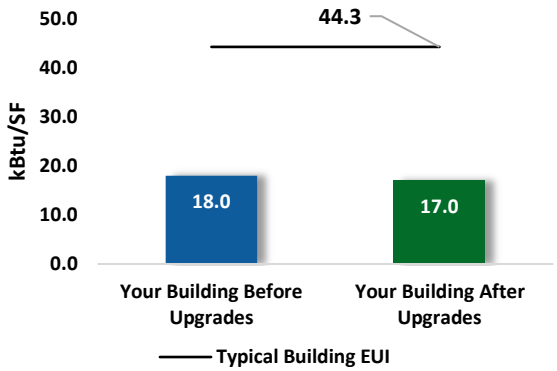
Energy Use by System

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.

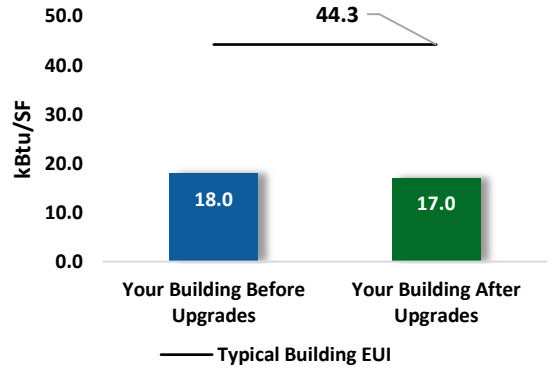
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$10,840
Potential Rebates & Incentives[1]	$1,460
Annual Cost Savings	$1,220
Annual Energy Savings	Electricity: 7,326 kWh No. 2 Fuel Oil: -20 Gallons
Greenhouse Gas Emission Savings	3 Tons
Simple Payback	7.7 Years
Site Energy Savings (All Utilities)	6%



Scenario 2: Cost Effective Package[2]

Installation Cost	$9,510
Potential Rebates & Incentives	$1,390
Annual Cost Savings	$1,197
Annual Energy Savings	Electricity: 7,192 kWh No. 2 Fuel Oil: -20 Gallons
Greenhouse Gas Emission Savings	3 Tons
Simple Payback	6.8 Years
Site Energy Savings (all utilities)	5%



On-site Generation Potential

Photovoltaic	None
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**5,907**	**4.1**	**-3**	**$976**	**$7,480**	**$1,070**	**$6,410**	**6.6**	**5,532**
ECM 1	Install LED Fixtures	Yes	293	0.0	0	$51	$780	$150	$630	12.2	295
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	3,415	2.0	-2	$562	$4,410	$670	$3,740	6.7	3,182
ECM 3	Retrofit Fixtures with LED Lamps	Yes	2,199	2.1	-1	$363	$2,290	$250	$2,040	5.6	2,055
Lighting Control Measures			**525**	**0.2**	**0**	**$86**	**$1,970**	**$330**	**$1,640**	**19.0**	**489**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	511	0.2	0	$84	$1,740	$260	$1,480	17.6	476
ECM 5	Install High/Low Lighting Controls	No	14	0.0	0	$2	$230	$70	$160	69.7	13
Unitary HVAC Measures			**120**	**0.2**	**0**	**$21**	**$1,100**	**$0**	**$1,100**	**52.1**	**121**
ECM 6	Install High Efficiency Air Conditioning Units	No	120	0.2	0	$21	$1,100	$0	$1,100	52.1	121
HVAC System Improvements			**128**	**0.0**	**0**	**$23**	**$240**	**$40**	**$200**	**8.9**	**129**
ECM 7	Install Pipe Insulation	Yes	128	0.0	0	$23	$240	$40	$200	8.9	129
Domestic Water Heating Upgrade			**646**	**0.0**	**0**	**$114**	**$50**	**$20**	**$30**	**0.3**	**651**
ECM 8	Install Low-Flow DHW Devices	Yes	646	0.0	0	$114	$50	$20	$30	0.3	651
TOTALS (COST EFFECTIVE MEASURES)			**7,192**	**4.3**	**-3**	**$1,197**	**$9,510**	**$1,390**	**$8,120**	**6.8**	**6,788**
TOTALS (ALL MEASURES)			**7,326**	**4.4**	**-3**	**$1,220**	**$10,840**	**$1,460**	**$9,380**	**7.7**	**6,922**

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

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

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 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.

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

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

Direct Install

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

Engineered Solutions

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

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

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

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

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for the Monmouth Battlefield State Park Central Supply building, Liberty Grove Restroom, Potato Cellar, and Toll Booth. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

2.1 Site Overview

On August 30, 2023, TRC performed an energy audit at the Central Supply, Liberty Grove restroom, the Potato Cellar, and the Toll Booth located in Freehold, New Jersey. TRC met with Ken Genieczko to review the facility operations and help focus our investigation on specific energy-using systems.

The four sites have been evaluated as a campus spanning 22,187 square feet.

The Central Supply site consists of two structures: the 7,738 square foot main central supply building and the 7,539 square foot storage barn. Spaces include an attic, boiler room, corridors, fire equipment rooms, garage, locker rooms, offices, storage rooms, warehouse section, and barn storage. The central supply building is 60% heated by two forced hot air furnaces and 5% cooled by two window AC units. The barn storage is not heated or cooled.

The Liberty Grove restroom is a single-story, 700 square foot building built in 1977. Spaces include the women's restroom, men's restroom, and restroom closet. The space is 100% heated by two electric resistance heaters. No cooling is present at the site.

The potato cellar is a single-story 6,000 square foot building built in 1746. Spaces include the main potato cellar which is used as storage. No heating or cooling is present.

The toll booths are two single-story, 105 square foot buildings built in 1977. Spaces include a toll booth with a restroom and toll booth without a restroom. The space is 100% heated by two electric resistance heaters. No cooling is present on site.

Recent Improvements and Facility Concerns

Facility staff have expressed interest in replacing fluorescent light fixtures throughout central supply and the larger Monmouth Battlefield State Park. Staff are concerned with the roof leaking.

At the time of the audit, the liberty grove restrooms had no power due to a meter electrical fire.

Staff are concerned with the roof condition of the tool booths.

2.2 Building Occupancy

The central supply is occupied seven days a week from 6:00 AM to 4:30 PM. Janitorial services are performed during normal business hours. The liberty grove restroom, the potato cellar, and the toll booth are occupied intermittently, as needed for maintenance and operations.

Building Name	Weekday/Weekend	Operating Schedule
Central Supply Operational Hours	Weekday	6:00 AM - 4:30 PM
	Weekend	6:00 AM - 4:30 PM
Liberty Grove Restroom Operational Hours	Weekday	12:00 AM - 12:00 AM
	Weekend	12:00 AM - 12:00 AM
Potato Cellar Operational Hours	Weekday	12:00 AM - 12:00 AM
	Weekend	12:00 AM - 12:00 AM
Toll Booth Operational Hours	Weekday	12:00 AM - 12:00 AM
	Weekend	12:00 AM - 12:00 AM

Building Occupancy Schedule

2.3 Building Envelope

The central supply building is comprised of a wood frame with concrete masonry unit (CMU), wood, and metal building walls. A vinyl siding façade covers the front face of the central supply building. The building walls are in fair to poor condition with signs of wear on all wall types. A pitched roof with a wood deck clad in asphalt shingles encloses the building. The roof condition is fair with facility staff noting leaks throughout the central supply site. Facility windows are a combination of operable and inoperable, single paned units, with wood frames. Storm windows cover some operable facility windows and the wood framed windows are in fair condition. Exterior doors consist of hollow metal doors with wood and aluminum frames. The doors range from fair to poor condition with signs of wear and frame deterioration. Metal garage doors open to the storage section of the central supply. The door to frame seals and the wood frames are in poor condition.

A barn located behind the central supply building is used as a storage area. The barn is on the same meter as the central supply and is comprised of a wood frame with wood walls. A pitched, wood deck roof, clad in shingles encloses the space. Overall, the barn walls and roof are in fair to poor condition.

