Local Government Energy Audit Report

Ancora Psych Hospital - Spruce, Willow, and Hemlock Halls

March 31, 2025

Prepared for:
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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.

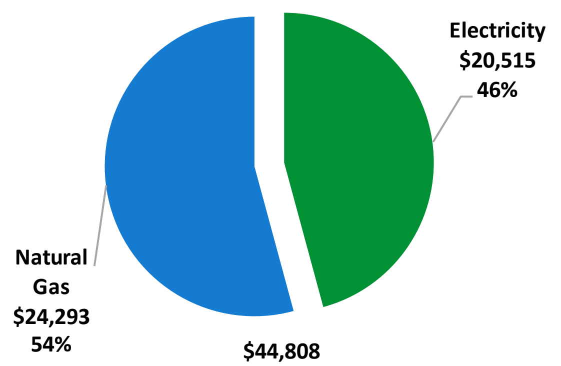
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

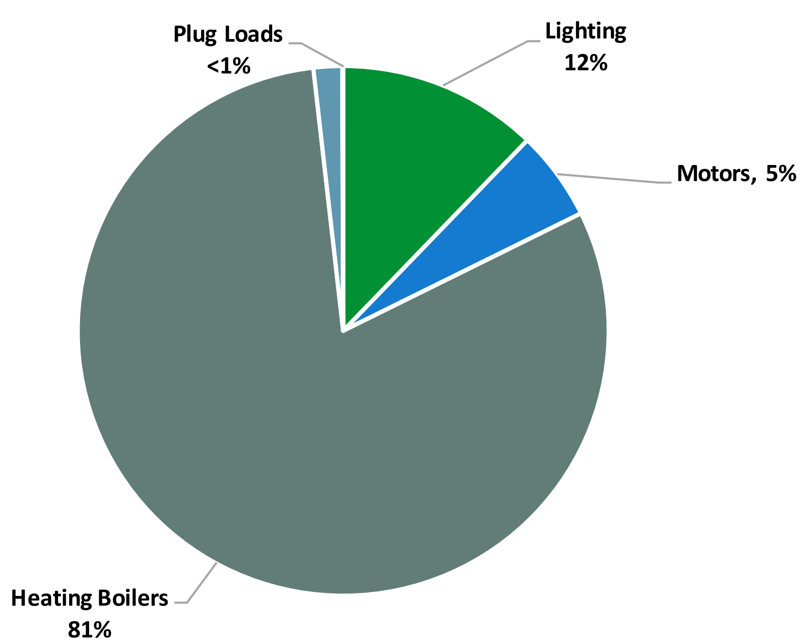
Table of Contents

1 Executive Summary

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

BUILDING PERFORMANCE REPORT

Annual Energy Utilities	Costs: $44,808 Electricity: 136,973 kWh Natural Gas: 21,706 Therms	
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.



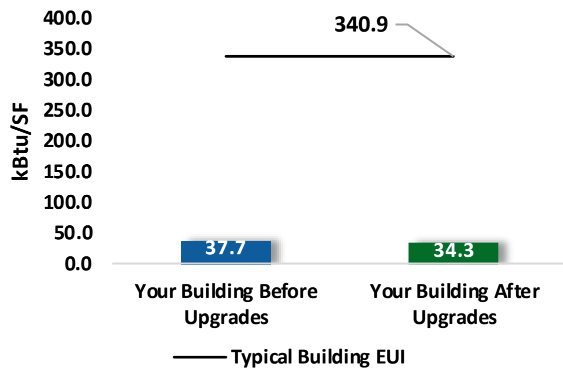
Energy Use by System

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.

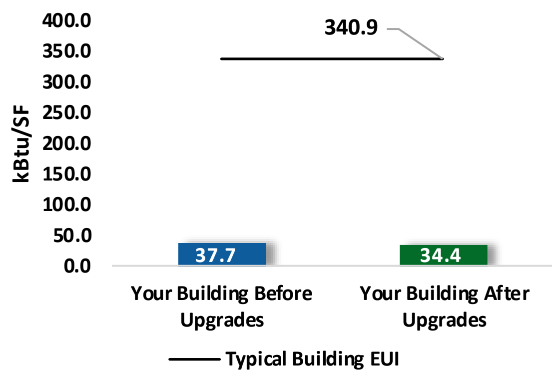
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$41,890
Potential Rebates & Incentives[1]	$9,460
Annual Cost Savings	$9,559
Annual Energy Savings	Electricity: 62,287 kWh Natural Gas: 206 Therms
Greenhouse Gas Emission Savings	33 Tons
Simple Payback	3.4 Years
Site Energy Savings (All Utilities)	9%



Scenario 2: Cost Effective Package[2]

Installation Cost	$37,840
Potential Rebates & Incentives	$8,960
Annual Cost Savings	$9,252
Annual Energy Savings	Electricity: 60,196 kWh Natural Gas: 211 Therms
Greenhouse Gas Emission Savings	32 Tons
Simple Payback	3.1 Years
Site Energy Savings (all utilities)	9%



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			**41,457**	**5.3**	**-8**	**$6,117**	**$18,970**	**$3,340**	**$15,630**	**2.6**	**40,787**
ECM 1	Install LED Fixtures	Yes	5,808	0.0	0	$870	$4,550	$850	$3,700	4.3	5,848
ECM 2	Retrofit Fixtures with LED Lamps	Yes	35,649	5.3	-8	$5,248	$14,420	$2,490	$11,930	2.3	34,938
Lighting Control Measures			**8,895**	**1.2**	**-2**	**$1,309**	**$10,240**	**$4,820**	**$5,420**	**4.1**	**8,718**
ECM 3	Install Occupancy Sensor Lighting Controls	No	2,091	0.4	0	$308	$4,050	$500	$3,550	11.5	2,049
ECM 4	Install High/Low Lighting Controls	Yes	6,804	0.8	-2	$1,002	$6,190	$4,320	$1,870	1.9	6,669
Variable Frequency Drive (VFD) Measures			**11,935**	**3.1**	**0**	**$1,788**	**$11,800**	**$1,200**	**$10,600**	**5.9**	**12,018**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	11,935	3.1	0	$1,788	$11,800	$1,200	$10,600	5.9	12,018
HVAC System Improvements			**0**	**0.0**	**29**	**$324**	**$850**	**$80**	**$770**	**2.4**	**3,388**
ECM 6	Install Pipe Insulation	Yes	0	0.0	29	$324	$850	$80	$770	2.4	3,388
Domestic Water Heating Upgrade			**0**	**0.0**	**2**	**$21**	**$30**	**$20**	**$10**	**0.5**	**222**
ECM 7	Install Low-Flow DHW Devices	Yes	0	0.0	2	$21	$30	$20	$10	0.5	222
TOTALS (COST EFFECTIVE MEASURES)			**60,196**	**9.2**	**21**	**$9,252**	**$37,840**	**$8,960**	**$28,880**	**3.1**	**63,083**
TOTALS (ALL MEASURES)			**62,287**	**9.6**	**21**	**$9,559**	**$41,890**	**$9,460**	**$32,430**	**3.4**	**65,133**

* - 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 decision to make, such as:

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

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

Direct Install

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

Engineered Solutions

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

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

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

LEUP is designed to promote self-investment in energy efficiency for the largest energy consumers in the state. Customers in this category spend about $5 million a year on energy bills. This program incentivizes owners/users of buildings to upgrade or install energy conserving measures in existing buildings to help offset the capital costs associated with the project. The efficiency upgrades are customized to meet the requirements of the customers' existing facilities, while advancing the State's energy efficiency, conservation, and greenhouse gas reduction goals.