Central Supply CMU

Metal Envelope

Central Supply Envelope

Central Supply Asphalt Shingle Roof

Central Supply Operable Windows w/ Storm Windows

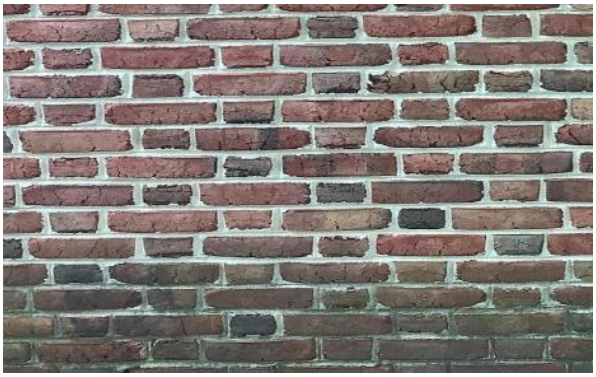
Non-Operable Windows

Central Supply Metal Facility Doors

Central Supply Garage Door

Central Supply Barn

The Liberty Grove restroom is comprised of a red brick envelope which is in good condition. A flat rubber membrane roof encloses the space and was not accessible during the audit. Facility doors are metal units with aluminum frames and are in good condition.



Liberty Grove Restrooms Envelope

Liberty Grove Restrooms Facility Doors

The potato cellar envelope is partially buried and is comprised of CMU walls which are in fair condition and show signs of cracks in the masonry. A truss construction sheet metal roof encloses the entire potato cellar. The one facility door is a wood unit and is in poor condition.

Potato Cellar Envelope

Potato Cellar Metal Roof

Potato Cellar Door

The toll booth envelope is comprised of red brick and is in fair condition. At the time of the audit the flat roof was not accessible. Facility windows are single pane and inoperable. The exterior sliding aluminum framed glass doors are in good condition. The door weather seals are in fair condition.

Tool Booth Envelope and Door

2.4 Lighting Systems

The primary lighting system for the central supply building consists mainly of incandescent and linear fluorescent sources. Lamps include 4-foot linear fluorescent T8 lamps, 4-foot linear fluorescent T12 lamps, 8-foot linear fluorescent T12 lamps, and incandescent A19 lamps. Additional lamps include compact fluorescent lamps (CFL) A19, halogen incandescent PAR38, and LED A19 lamps. Socketed and surface mounted fixtures are the most common fixture types throughout the building. Emergency exit signs are up to date with LED technology. Wall switches control the interior lights. Overall, the current lighting system for central supply is in good condition.

Exterior lighting is provided by surface mounted metal halide and CFLs. Photocells control the metal halide lamps and the CFLs are controlled by switch.

Central Supply 4-Foot Linear Fluorescent T8 Lamps

Incandescent A19 Lamps,

Central Supply Metal Halide

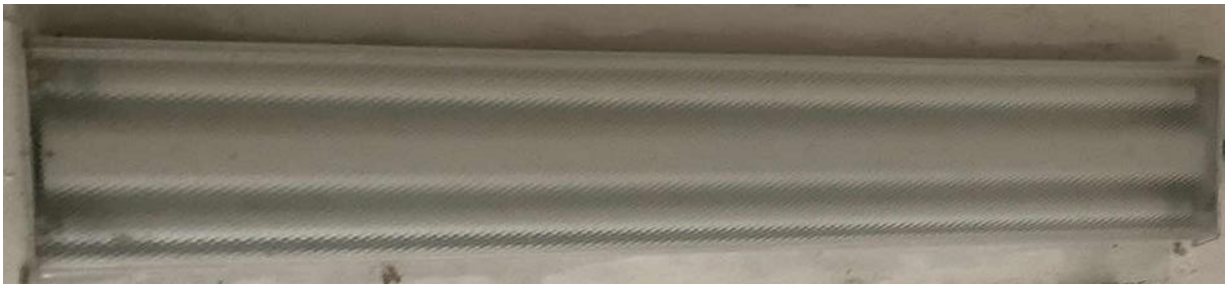
Halogen Incandescent Lamps

CFL Exterior Lights

LED Exit Sign

The primary lighting system for the Liberty Grove restroom consists of linear fluorescent sources. Fixtures include surfaced mounted 4-foot linear fluorescent T8 lamps and 4-foot linear fluorescent T12 lamps. Wall switches control the interior lights. Overall, the current lighting system for the central supply building is in good condition.

Exterior lighting is provided by halogen incandescent wall sconces. Switches control the lamps; however, they have low run times due to the park closing at night.



Liberty Grove 4-Foot Linear Fluorescent T8 Lamps

Liberty Grove Halogen Incandescent Wall Sconce

The potato cellar is illumined by pendant fixtures equipped with 8-foot linear fluorescent T12 lamps. A wall switch controls the interior lights. Overall, the current lighting system is in fair condition due to the visibly aging system (lights failing to arc properly) as well as some broken interior lights.

Potato Cellar 8-Foot Linear Fluorescent T12 Lamps

The toll booths are illuminated by socketed A19 incandescent lamps which are controlled by a wall switch. The booths are equipped with red and green, PAR38, traffic lights to direct vehicle traffic into the park. The toll booths are used approximately once a year and the lighting system is used infrequently. Overall, the current lighting system is in good condition.

Toll Booth A19 Incandescent Lamp

PAR38 Traffic Light

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

A 1.0-ton and 1.5-ton window AC unit conditions the central supply garage and maintenance supervisor office, respectively. The 1-ton unit has an energy efficiency ratio (EER) of 12 while the 1.5-ton unit has an EER of 10. The 1.5-ton unit is in poor condition and has been evaluated for replacement.

Central Supply 1.5-Ton Window AC Unit

Unitary Heating Equipment

Two No. 2 fuel oil forced air furnaces heat the central supply garage area. The units have been estimated to provide 116 MBh of heating at an annual fuel utilization efficiency (AFUE) of 0.85. The units are controlled by local thermostat and appear to be operating beyond their rated useful life.

Central Supply Forced Hot Air Furnace

Two McQuay, 51 MBh (15 kW) electric resistance heaters serve the Liberty Grove restrooms. On board thermostats control the units and they appear to be in good condition.

Liberty Grove Restrooms Electric Resistance Heater

The toll booths are heated by two electric resistance heaters with an estimated 5 MBh (1.5kW) heating capacity. At the time of the audit the heaters were not accessible.

2.6 Building General Exhaust Air Systems

Central supply and Liberty Grove restrooms are equipped with general exhaust fans. Exhaust fans serve to ventilate restrooms, and attic and garage spaces. According to facility staff the Liberty Grove restroom fans ran continuously. Fractional horsepower motors drive the exhaust fans.

Central Supply Attic

Garage Exhaust Fans

2.7 Heating Hot Water Systems

A Weil McLain, 114 MBh, non-condensing hot water boiler serves the central supply facility. The boiler provides hot water heating terminating at radiators throughout the building. The boiler runs at a nominal efficiency of 85%. The boiler includes a Beckett oil burner and a fractional horsepower "Sid Harvey's" combustion air fan. The boiler is from 1996, in good condition, and is operating beyond its rated useful life. The unit has been evaluated for replacement. Thermostats control the local space temperature and maintain an occupied temperature setpoint of 68°F and an unoccupied temperature of 60°F. Overall, the heating hot water (HHW) system is in good condition.

Central Supply Non-Condensing Hot Water Boiler

Central Supply Oil Burner

2.8 Domestic Hot Water

A GE, 20-gallon, 2 kW tank serves the central supply's domestic hot water (DHW) demand. The unit is from 2003, operating beyond its rated useful life, and is in good condition.

Central Supply DHW Tank

The Liberty Grove restroom is served by an estimated 30-gallon, 4.5 kW DHW tank. At the time of the audit the unit was out of service and inaccessible.

Liberty Grove DHW Tank

2.9 Plug Load and Vending Machines

The central supply plug loads include office and workshop equipment. Typical office plug loads include desktops, coffee machines, microwaves, and printers. There are two desktops throughout the central supply site.

There are two residential-style refrigerators located onsite. Equipment condition and efficiency vary.

Workshop equipment includes an air compressor, bench grinder, drill press, saws, and other small tools. MIG welding is utilized as needed for vehicle maintenance.

Central Supply MIG Welder

Printer Plug Loads

The toll booth plug load includes one cash register that is used once a year. No other plug loads are present at the toll booth site.

2.10 Water-Using Systems

Water is provided by Veolia, a municipal water supplier. Potable water is used for drinking, cleaning, cooking, and sanitary fixtures. No water leaks were observed/reported at the time of the audit.

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 is one restroom at the central supply site and two restrooms at the Liberty Grove restrooms with toilets and sinks. Faucet flow rates are at 2.0 gpm or lower. Toilets are rated at 2.5 gpf and urinals are rated at 2.5 gpf.

Note: Provided water billing data is campus wide, meaning individual site water consumption data is unavailable. Water consumption included in the visitor center report represents the entire Monmouth Battlefield State Park.

Central Supply Restroom

Kitchen-style Faucet

2.11 Process Equipment

A 7 hp air compressor serves the central supply garage space. The garage is equipped with shop equipment including miter saws, drill press, wheel balancer, bench grinder, and shop vac. Equipment condition and efficiency vary.

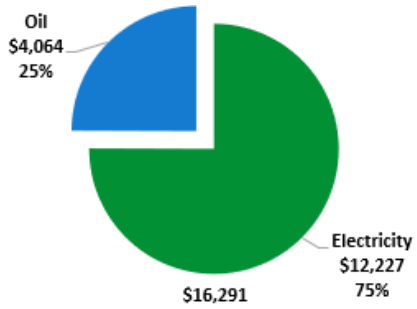
Central Supply Garage Air Compressor

Miter Saw

3 Energy Use and Costs

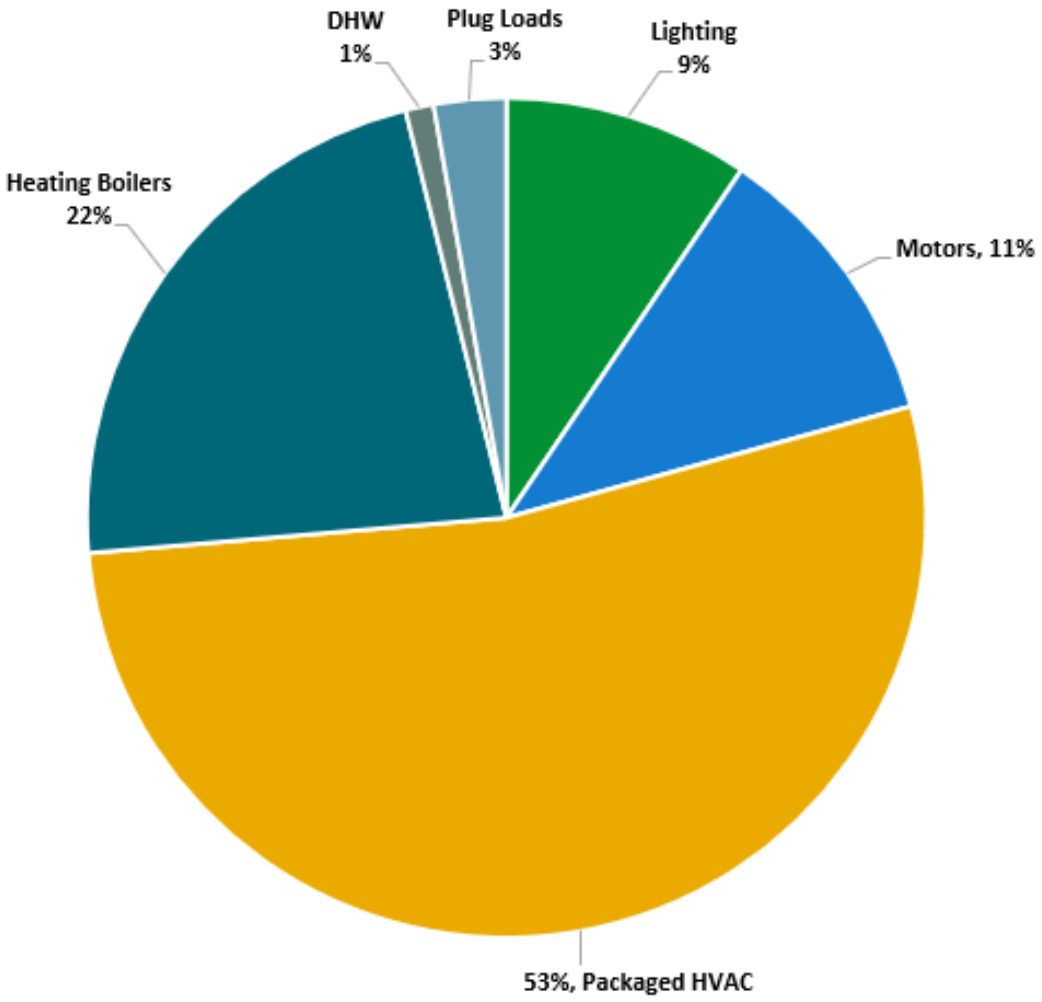
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	69,450 kWh	$12,227
No. 2 fuel oil	1,173 Gallons	$4,064
Total		**$16,291**



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.

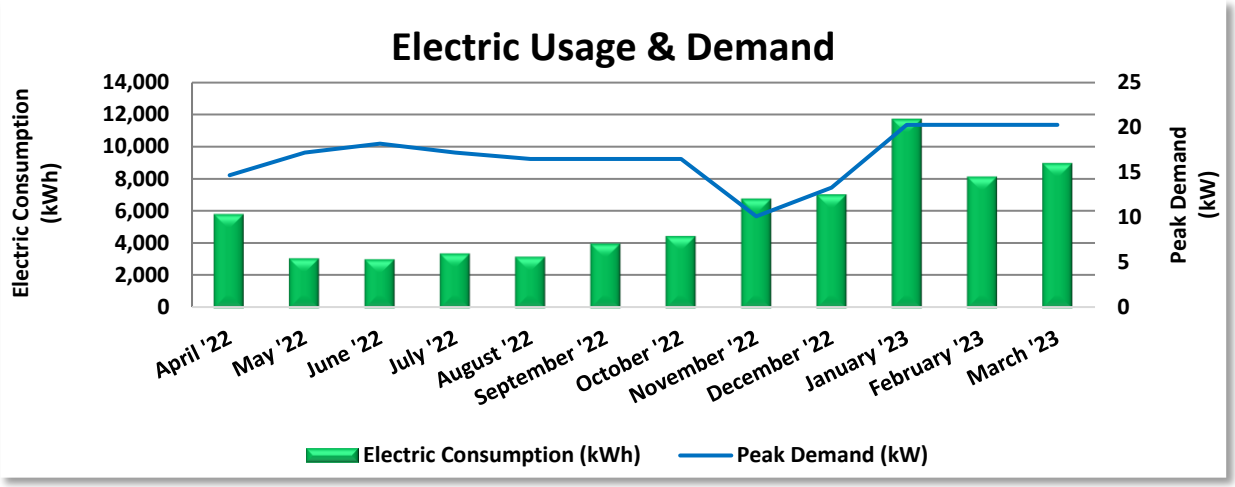
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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