For more details on these programs please visit [New Jersey's Clean Energy Program website](#).

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Spruce, Willow, and Hemlock Halls. 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 January 10, 2024, TRC performed an energy audit at Spruce, Willow, and Hemlock Halls located in Hammonton, New Jersey. TRC met with Kyle Irizarry to review the facility operations and help focus our investigation on specific energy-using systems. Ancora Psychiatric Hospital is a 600-bed adult inpatient facility that offers a multidisciplinary team approach to development and implementation of care. Opened in 1955, the Ancora campus consists of multiple buildings across 650 acres.

All three buildings are original to the site, constructed in 1953. Spruce Hall is a 29,449 square foot multi-story building that includes prison cells, offices, kitchen, corridors, stairwells, dining area, multipurpose room, restrooms, and mechanical space. Willow Hall is a similarly configured multi-story building covering 29,257 square feet. Hemlock Hall is a multi-story building that occupies 11,354 square feet.

All three halls have been closed for a number of years. However, the lighting in the hallways and other blocks is still operational, and the steam system is still working. Some of the storage rooms are used. Hemlock Hall was completely dark at the time of the audit, and we have assumed that interior lighting systems there are not in use. According to facility personnel, Hemlock Hall is part of a capital improvement project and is scheduled for demolition.

The facilities primarily use T8 fluorescent fixtures for lighting, and heating is mainly provided by steam from the Boiler House.

2.2 Building Occupancy

The facility is used occasionally, as needed for maintenance and operations, for limited periods during both weekdays and weekends.

Building Name	Weekday/Weekend	Operating Schedule
Ancora Psych Hospital - Spruce Hall	Weekday	Limited
	Weekend	Limited
Ancora Psych Hospital - Willow Hall	Weekday	Limited
	Weekend	Limited
Ancora Psych Hospital - Hemlock Hall	Weekday	Limited
	Weekend	Limited

Building Occupancy Schedule

2.3 Building Envelope

The building envelope sections for all three buildings is similar. The walls consist of concrete masonry units (CMUs) over structural steel with a brick veneer and a painted CMU interior finish. The flat roofs are supported by steel trusses and made of a reinforced concrete deck. Overall, the Spruce and Willow roofs are in good condition and enclose conditioned space, while the Hemlock Hall roof is in poor condition.

Most of the windows are single paned with aluminum frames. The glass-to-frame seals are in fair condition, as are the weather seals on the operable windows, which show little evidence of excessive wear.

Exterior doors are made from fiberglass reinforced polymer (FRP) composite material with aluminum frames. They are in fair condition with undamaged door seals. Degraded window and door seals increase drafts and outside air infiltration.

Building Envelope-Spruce Hall

Building Windows-Spruce Hall

Building Door-Spruce Hall

Building Door-Willow Hall

Building Envelope-Willow Hall

Building Envelope-Willow Hall

Building Door-Hemlock Hall

Building Window-Hemlock Hall

2.4 Lighting Systems

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

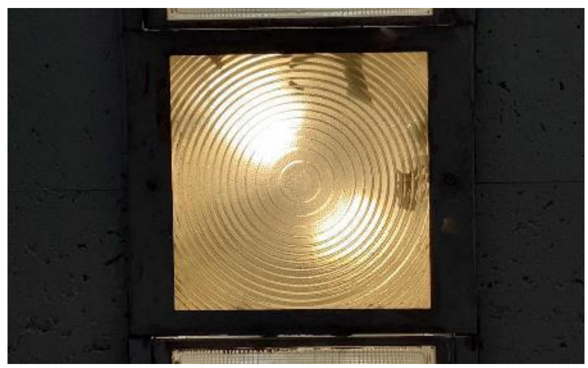
Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general-purpose lamps, mainly in the multipurpose rooms, restrooms, stairs, corridors, and classrooms in Spruce and Willow Hall.

All exit signs are LED. Most fixtures are in fair condition. Interior lighting levels were generally sufficient. Most light fixtures are controlled manually by wall switches.

Linear Fluorescent T8 Lamps-Spruce Hall

Linear Fluorescent U-Bend T8 Lamps-Spruce Hall

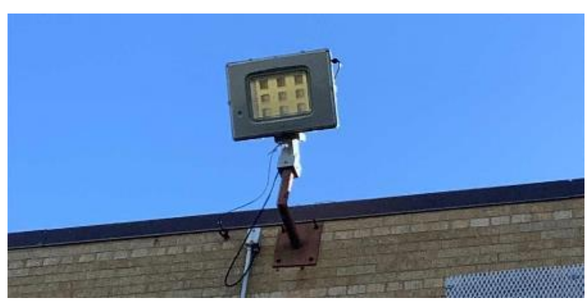
LED Lamp-Willow Hall



Incandescent Lamp-Willow Hall

Exterior fixtures include a mix of wall packs, floodlights, and canopy lights with high intensity discharge (HID), CFL, and incandescent lamps. The parking lot is illuminated by mix of pole-mounted LED and HID fixtures. Exterior light fixtures are mainly controlled by photocell; however, some fixtures were observed to be operating during daylight hours.

Exterior HID Wall Pack Fixture-Spruce Hall



Exterior LED Fixture-Spruce Hall

Exterior HID Fixture-Willow Hall

Exterior LED Fixture-Willow Hall

Exterior HID Fixture-Hemlock Hall

Pole Fixture-HID and LED Fixture (Mix)-Hemlock Hall

2.5 Air Handling Systems

Exhaust Fans

There are three exhaust fans serving the buildings: A 7.5 hp fan serves the mechanical basement area of Spruce Hall, 3 hp fan serves the mechanical area of Willow Hall, and fractional horsepower fan serves Hemlock Hall. The fan motors are standard efficiency and are in fair condition. All the exhaust fans were operating during the audit and are controlled locally.

Exhaust Fan-Spruce Hall

Exhaust Fan-Willow Hall

Exhaust Fan-Hemlock Hall

2.6 Steam Heating Systems

This building is supplied with steam produced by the boilers located at the boiler house. Steam is used directly for heating. The system was operating during the audit, and steam is continuously supplied to the buildings. Each building has condensate return pumps: Spruce Hall has two, 0.75 hp pumps; Willow Hall has two, 0.33 hp pumps; and Hemlock Hall has two, 2 hp pumps.

Most of the supply and return piping is well insulated, but some areas have uninsulated or poorly insulated pipes. We have evaluated the insulation in those areas.