3.1 Electricity

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



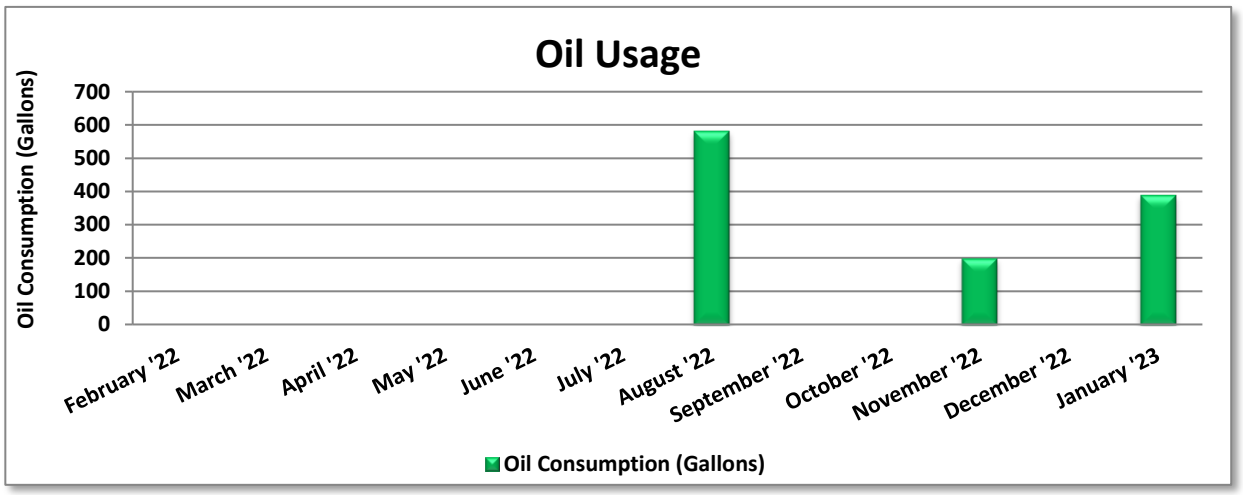
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
4/26/22	29	5,799	15	$105	$995
5/26/22	30	3,085	17	$61	$609
6/28/22	33	3,021	18	$61	$592
7/28/22	30	3,379	17	$61	$631
8/26/22	29	3,185	17	$59	$607
9/27/22	32	3,994	17	$59	$742
10/26/22	29	4,458	17	$59	$784
11/23/22	28	6,761	10	$74	$1,096
12/23/22	30	7,028	13	$97	$1,149
1/26/23	34	11,679	20	$148	$1,975
2/24/23	29	8,116	20	$148	$1,464
3/28/23	32	8,945	20	$148	$1,584
Totals	**365**	**69,450**	**20**	**$1,081**	**$12,227**
Annual	**365**	**69,450**	**20**	**$1,081**	**$12,227**

Notes:

- Peak demand of 20 kW occurred in January '23.
- Average demand over the past 12 months was 17 kW.
- The average electric cost over the past 12 months was $0.176/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 No. 2 Fuel Oil

Taylor Oil Company delivers No. 2 fuel oil to the project site.



No. 2 fuel oil Billing Data			
Period Ending	**Days in Period**	**Oil Usage (Gallons)**	**Fuel Cost**
3/1/22	28	0	$0
4/1/22	31	0	$0
5/1/22	30	0	$0
6/1/22	31	0	$0
7/1/22	30	0	$0
8/1/22	31	0	$0
9/1/22	31	582	$2,035
10/1/22	30	0	$0
11/1/22	31	0	$0
12/1/22	30	201	$688
1/1/23	31	0	$0
2/1/23	31	391	$1,341
Totals	**365**	**1,173**	**$4,064**
Annual	**365**	**1,173**	**$4,064**

Notes:

- The average No. 2 fuel oil cost for the past 12 months is $3.463/Gallon, which is the blended rate used throughout the analysis.
- Fuel deliveries do not necessarily correspond to periods of use.

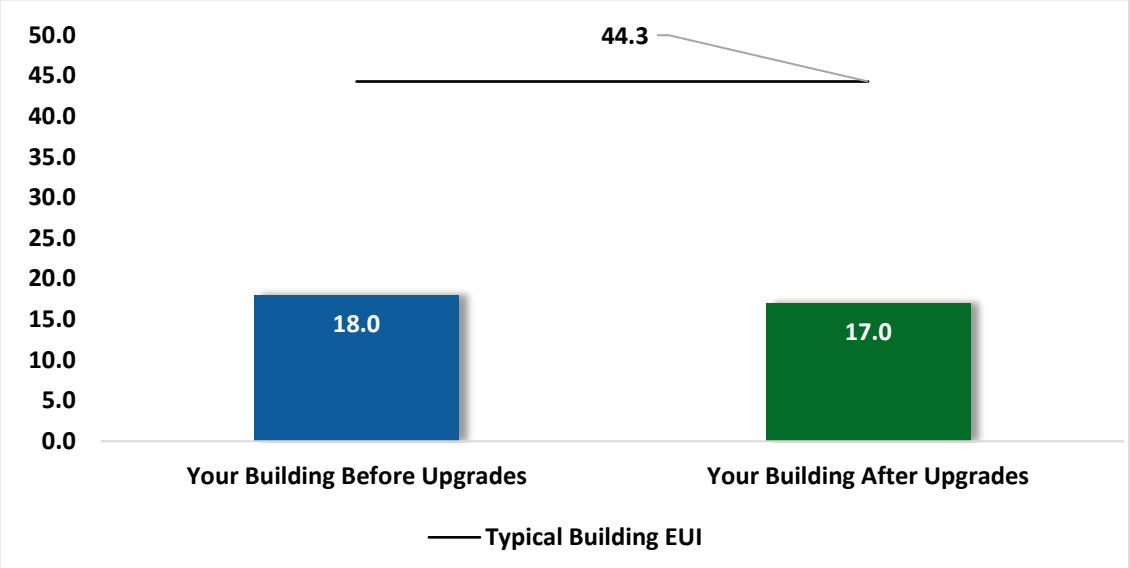
3.3 Benchmarking

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	**N/A**

Due to its unique characteristics, this building type is not able to receive a benchmarking score. This report contains suggestions about how to improve building performance and reduce energy costs.



Energy Use Intensity Comparison[4]

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**5,907**	**4.1**	**-3**	**$976**	**$7,480**	**$1,070**	**$6,410**	**6.6**	**5,532**
ECM 1	Install LED Fixtures	Yes	293	0.0	0	$51	$780	$150	$630	12.2	295
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	3,415	2.0	-2	$562	$4,410	$670	$3,740	6.7	3,182
ECM 3	Retrofit Fixtures with LED Lamps	Yes	2,199	2.1	-1	$363	$2,290	$250	$2,040	5.6	2,055
Lighting Control Measures			**525**	**0.2**	**0**	**$86**	**$1,970**	**$330**	**$1,640**	**19.0**	**489**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	511	0.2	0	$84	$1,740	$260	$1,480	17.6	476
ECM 5	Install High/Low Lighting Controls	No	14	0.0	0	$2	$230	$70	$160	69.7	13
Unitary HVAC Measures			**120**	**0.2**	**0**	**$21**	**$1,100**	**$0**	**$1,100**	**52.1**	**121**
ECM 6	Install High Efficiency Air Conditioning Units	No	120	0.2	0	$21	$1,100	$0	$1,100	52.1	121
HVAC System Improvements			**128**	**0.0**	**0**	**$23**	**$240**	**$40**	**$200**	**8.9**	**129**
ECM 7	Install Pipe Insulation	Yes	128	0.0	0	$23	$240	$40	$200	8.9	129
Domestic Water Heating Upgrade			**646**	**0.0**	**0**	**$114**	**$50**	**$20**	**$30**	**0.3**	**651**
ECM 8	Install Low-Flow DHW Devices	Yes	646	0.0	0	$114	$50	$20	$30	0.3	651
TOTALS			**7,326**	**4.4**	**-3**	**$1,220**	**$10,840**	**$1,460**	**$9,380**	**7.7**	**6,922**

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

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

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		**5,907**	**4.1**	**-3**	**$976**	**$7,480**	**$1,070**	**$6,410**	**6.6**	**5,532**
ECM 1	Install LED Fixtures	293	0.0	0	$51	$780	$150	$630	12.2	295
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	3,415	2.0	-2	$562	$4,410	$670	$3,740	6.7	3,182
ECM 3	Retrofit Fixtures with LED Lamps	2,199	2.1	-1	$363	$2,290	$250	$2,040	5.6	2,055
Lighting Control Measures		**511**	**0.2**	**0**	**$84**	**$1,740**	**$260**	**$1,480**	**17.6**	**476**
ECM 4	Install Occupancy Sensor Lighting Controls	511	0.2	0	$84	$1,740	$260	$1,480	17.6	476
HVAC System Improvements		**128**	**0.0**	**0**	**$23**	**$240**	**$40**	**$200**	**8.9**	**129**
ECM 7	Install Pipe Insulation	128	0.0	0	$23	$240	$40	$200	8.9	129
Domestic Water Heating Upgrade		**646**	**0.0**	**0**	**$114**	**$50**	**$20**	**$30**	**0.3**	**651**
ECM 8	Install Low-Flow DHW Devices	646	0.0	0	$114	$50	$20	$30	0.3	651
TOTALS		**7,192**	**4.3**	**-3**	**$1,197**	**$9,510**	**$1,390**	**$8,120**	**6.8**	**6,788**

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

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

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		**5,907**	**4.1**	**-3**	**$976**	**$7,480**	**$1,070**	**$6,410**	**6.6**	**5,532**
ECM 1	Install LED Fixtures	293	0.0	0	$51	$780	$150	$630	12.2	295
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	3,415	2.0	-2	$562	$4,410	$670	$3,740	6.7	3,182
ECM 3	Retrofit Fixtures with LED Lamps	2,199	2.1	-1	$363	$2,290	$250	$2,040	5.6	2,055

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 fixture(s).