Condensate Return Pump–Spruce Hall

Condensate Return Pump–Willow Hall

Heating Hot Water Tank-Hemlock Hall

Heat Exchanger-Hemlock Hall

2.7 Domestic Hot Water

This building receives steam from the boilers at the boiler house. Steam is turned into hot water using heat exchangers; one was noted in Spruce Hall and one in Hemlock Hall. Hot water is then stored in a tank and used as needed.

There are a few small circulation pumps on site to recirculate hot water, but they were not operating at the time of the audit. The domestic hot water pipes are mainly insulated, and the insulation is generally in good condition. However, some areas are either not insulated or have poor insulation. We have assessed the insulation in these areas.

Hot Water Tank–Heat Exchanger–Spruce Hall

2.8 Plug Load and Vending Machines

Few plug loads were noted during the survey as the facilities are largely abandoned. This report makes suggestions for ECMs in this area as well as energy efficient best practices.

There is one ceiling fan in the maintenance office 161, and no additional plug loads was found in all three buildings.

2.9 Water-Using Systems

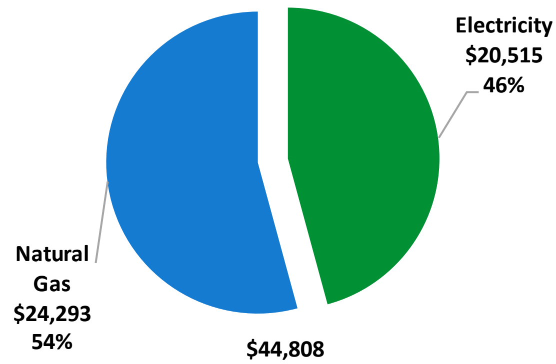
Water is provided by New Jersey American Water. There is one active onsite well that serves as a secondary water source for emergencies, firefighting, and other uses. Well water is directed to the water tower located on campus. The primary use of water is for drinking, cleaning, cooking, and sanitary fixtures. No water leaks were observed.

The EPA WaterSense® has set maximum flow rates for sanitary fixtures: 1.28 gallons per flush (gpf) for toilets, 0.5 gpf for urinals, 1.5 gallons per minute (gpm) for lavatory faucets, and 2.0 gpm for showerheads. There are a few restrooms with toilets, urinals, and sinks. Faucet flow rates are 2.2 gpm or higher.

3 Energy Use and Costs

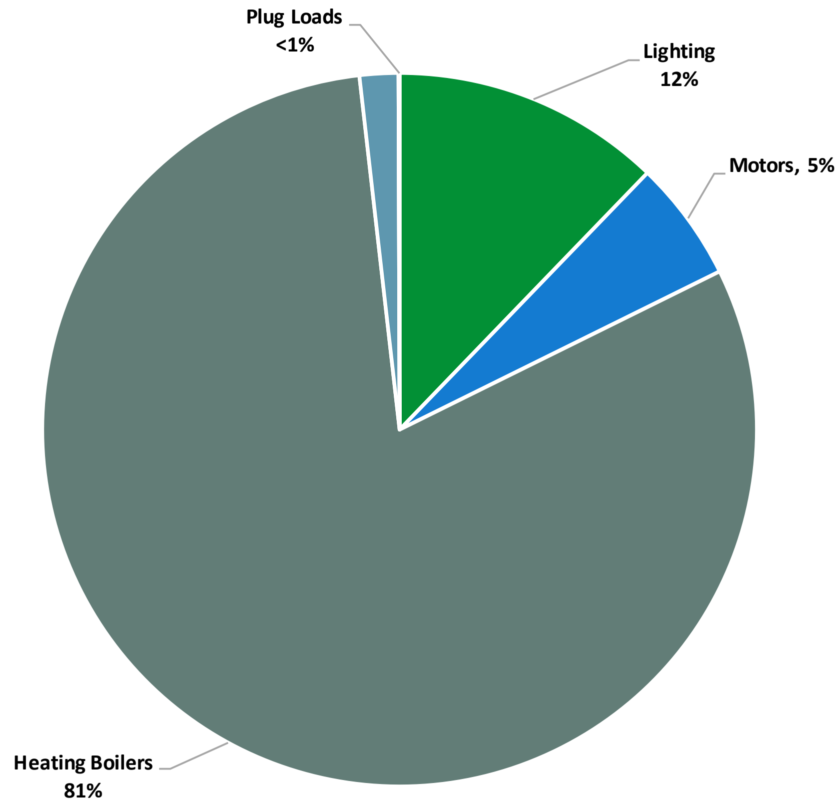
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	Usage	Cost
Electricity	136,973 kWh	$20,515
Natural Gas	21,706 Therms	$24,293
Total		$44,808



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

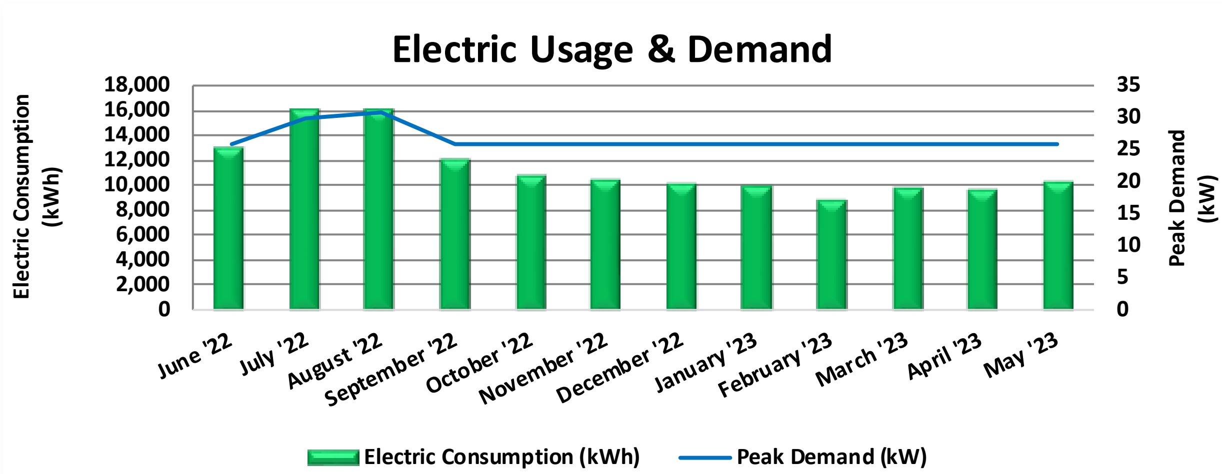
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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



Energy Balance by System

3.1 Electricity

Atlantic City Electric delivers electricity under rate class Annual General Service Secondary (GSP), with electric production provided by Constellation, a third-party supplier.