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: central supply's exterior metal halide lamps

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected Building Areas: outlined below.

Central Supply - boiler room, garage, warehouse, warehouse attic storage, and attic fire equipment storage

Liberty Grove Restroom - restroom closet

Potato Cellar - storage room

ECM 3: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, U-bend fluorescent, CFL, halogen incandescent, 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: outlined below.

Central Supply - ammunition storage room, attic, C.C.P storage room, office corridor, supply corridor, the file room, fire equipment storage room, form room, locker room, maintenance supervisor office, office break room, office restroom, staff office, stationary closet, ticket storage, warehouse attic storage, and the open storage east barn

Liberty Grove Restroom - exterior wall sconces, men's restroom, and women's restroom.

The Toll Booth **-** both toll booths

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		**525**	**0.2**	**0**	**$86**	**$1,970**	**$330**	**$1,640**	**19.0**	**489**
ECM 4	Install Occupancy Sensor Lighting Controls	511	0.2	0	$84	$1,740	$260	$1,480	17.6	476
ECM 5	Install High/Low Lighting Controls	14	0.0	0	$2	$230	$70	$160	69.7	13

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 4: 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: outlined below.

Central Supply - attic, maintenance supervisor office, office breakroom, and staff office

Liberty Grove Restroom – men's and women's restrooms

ECM 5: 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: outlined below.

Central Supply - the supply corridor

4.3 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**120**	**0.2**	**0**	**$21**	**$1,100**	**$0**	**$1,100**	**52.1**	**121**
ECM 6	Install High Efficiency Air Conditioning Units	120	0.2	0	$21	$1,100	$0	$1,100	52.1	121

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

ECM 6: Install High Efficiency Air Conditioning Units

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

Affected Building Areas: outlined below.

Central Supply - office breakroom window AC unit

4.4 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**128**	**0.0**	**0**	**$23**	**$240**	**$40**	**$200**	**8.9**	**129**
ECM 7	Install Pipe Insulation	128	0.0	0	$23	$240	$40	$200	8.9	129

ECM 7: Install Pipe Insulation

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

Affected Building Areas: outlined below.

Central Supply - attic DHW tank pipes

4.5 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**646**	**0.0**	**0**	**$114**	**$50**	**$20**	**$30**	**0.3**	**651**
ECM 8	Install Low-Flow DHW Devices***	646	0.0	0	$114	$50	$20	$30	0.3	651

ECM 8: Install Low-Flow DHW Devices

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

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

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing.

Additional cost savings may result from reduced water usage.

4.6 Measures for Future Consideration

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

NJ DEP Monmouth Battlefield SP 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.

Upgrade to a Heat Pump System

Electric resistance heating units work by passing an electric current through wires to heat them. The system is 100% efficient since for every unit of electricity consumed, one unit of heat is produced.

But there is a way to convert electricity to create heat at better than a 1:1 ratio. Heat pumps operate on a more efficient principle, the refrigeration cycle. Instead of directly converting electricity to heat, electricity does the work, via a compressor, of moving refrigerant through a system that transfers heat from a cooler place to a warmer place. That system can move three to five as much energy as is available using electric resistance heating methods. Heat pumps work in a similar manner to an air conditioner, except they reverse the cooling process to circulate warm air instead of cold air. Also, heat pumps are generally capable of dispensing refrigerated air as they can typically be operated in air conditioning mode.

Electric resistance heat, including electric furnaces and baseboard heaters, can be inexpensive to install but often expensive to run. Facilities with these systems can save substantial energy at a moderate cost by installing a heat pump when they replace a central air conditioner.

Even in buildings without central air-conditioning, there are opportunities to save energy when an existing electric furnace needs to be replaced, as well as opportunities to install ductless electric heat pumps in buildings with baseboard electric heaters and electric fan coils. Unit ventilators with built-in electric resistance heaters can be replaced with unit ventilators with integrated heat pumps.

Electric heat pumps have high coefficient of performance (COP) ratings and are substantially more efficient than traditional electric heating systems. Further investigation is required to determine whether installing a heat pump system is a cost-effective solution when replacing existing electrical heating systems.

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.

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

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

Motor Maintenance

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

Fans to Reduce Cooling Load

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

Thermostat Schedules and Temperature Resets

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

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.

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.

Furnace Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should check for gas / carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

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.

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

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

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

Procurement Strategies

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

6 On-site Generation

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

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

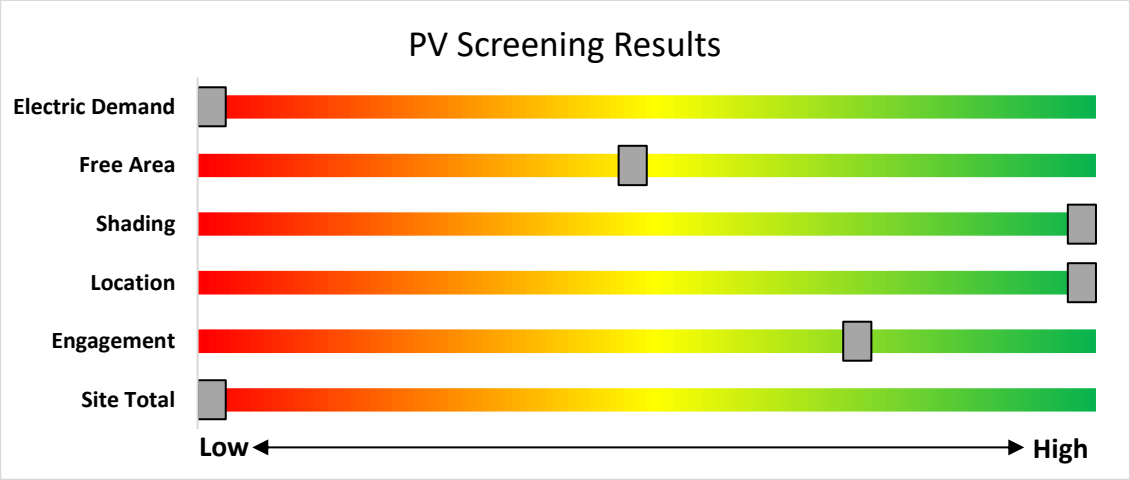
6.1 Solar Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has no potential for installing a PV array.