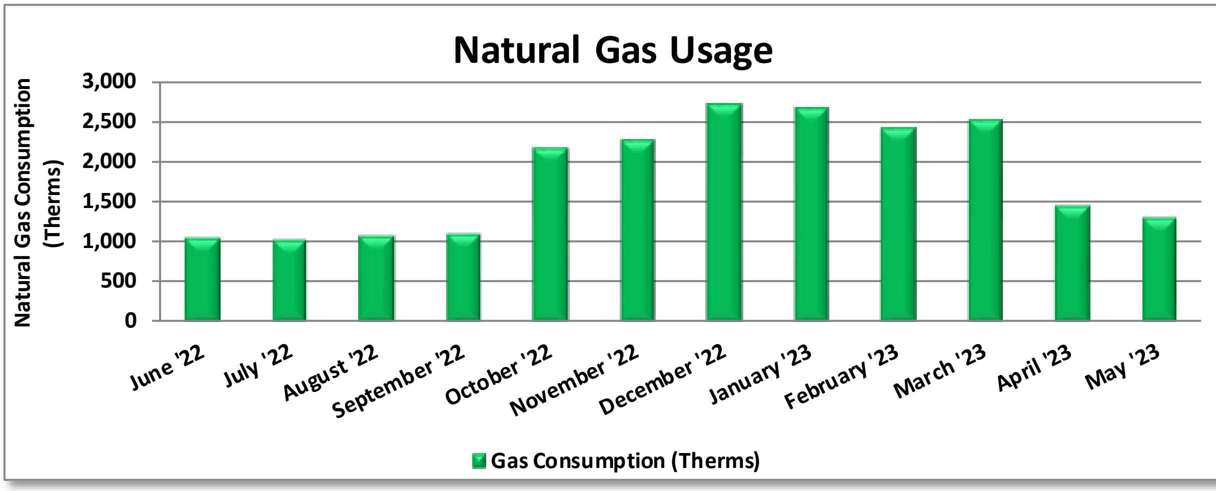
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/30/22	30	13,061	26	$269	$1,880
7/31/22	31	16,005	30	$309	$2,283
8/31/22	31	16,051	31	$326	$2,304
9/30/22	30	12,059	26	$254	$1,753
10/31/22	31	10,785	26	$261	$1,596
11/30/22	30	10,432	26	$252	$1,542
12/31/22	31	10,087	26	$261	$1,573
1/31/23	31	9,958	26	$261	$1,554
2/28/23	28	8,824	26	$235	$1,389
3/31/23	31	9,768	26	$261	$1,531
4/30/23	30	9,718	26	$252	$1,516
5/31/23	31	10,225	26	$261	$1,594
Totals	**365**	**136,973**	**31**	**$3,202**	**$20,515**
Annual	**365**	**136,973**	**31**	**$3,202**	**$20,515**

Notes:

- An estimated peak demand of 31 kW occurred in August '22.
- An estimated average demand over the past 12 months was 27 kW.
- These buildings are served from the main campus electric meter along with several others. Energy usage (kWh) and demand (kW) was apportioned among those buildings using a formula that accounts for building area (sf), usage, and the energy intensity of the equipment.
- The average electric cost over the past 12 months was $0.150/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class Comprehensive Transportation Services (SJ-CTS), with natural gas supply provided by UGI, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/30/22	30	1,045	$1,286
7/31/22	31	1,018	$1,280
8/31/22	31	1,062	$1,290
9/30/22	30	1,089	$1,309
10/31/22	31	2,163	$2,121
11/30/22	30	2,278	$2,233
12/31/22	31	2,720	$1,880
1/31/23	31	2,676	$3,148
2/28/23	28	2,404	$2,988
3/31/23	31	2,513	$3,004
4/30/23	30	1,450	$1,960
5/31/23	31	1,288	$1,794
Totals	**365**	**21,706**	**$24,293**
Annual	**365**	**21,706**	**$24,293**

Notes:

- The average gas cost for the past 12 months is $1.119/therm, which is the blended rate used throughout the analysis.
- Heating steam and domestic hot water for these buildings are from steam provided by the central plant. Central plant natural gas use has been apportioned among the buildings served with steam using a formula that accounts for building area (sf), usage, and the energy intensity of the equipment.
- These buildings do not use natural gas in direct form.

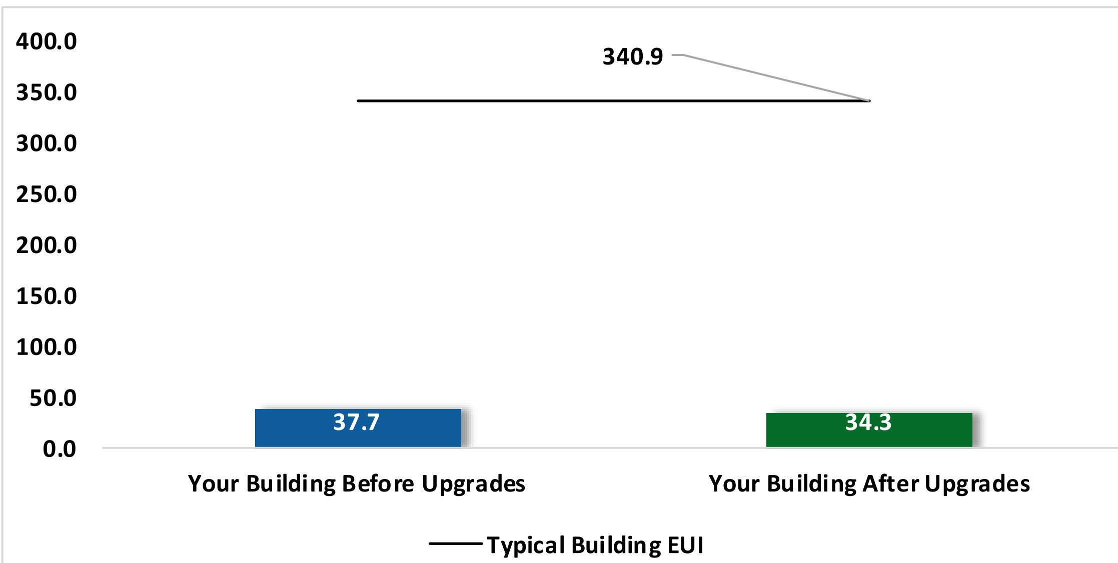
3.3 Benchmarking

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.



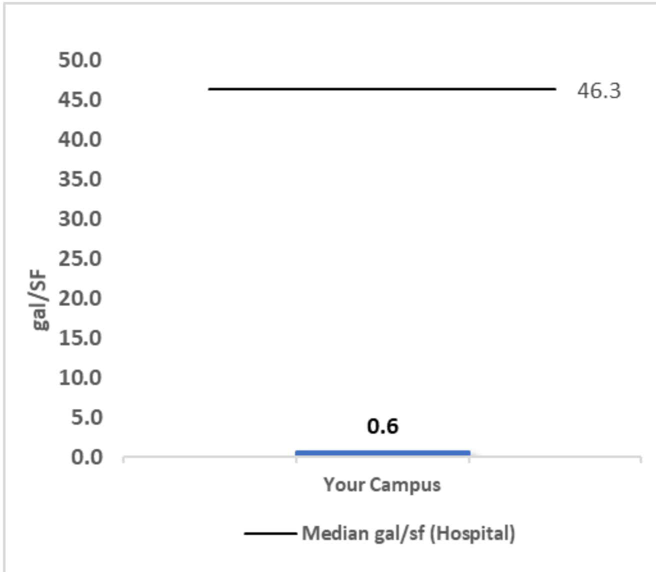
Energy Use Intensity Comparison[4]

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.