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

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



Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

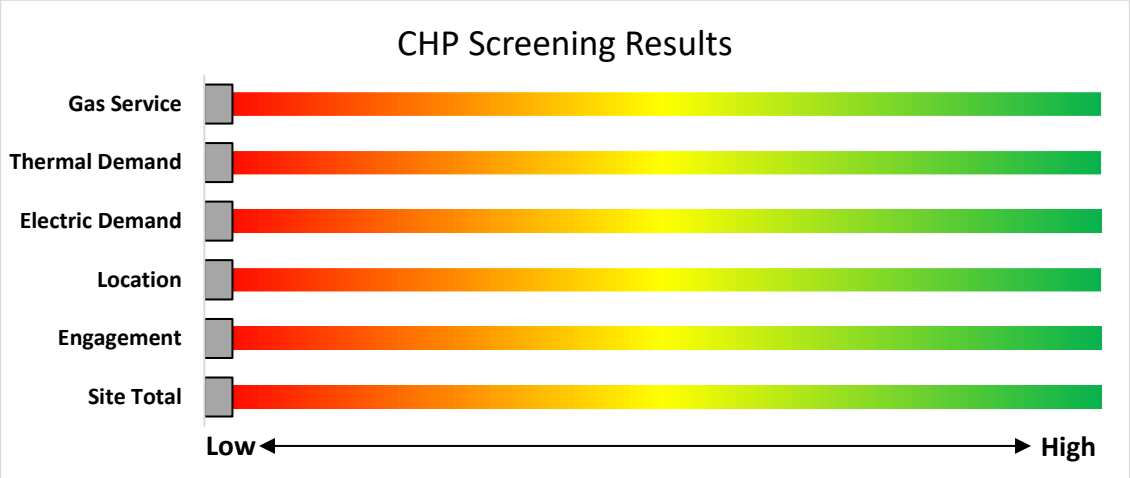
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

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

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

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

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



Combined Heat and Power Screening

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

7 Electric Vehicles (EV)

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

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

7.1 Electric Vehicle Charging

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

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

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

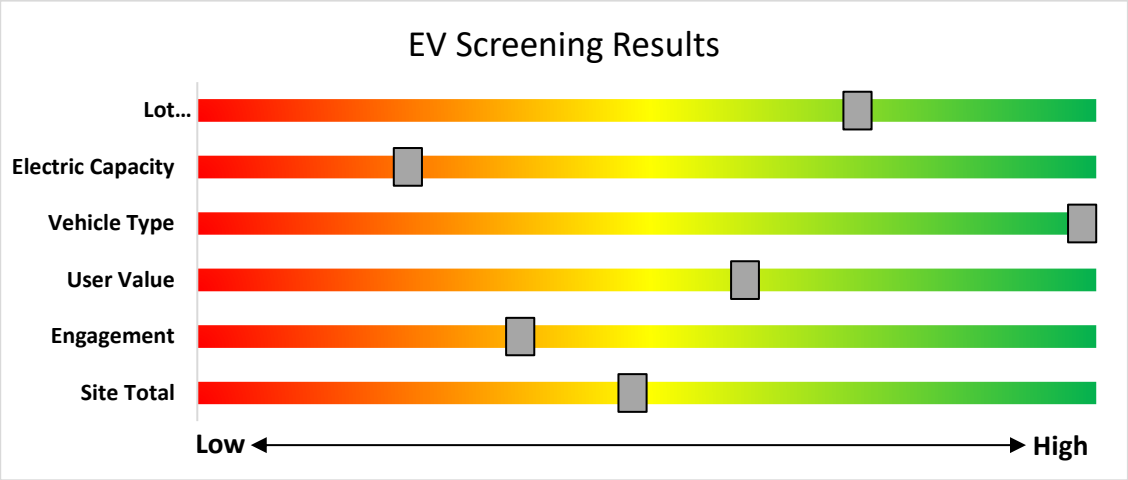
The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

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

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

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

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



EV Charger Screening

Electric Vehicle Programs Available

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

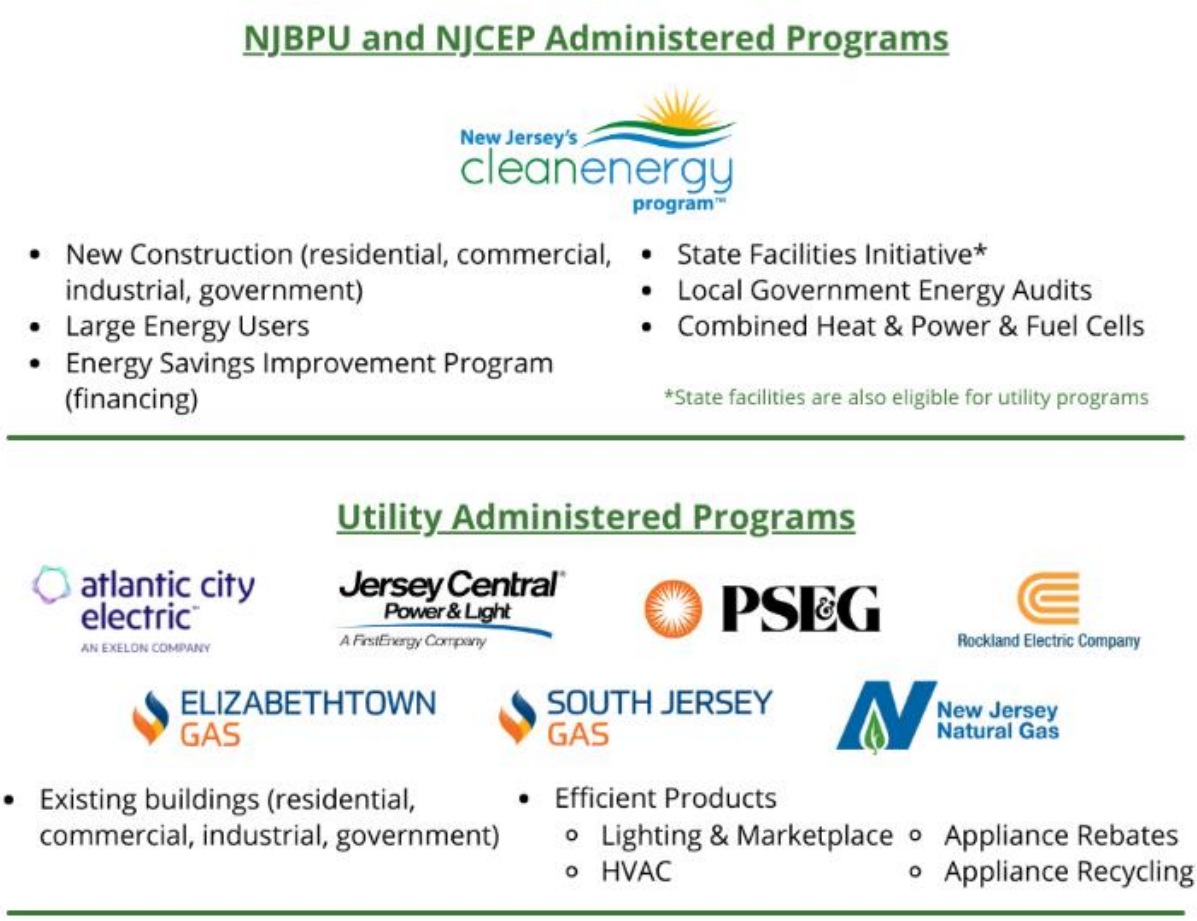
NJCEP offers a variety of EV programs for vehicles, charging stations, and fleets. Certain EV charging stations that receive electric utility service from Atlantic City Electric Company (ACE) or Public Service Electric & Gas Company (PSE&G), may be eligible for additional electric vehicle charging incentives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

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

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

8 Project Funding and Incentives

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



8.1 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 http://www.njcleanenergy.com/LEUP.

Combined Heat and Power

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

Incentives[8]

Eligible Technology	Size (Installed Rated Capacity)	Incentive ($/Watt)[5]	% of Total Cost Cap per Project	$ Cap per Project
CHPs powered by non-renewable or renewable fuel source, or a combination:[4] - Gas Internal Combustion Engine - Gas Combustion Turbine - Microturbine Fuel Cells ≥60%	≤500 kW[1]	$2.00	30-40%[2]	$2 million
	>500 kW - 1 MW[1]	$1.00		
	> 1 MW - 3 MW[1]	$0.55	30%	$3 million
	>3 MW[1]	$0.35		
Fuel Cells ≥40%	Same as above[1]	Applicable amount above	30%	$1 million
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)	≤1MW[1]	$1.00	30%	$2 million
	> 1MW[1]	$.50	30%	$3 million

[8]

[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 http://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 (5) 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://njcleanenergy.com/renewable-energy/programs/susi-program.

Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities, and other public and state entities enter 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[9]. 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[10].

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.

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

[10] http://www.pjm.com/training/training-events.aspx.

8.2 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.

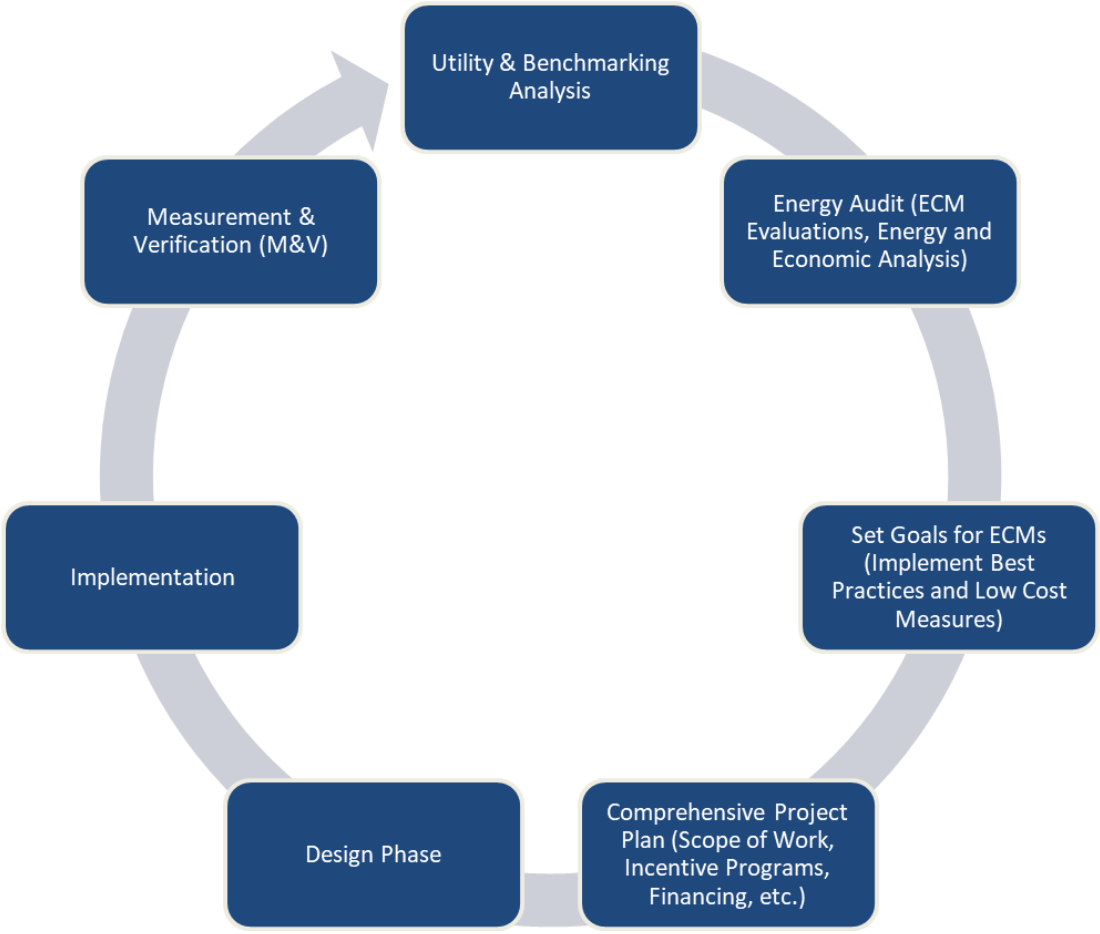
Engineered Solutions

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/transition.

9 PROJECT DEVELOPMENT

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



Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[11].

10.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[12].

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

[12] 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
Ammunition Storage - Central Supply	1	Incandescent: (1) 43W A19 Screw-In Lamp	Wall Switch	S	43	25	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	25	0.0	1	0	$0	$20	$0	147.3
Attic - Central Supply	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Attic - Central Supply	4	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	800	3, 4	Relamp	Yes	4	LED Lamps: A19 Lamps	Occupancy Sensor	10	552	0.1	170	0	$28	$350	$40	11.1
Boiler Room - Central Supply	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,000	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.0	118	0	$19	$70	$10	3.1
C.C.P Storage - Central Supply	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	25	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	25	0.0	1	0	$0	$20	$0	97.2
Corridor Office - Central Supply	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Office - Central Supply	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,500	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,500	0.0	44	0	$7	$70	$10	8.4
Corridor Supply - Central Supply	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Supply - Central Supply	2	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	100	1,500	3, 5	Relamp	Yes	2	LED Lamps: A19 Lamps	High/Low Control	15	1,035	0.1	269	0	$44	$270	$70	4.5
Exterior Surface Mount - Central Supply	3	Metal Halide: (1) 70W Lamp	Photocell		95	1,500	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	30	1,500	0.0	293	0	$51	$780	$150	12.2
File Room - Central Supply	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	300	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	300	0.0	20	0	$3	$80	$20	18.4
Fire Equipment Storage - Central Supply	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	800	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	800	0.0	40	0	$7	$20	$0	3.0
Form Room - Central Supply	5	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	80	3	Relamp	No	5	LED Lamps: A19 Lamps	Wall Switch	10	80	0.2	20	0	$3	$100	$10	27.3
Garage - Central Supply	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	11	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	1,500	2	Relamp & Reballast	No	11	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,500	0.6	1,419	-1	$234	$1,430	$220	5.2
Garage - Central Supply	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	1,500	2	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.2	354	0	$58	$280	$40	4.1
Locker Room - Central Supply	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,300	0.0	76	0	$12	$40	$10	2.4
Maintenance Supervisor Office - Central Supply	1	Compact Fluorescent: (4) 26W A19 Screw-In Lamps	Wall Switch	S	104	2,200	3, 4	Relamp	Yes	1	LED Lamps: A19 Lamps	Occupancy Sensor	90	1,518	0.0	92	0	$15	$340	$40	19.8
Maintenance Supervisor Office - Central Supply	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,200	4	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,518	0.0	14	0	$2	$120	$20	44.6
Office Break Room - Central Supply	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Office Break Room - Central Supply	13	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,000	3, 4	Relamp	Yes	13	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,380	0.2	572	0	$94	$530	$110	4.5
Office Restroom - Central Supply	1	Incandescent: (1) 43W A19 Screw-In Lamp	Wall Switch	S	43	1,000	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	1,000	0.0	33	0	$5	$20	$0	3.7
Staff Office - Central Supply	4	Compact Fluorescent: (4) 32W A19 Screw-In Lamps	Wall Switch	S	128	2,000	3, 4	Relamp	Yes	4	LED Lamps: A19 Lamps	Occupancy Sensor	90	1,380	0.2	527	0	$87	$550	$60	5.6
Stationary Closet - Central Supply	1	Incandescent: (1) 43W A19 Screw-In Lamp	Wall Switch	S	43	50	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	50	0.0	2	0	$0	$20	$0	73.7
Ticket Storage - Central Supply	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	80	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	80	0.0	4	0	$1	$20	$0	30.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Warehouse - Central Supply	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Warehouse - Central Supply	3	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	1,200	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,200	0.2	310	0	$51	$390	$60	6.5
Warehouse Attic Fire Equipment Storage - Central Supply	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	100	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	100	0.0	6	0	$1	$70	$10	61.8
Warehouse Attic Storage - Central Supply	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Warehouse Attic Storage - Central Supply	1	Halogen Incandescent: (1) 65W PAR38 Screw-In Lamp	Wall Switch	S	65	800	3	Relamp	No	1	LED Lamps: PAR38 Lamps	Wall Switch	10	800	0.0	44	0	$7	$30	$0	4.1
Warehouse Attic Storage - Central Supply	7	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	800	3	Relamp	No	7	LED Lamps: A19 Lamps	Wall Switch	10	800	0.2	280	0	$46	$140	$10	2.8
Warehouse Attic Storage - Central Supply	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	800	2	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.2	189	0	$31	$280	$40	7.7
Open Storage East Barn - Central Supply	4	Compact Fluorescent: (1) 65W Quadruple Biaxial Screw-In Lamp	Wall Switch		65	10	3	Relamp	No	4	LED Lamps: (1) 46W Screw-In Lamp	Wall Switch	46	10	0.0	1	0	$0	$80	$0	597.9
Barn Storage South Barn - Central Supply	8	Incandescent: (1) 100W A21 Screw-In Lamp	Wall Switch	S	100	10	3	Relamp	No	8	LED Lamps: A21 Lamps	Wall Switch	15	10	0.4	7	0	$1	$320	$10	277.0
Exterior Wall Sconce - Liberty Grove Restroom	2	Halogen Incandescent: (1) 50W PAR38 Screw-In Lamp	Wall Switch		50	1,000	3	Relamp	No	2	LED Lamps: PAR38 Lamps	Wall Switch	8	1,000	0.0	84	0	$15	$60	$10	3.4
Men's Restroom - Liberty Grove Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	378	0	$62	$390	$70	5.1
Restroom Closet - Liberty Grove Restroom	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	3,000	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,000	0.0	177	0	$29	$70	$10	2.1
Women's Restroom - Liberty Grove Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	200	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	138	0.1	25	0	$4	$390	$70	77.2
Storage Room - Potato Cellar	14	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	700	2	Relamp & Reballast	No	14	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	700	0.8	843	0	$139	$1,820	$280	11.1
Booth with Restroom - Toll Booth	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	50	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	50	0.0	3	0	$0	$20	$0	47.7
Booth with Restroom - Toll Booth	2	Incandescent: (1) 100W PAR38 Screw-In Lamps	Wall Switch	S	100	50	3	Relamp	No	2	LED Lamps: PAR38 Lamps	Wall Switch	15	50	0.1	9	0	$1	$120	$10	78.6
Booth without Restroom - Toll Booth	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	50	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	50	0.0	3	0	$0	$20	$0	47.7
Booth without Restroom - Toll Booth	2	Incandescent: (1) 100W PAR38 Screw-In Lamps	Wall Switch	S	100	50	3	Relamp	No	2	LED Lamps: PAR38 Lamps	Wall Switch	15	50	0.1	9	0	$1	$120	$10	78.6