Note that the typical building EUI used in this report refers to the national median energy use intensity for a "specialty hospital" and does not correlate with the energy use intensity of a particular building. Specifically, buildings with lower occupancy periods or less equipment typically use less energy.

[4] Based on all evaluated ECMs

Campus Water Benchmarking



A benchmark is provided for your campus's water use based on the annual water use in gallons per square foot of building area (gal/sf-yr). Your building is compared to other similar buildings based on average water usage as available from the 2012 Commercial Buildings Energy Consumption Survey (CBECS) and from the EPA ENERGY STAR DataTrends Water Use Tracking database.

New Jersey American Water supplies water to the campus. This building, along with several others, shares the main campus water meter. The water bill is not divided among these buildings, so it covers the metered water usage for multiple buildings on campus. This information has been included in the report for the Main Hospital. Additional use of unmetered well water may contribute slightly to overall water consumption. Water use varies considerably depending mainly on the extent of indoor water use and whether process water is used, such as for laundry equipment. Sanitary fixtures may use varying amounts of water.

Tracking your Energy Performance

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

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

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

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

3.4 Understanding Your Utility Bills

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

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

Why Utility Bills Vary

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

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

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

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

4 Energy Conservation Measures

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

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

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

Financial incentives in this report are 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			**41,457**	**5.3**	**-8**	**$6,117**	**$18,970**	**$3,340**	**$15,630**	**2.6**	**40,787**
ECM 1	Install LED Fixtures	Yes	5,808	0.0	0	$870	$4,550	$850	$3,700	4.3	5,848
ECM 2	Retrofit Fixtures with LED Lamps	Yes	35,649	5.3	-8	$5,248	$14,420	$2,490	$11,930	2.3	34,938
Lighting Control Measures			**8,895**	**1.2**	**-2**	**$1,309**	**$10,240**	**$4,820**	**$5,420**	**4.1**	**8,718**
ECM 3	Install Occupancy Sensor Lighting Controls	No	2,091	0.4	0	$308	$4,050	$500	$3,550	11.5	2,049
ECM 4	Install High/Low Lighting Controls	Yes	6,804	0.8	-2	$1,002	$6,190	$4,320	$1,870	1.9	6,669
Variable Frequency Drive (VFD) Measures			**11,935**	**3.1**	**0**	**$1,788**	**$11,800**	**$1,200**	**$10,600**	**5.9**	**12,018**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	11,935	3.1	0	$1,788	$11,800	$1,200	$10,600	5.9	12,018
HVAC System Improvements			**0**	**0.0**	**29**	**$324**	**$850**	**$80**	**$770**	**2.4**	**3,388**
ECM 6	Install Pipe Insulation	Yes	0	0.0	29	$324	$850	$80	$770	2.4	3,388
Domestic Water Heating Upgrade			**0**	**0.0**	**2**	**$21**	**$30**	**$20**	**$10**	**0.5**	**222**
ECM 7	Install Low-Flow DHW Devices	Yes	0	0.0	2	$21	$30	$20	$10	0.5	222
TOTALS			**62,287**	**9.6**	**21**	**$9,559**	**$41,890**	**$9,460**	**$32,430**	**3.4**	**65,133**

* - 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		**41,457**	**5.3**	**-8**	**$6,117**	**$18,970**	**$3,340**	**$15,630**	**2.6**	**40,787**
ECM 1	Install LED Fixtures	5,808	0.0	0	$870	$4,550	$850	$3,700	4.3	5,848
ECM 2	Retrofit Fixtures with LED Lamps	35,649	5.3	-8	$5,248	$14,420	$2,490	$11,930	2.3	34,938
Lighting Control Measures		**6,804**	**0.8**	**-2**	**$1,002**	**$6,190**	**$4,320**	**$1,870**	**1.9**	**6,669**
ECM 4	Install High/Low Lighting Controls	6,804	0.8	-2	$1,002	$6,190	$4,320	$1,870	1.9	6,669
Variable Frequency Drive (VFD) Measures		**11,935**	**3.1**	**0**	**$1,788**	**$11,800**	**$1,200**	**$10,600**	**5.9**	**12,018**
ECM 5	Install VFDs on Constant Volume (CV) Fans	11,935	3.1	0	$1,788	$11,800	$1,200	$10,600	5.9	12,018
HVAC System Improvements		**0**	**0.0**	**29**	**$324**	**$850**	**$80**	**$770**	**2.4**	**3,388**
ECM 6	Install Pipe Insulation	0	0.0	29	$324	$850	$80	$770	2.4	3,388
Domestic Water Heating Upgrade		**0**	**0.0**	**2**	**$21**	**$30**	**$20**	**$10**	**0.5**	**222**
ECM 7	Install Low-Flow DHW Devices	0	0.0	2	$21	$30	$20	$10	0.5	222
TOTALS		**60,196**	**9.2**	**21**	**$9,252**	**$37,840**	**$8,960**	**$28,880**	**3.1**	**63,083**

* - 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		**41,457**	**5.3**	**-8**	**$6,117**	**$18,970**	**$3,340**	**$15,630**	**2.6**	**40,787**
ECM 1	Install LED Fixtures	5,808	0.0	0	$870	$4,550	$850	$3,700	4.3	5,848
ECM 2	Retrofit Fixtures with LED Lamps	35,649	5.3	-8	$5,248	$14,420	$2,490	$11,930	2.3	34,938

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

ECM 1: Install LED Fixtures

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

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

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

Affected Building Areas: exterior HID fixtures (all three buildings)

ECM 2: Retrofit Fixtures with LED Lamps

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

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

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes (Willow and Spruce Halls); incandescent lamps: classroom-Willow Hall; CFLs: shower room-Willow Hall

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		**8,895**	**1.2**	**-2**	**$1,309**	**$10,240**	**$4,820**	**$5,420**	**4.1**	**8,718**
ECM 3	Install Occupancy Sensor Lighting Controls	2,091	0.4	0	$308	$4,050	$500	$3,550	11.5	2,049
ECM 4	Install High/Low Lighting Controls	6,804	0.8	-2	$1,002	$6,190	$4,320	$1,870	1.9	6,669

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: offices, classrooms, dining area, kitchen, lounge area, maintenance shop, and shower room (Willow and Spruce Halls)

ECM 4: Install High/Low Lighting Controls

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

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

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

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

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

Affected Building Areas: hallways and stairwells (Willow and Spruce Halls)