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Open Storage Canopy - Central Supply	Gas Pump	1	Other	0.33	65.0%	No	Gpro	Pro 20 - 115	W	150		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Air Compressor	1	Air Compressor	7.00	91.0%	No	Baldor	36K553X232G1	W	1,700		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Central Supply	Exhaust Fan	1	Exhaust Fan	0.30	65.0%	No			W	1,300		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Exhaust Fan - Central Supply	Exhaust Fan	1	Exhaust Fan	0.30	65.0%	No			W	1,300		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Exhaust Fan	1	Exhaust Fan	0.30	65.0%	No			W	1,800		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Shop Vac	1	Other	6.50	89.0%	No	Shop Vac	QSP Contractor	W	45		No	89.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Garage Door Motor	2	Other	0.50	70.0%	No			W	5		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Vehicle Lift Motor	1	Other	2.00	89.5%	No	Emerson Motor		W	10		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Furnace Supply Fan	2	Supply Fan	1.00	85.5%	No			W	1,900		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Central Supply	HHW Boiler Combustion Fan	1	Combustion Air Fan	0.14	65.0%	No	Sid Harveys	MTROB1	W	1,900		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Miter Saw	2	Other	0.50	70.0%	No			W	10		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Drill Press	1	Other	0.75	70.0%	No	Delta	15-665	W	5		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Chainsaw Sharpener	1	Other	0.50	70.0%	No	Stihl		W	5		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Wheel Balancer	1	Other	1.50	86.5%	No	Snap On	EEWB304A	W	20		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Bench Grinder	1	Other	0.30	65.0%	No	Ryobi		W	10		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Angle Grinder	1	Other	3.00	85.5%	No			W	50		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Central Supply	Booster Pump	1	Heating Hot Water Pump	0.15	66.0%	No	B&G	LR20BF	W	1,900		No	66.0%	No		0.0	0	0	$0	$0	$0	0.0
Liberty Grove Restrooms	Exhaust Fan	2	Exhaust Fan	0.10	65.0%	No			W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Garage - Central Supply	Furnace	2	Forced Air Furnace		116.00		0.85 AFUE	Ruud		B		No							0.0	0	0	$0	$0	$0	0.0
Maintenance Supervisor Office - Central Supply	Window Air Conditioner	1	Window AC	1.00		12.00		Maytag		W		No							0.0	0	0	$0	$0	$0	0.0
Office Break Room - Central Supply	Window Air Conditioner	1	Window AC	1.50		10.00		Friedrich		B	6	Yes	1	Window AC	1.50		12.00		0.2	120	0	$21	$1,100	$0	52.1
Liberty Grove Restrooms	Electric Resistance Heat	2	Electric Resistance Heat		51.18		1 COP	McQuay	U.AHV.6.H10.K.Z .13.D.B7.BD.27. G.Y.B.1	W		No							0.0	0	0	$0	$0	$0	0.0
Toll Booths	Electric Resistance Heat	2	Electric Resistance Heat		5.10		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room - Central Supply	HHW Boiler	1	Non-Condensing Hot Water Boiler	114	Weil McLain	P 368 WT	B		No						0.0	0	0	$0	$0	$0	0.0

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
Attic - Central Supply	DHW Tank	7	20	1.00	0.0	128	0	$23	$240	$40	8.9

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
Attic - Central Supply	DHW Tank	1	Storage Tank Water Heater (≤ 50 Gal)	GE	GE20P6A	B		No						0.0	0	0	$0	$0	$0	0.0
Restroom Closet - Liberty Grove Restroom	DHW Tank	1	Storage Tank Water Heater (≤ 50 Gal)			B		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room - Central Supply	8	1	Faucet Aerator (Kitchen)	1.80	1.50	0.0	25	0	$4	$10	$0	2.3
Office Break Room - Central Supply	8	1	Faucet Aerator (Kitchen)	1.80	1.50	0.0	25	0	$4	$10	$0	2.3
Office Restroom - Central Supply	8	1	Faucet Aerator (Lavatory)	1.80	0.50	0.0	106	0	$19	$10	$0	0.5
Men's Restroom - Liberty Grove Restroom	8	2	Faucet Aerator (Lavatory)	2.00	0.50	0.0	245	0	$43	$10	$10	0.0
Women's Restroom - Liberty Grove Restroom	8	2	Faucet Aerator (Lavatory)	2.00	0.50	0.0	245	0	$43	$10	$10	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Central Supply	1	MIG Welder	10,000	No		
Central Supply	1	Coffee Machine	900	No		
Central Supply	1	Dehumidifier	500	No		
Central Supply	2	Desktop	150	No		
Central Supply	1	Microwave	1,000	No		
Central Supply	1	Paper Shredder	300	No		
Central Supply	2	Printer (Medium/Small)	300	No		
Central Supply	1	Printer/Copier (Large)	500	No		
Central Supply	2	Refrigerator (Residential)	170	No		
Central Supply	1	Toaster Oven	1,200	No		
Toll Booths	1	Cash Register	10	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.

NJCEP uses the EPA's ENERGY STAR Portfolio Manager system to generate baseline energy usage results and comparable building EUIs. Portfolio Manager is specifically designed for benchmarking energy consumption within a building. Due to the building types, NJCEP is unable to provide an ENERGY STAR Statement of Energy Performance (SEP) for the facilities and the sites have been evaluated based on the entire Monmouth Battlefield State Park campus.

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

DEP - Monmouth Battlefield State Park (MBSP Campus)

Primary Property Type: Other - Public Services
Gross Floor Area (ft²): 54,698
Built: 1800

For Year Ending: February 28, 2023
Date Generated: February 05, 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
DEP - Monmouth Battlefield State Park (MBSP Campus) 20 State Route 33 / 333 Freehold Manalapan, New Jersey 07726	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: 28034796

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
39.2 kBtu/ft²

Source EUI
79.1 kBtu/ft²

Annual Energy by Fuel	
Propane (kBtu)	602,223 (28%)
Fuel Oil (No. 2) (kBtu)	337,369 (16%)
Electric - Grid (kBtu)	1,207,164 (56%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	44.3
National Median Source EUI (kBtu/ft²)	89.3
% Diff from National Median Source EUI	-11%
Annual Emissions	
Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	172

Signature & Stamp of Verifying Professional

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

LP Signature: _____Date: _____

Licensed Professional

___ _____
,
(___)___-_____
_____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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