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**11,935**	**3.1**	**0**	**$1,788**	**$11,800**	**$1,200**	**$10,600**	**5.9**	**12,018**
ECM 5	Install VFDs on Constant Volume (CV) Fans	11,935	3.1	0	$1,788	$11,800	$1,200	$10,600	5.9	12,018

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

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

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

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

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

Affected Air Handlers: exhaust fans: Spruce and Willow Halls

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		**0**	**0.0**	**29**	**$324**	**$850**	**$80**	**$770**	**2.4**	**3,388**
ECM 6	Install Pipe Insulation	0	0.0	29	$324	$850	$80	$770	2.4	3,388

ECM 6: Install Pipe Insulation

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

Affected Systems: hot water piping-Spruce Hall

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		**0**	**0.0**	**2**	**$21**	**$30**	**$20**	**$10**	**0.5**	**222**
ECM 7	Install Low-Flow DHW Devices	0	0.0	2	$21	$30	$20	$10	0.5	222

ECM 7: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand in Willow Hall. The following low-flow devices are recommended to reduce hot water usage when it is in use:

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

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

4.6 Measures for Future Consideration

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

State of NJ Department of Human Services 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.

Electric Sub Metering

Electricity use varies in different facilities, and plant operators need to perform their own investigations and analyses to understand how their facilities consume energy. Utility bills indicate how much energy a facility uses across the entire facility, but submetering provides more detailed data on the energy consumption of specific systems and even on individual pieces of equipment, depending on how extensively meters are installed. Electric submeters alone do not save energy, but they are a useful tool under the right circumstances. Electric sub-meters can provide facility staff with real-time energy use data for specific buildings and equipment, information that enhances the potential for greater energy management activities. Revenue grade submeters are a tool that allow operators to better understand how and where electricity is used at the facility. Better resolution of system energy use can lead to operational changes or even equipment modifications or replacement, which often result in reduced energy use, which often result in reduced energy use.

Replace Smooth V-Belts with Notched or Synchronous Belts

This measure is for the replacement of smooth V-belts in exhaust systems with notched V-belts or for the installation of new equipment with synchronous belts instead of smooth V-belts. Typically, there is a V-belt between the motor and the exhaust systems.

In general, there are two styles of grooved V-belts: notched and synchronous. The U.S. Department of Energy (DOE) compares these two types as follows:[5]

Characteristic	Notched V-Belts	Synchronous Belts
Description	A notched belt has grooves or notches that run perpendicular to the belt's length, which reduces the bending resistance of the belt.	They are also called cogged, timing, positive-drive, or high-torque drive belts, and are "toothed".
Pulleys/Sprockets	Can use the same pulleys as cross-section standard V-belts	Require the installation of mating grooved sprockets.
Typical Efficiency	Run cooler, last longer, and are about 2% more efficient than standard V-belts.	Operate with a consistent efficiency of 98% and maintain their efficiency over a wide load range.
Constraints	Have a sharp reduction in efficiency at high torque due to increased slippage.	Noisier than V-belts, less suited for use on shock-loaded applications, and transfer more vibration due to their stiffness.
Other Benefits	Lower cost than synchronous belts, overall.	Require minimal maintenance and re-tensioning. Operate in wet and oily environments, and run slip-free

The DOE offers the following suggested actions with respect to investigating the applicability of notched or synchronous V belts:

- Conducted a survey of belt-driven equipment. Gather application and operating-hour data. Then determine the cost effectiveness of replacing existing V-belts with notched belts or synchronous belts and sprockets.
- Consider synchronous belts for all new installations; the price premium is minimal due to the avoidance of conventional pulley costs.
- Consider having a power transmission specialist determine the energy and cost savings potential from retrofitting all V-belt drives with synchronous belts. Synchronous belts rely on tooth grip instead of friction to efficiently transfer power and provide a constant speed ratio.
- Install notched belts where the retrofit of a synchronous belt is not cost effective.

[5] https://www.nrel.gov/docs/fy13osti/56012.pdf US DOE Motor Systems Tip Sheet #5

5 Energy Efficient Best Practices

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

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

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

Energy Tracking with ENERGY STAR Portfolio Manager

You've heard it before—you cannot manage what you do not measure. ENERGY STAR Portfolio Manager is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[6]. 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.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single-pane windows and east- or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

[6] 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.

Procurement Strategies

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

6 Water Best Practices

Getting Started

The commercial and institutional sector is the second largest consumer of publicly supplied water in the United States, accounting for 17% of the withdrawals from public water supplies[7]. In New Jersey, excluding water used for power generation, approximately 80% of total water use was attributed to potable supply during the period of 2009 to 2018. Water withdrawals for potable supply have not changed noticeably during the period from 1990 to 2018[8].

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

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

For more information regarding water conservation or additional details regarding the practices shown below go to the EPA's WaterSense website[9] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[10] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water Metering and Submetering

Tracking a facility's total water use, as well as specific end uses, is a key component of a facility's water-efficiency efforts. Accurately measuring water use can help facility managers identify areas for targeted reductions and track progress from water-efficiency upgrades. If possible, install meters to measure all water conveyed to the facility, regardless of the source. Each source should be metered separately. Consider developing a metering plan and installing separate submeters to measure specific end uses. There are many types and sizes of meters intended for different uses. Installing the correct type and size of meter are critical to accurate water measurement. Sub-metering applications may include:

- Individual tenant spaces
- Cooling tower make-up and blowdown water supply
- Water lines serving other HVAC systems including water circulating loops
- Make up water supply for steam boiler plants with a capacity of 500,000 Btu/hr. or greater
- Systems or equipment that use single pass cooling water
- Irrigation systems

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

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

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

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

- Roof spray systems (for irrigating vegetated roofs or thermal conditioning)
- Ornamental water features
- Indoor and outdoor pools and spas
- Industrial water using processes

Leak Detection and Repair

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

Toilets and Urinals

Toilets and urinals are considered sanitary fixtures and are found in most facilities. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously flushing, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older inefficient fixtures with current generation WaterSense labeled equipment.

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

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

Faucets and Showerheads

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

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

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

7 On-Site Generation

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

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

7.1 Solar Photovoltaic

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

A campus wide screening based on the facility's demand, combined available spaces, and shading elements has been included in the report for Boiler House.

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

7.2 Combined Heat and Power

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

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

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

A preliminary screening based on heating and electrical demand, siting, and interconnection has been included in the report for the Boiler House.

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

8 Electric Vehicles

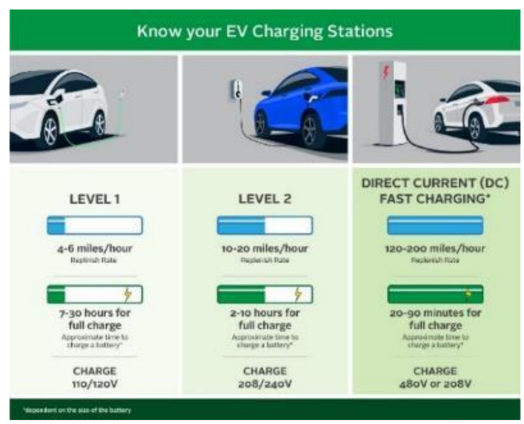
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

8.1 EV 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.

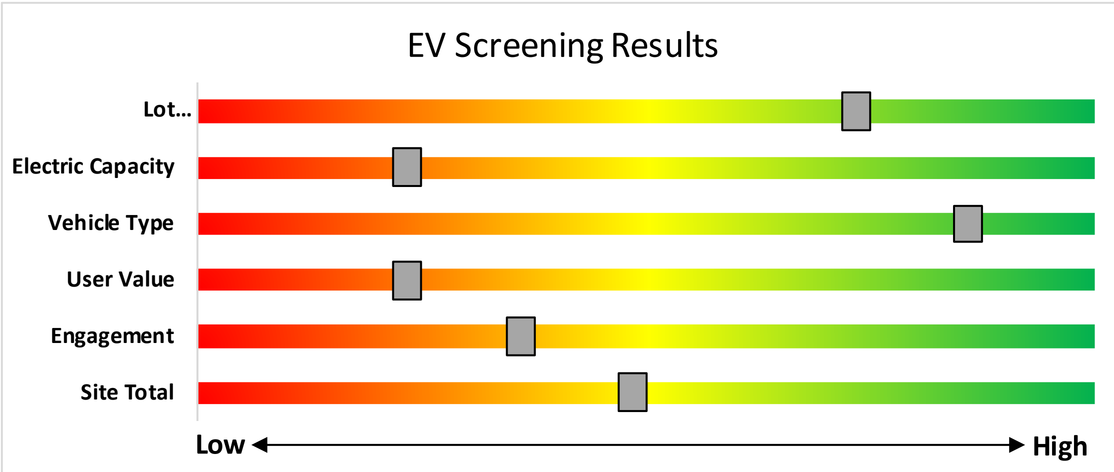
The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

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 208V - 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. Adding EV charging may have a negative financial impact due to increased electric demand charges.

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



EV Charger Screening

Electric Vehicle Programs Available

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

EV Charging incentive information is available from Atlantic City Electric, PSE&G and JCP&L. For more information and to keep up to date on all EV programs please visit https://www.njcleanenergy.com/commercial-industrial/programs/electric-vehicle-programs

9 Project Funding and Incentives

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

NJBPU and NJCEP Administered Programs

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

*State facilities are also eligible for utility programs

Utility Administered Programs

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

9.1 New Jersey's Clean Energy Program

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

Large Energy Users

The Large Energy Users Program (LEUP) is designed to foster self-directed investment in energy projects. This program is offered to New Jersey's largest energy customers. To qualify entities must have incurred at least $5 million in total energy costs in the prior fiscal year.

Incentives

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

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

How to Participate

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

Detailed program descriptions, instructions for applying, and applications can be found at 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[11]

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	≤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
Fuel Cells ≥60%	>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

11

[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[12]. 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[13].

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.

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

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

9.2 Utility Energy Efficiency Programs

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

Prescriptive and Custom

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

Equipment Examples

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

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

Direct Install

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

Incentives

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

How to Participate

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

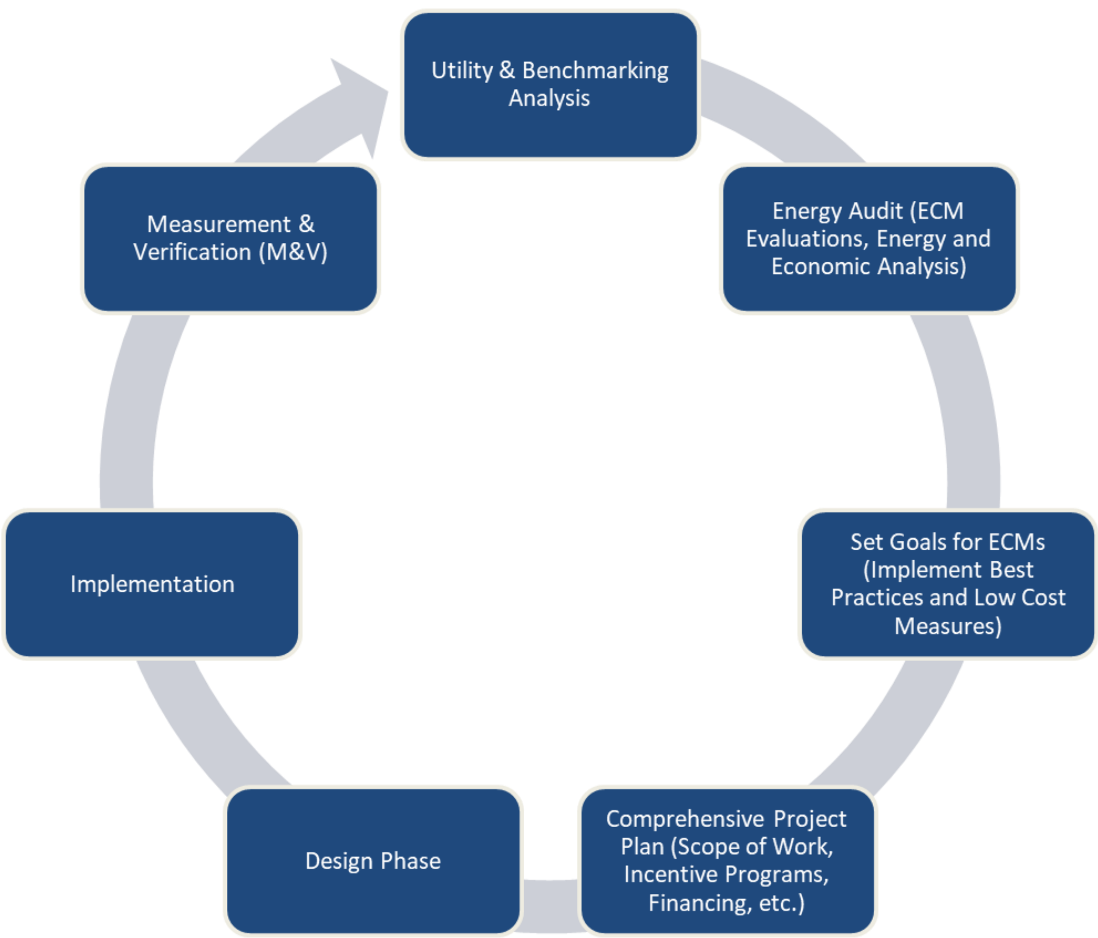
Engineered Solutions

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

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

10 Project Development

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



Project Development Cycle

11 Energy Purchasing and Procurement Strategies

11.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[14].

11.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[15].

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

[15] 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
Cell - 1st Floor #1 - Spruce Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Corridor 1st Floor - Spruce Hall	7	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1st Floor - Spruce Hall	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,019	0.2	1,712	0	$252	$910	$320	2.3
Corridor 1st Floor - Spruce Hall	21	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	21	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	4,019	0.5	4,798	-1	$706	$2,710	$950	2.5
Dining Area 1st - Spruce Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,120	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,153	0.2	923	0	$136	$680	$120	4.1
Kitchen 1st - Spruce Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,120	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,153	0.2	923	0	$136	$680	$120	4.1
Multipurpose - Day Room 1st Floor - Spruce Hall	2	LED Lamps: (2) 12W A19 Screw-In Lamps	Wall Switch	S	24	3,120	3	None	Yes	2	LED Lamps: (2) 12W A19 Screw-In Lamps	Occupancy Sensor	24	2,153	0.0	46	0	$7	$0	$0	0.0
Multipurpose - Day Room 1st Floor - Spruce Hall	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.2	786	0	$116	$630	$100	4.6
Office - Security 1st - Spruce Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,153	0.2	734	0	$108	$860	$100	7.0
Restroom - Staff 1st - Spruce Hall	1	LED Lamps: (2) 12W A19 Screw-In Lamps	Wall Switch	S	24	3,120		None	No	1	LED Lamps: (2) 12W A19 Screw-In Lamps	Wall Switch	24	3,120	0.0	0	0	$0	$0	$0	0.0
Stairs - Spruce Hall	4	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch		12	8,736	4	None	Yes	4	LED Lamps: (1) 12W A19 Screw-In Lamp	High/Low Control	12	6,028	0.0	130	0	$19	$280	$140	7.3
Corridor 2nd Floor - Spruce Hall	7	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2nd Floor - Spruce Hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,019	0.2	1,956	0	$288	$960	$360	2.1
Corridor 2nd Floor - Spruce Hall	22	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	22	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	4,019	0.6	5,026	-1	$740	$2,800	$990	2.4
Office - Nurses Station - Spruce Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	524	0	$77	$530	$80	5.8
Corridor - Basement - Spruce Hall	4	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	S	12	5,824	4	None	Yes	4	LED Lamps: (1) 12W A19 Screw-In Lamp	High/Low Control	12	4,019	0.0	87	0	$13	$0	$0	0.0
Corridor - Basement - Spruce Hall	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,019	0.3	2,935	-1	$432	$1,170	$540	1.5
Mechanical - Basement - Spruce Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	393	0	$58	$480	$70	7.1
Mechanical - Basement Exhaust - Spruce Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,120	0.0	103	0	$15	$50	$10	2.6
Exterior - Spruce Hall	4	High-Pressure Sodium: (1) 70W Lamp	Photocell		95	4,380	1	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	21	4,380	0.0	1,296	0	$194	$1,060	$200	4.4
Exterior - Spruce Hall	20	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		100	4,380		None	No	20	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	100	4,380	0.0	0	0	$0	$0	$0	0.0
Cell - 102 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	0	3,640	0.0	226	0	$33	$0	$0	0.0
Cell - 103 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 104 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 105 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3

	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
Cell - 106 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 107 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 108 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 109 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 110 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 111 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 112 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 113 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 114 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 116 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 117 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 118 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 119 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 120 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 121 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 122 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 123 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 135 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 136 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 137 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 138 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 139 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 140 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 141 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 142 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3

	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
Cell - 144 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 145 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 146 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 147 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 148 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 149 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 150 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 151 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 152 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 153 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 163 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 164 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 165 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 166 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 167 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 168 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 169 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 171 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 172 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 173 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 174 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 175 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 176 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 177 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 178 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3

	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
Cell - 179 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Cell - 180 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.0	120	0	$18	$50	$10	2.3
Classroom 1st Floor - Willow Hall	2	Incandescent: (1) 75W A19 Screw-In Lamp	Wall Switch	S	75	3,120	2, 3	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	12	2,153	0.1	416	0	$61	$200	$20	2.9
Classroom 1st Floor - Willow Hall	1	LED Lamps: (2) 12W A19 Screw-In Lamps	Wall Switch	S	24	3,120	3	None	Yes	1	LED Lamps: (2) 12W A19 Screw-In Lamps	Occupancy Sensor	24	2,153	0.0	23	0	$3	$0	$0	0.0
Classroom 1st Floor - Willow Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	524	0	$77	$530	$80	5.8
Corridor 1st - Willow Hall	11	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	11	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1st - Willow Hall	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	40	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,019	1.1	9,782	-2	$1,440	$3,990	$1,800	1.5
Janitorial 1st Floor - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,120	0.0	103	0	$15	$50	$10	2.6
Lounge - 133 - Willow Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	262	0	$39	$250	$40	5.4
Lounge - TV Room 1st Floor - Willow Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,120	2, 3	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,153	0.1	274	0	$40	$430	$60	9.2
Maintenance Shop - Willow Hall	5	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	3,120	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	2,153	0.2	941	0	$139	$900	$140	5.5
Office - 161 Maintenance - Willow Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	262	0	$39	$250	$40	5.4
Restroom - 124 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,120	0.0	103	0	$15	$50	$10	2.6
Restroom - 134 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,120	0.0	103	0	$15	$50	$10	2.6
Restroom - 162 - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,120	0.0	103	0	$15	$50	$10	2.6
Restroom - Staff 1st Floor - Willow Hall	1	LED Lamps: (2) 12W A19 Screw-In Lamps	Wall Switch	S	24	3,120		None	No	1	LED Lamps: (2) 12W A19 Screw-In Lamps	Wall Switch	24	3,120	0.0	0	0	$0	$0	$0	0.0
Shower Room 1st Floor - Willow Hall	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	3,120	2	Relamp	No	1	LED Lamps: LED Lamp	Wall Switch	19	3,120	0.0	22	0	$3	$30	$0	9.3
Shower Room 1st Floor - Willow Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	393	0	$58	$300	$50	4.3
Stairs - Willow Hall	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs - Willow Hall	3	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch		12	8,736	4	None	Yes	3	LED Lamps: (1) 12W A19 Screw-In Lamp	High/Low Control	12	6,028	0.0	97	0	$14	$280	$110	11.8
Stairs - Willow Hall	1	LED - Fixtures: Wall Pack	Wall Switch		20	3,120	4	None	Yes	1	LED - Fixtures: Wall Pack	High/Low Control	20	2,153	0.0	19	0	$3	$0	$0	0.0
Storage - Maintenance 125 - Willow Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	79	0	$12	$100	$20	6.9
Storage - Supply - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	40	0	$6	$50	$10	6.9
Dining Area 2nd - Willow Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,120	0.0	103	0	$15	$50	$10	2.6
Kitchen 2nd Floor - Willow Hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.2	1,048	0	$154	$730	$120	4.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor - Basement - Willow Hall	4	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	S	12	5,824	4	None	Yes	4	LED Lamps: (1) 12W A19 Screw-In Lamp	High/Low Control	12	4,019	0.0	87	0	$13	$0	$0	0.0
Corridor - Basement - Willow Hall	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,824	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,019	0.2	1,467	0	$216	$580	$270	1.4
Mechanical - Basement - Willow Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,120	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,153	0.1	262	0	$39	$250	$40	5.4
Exterior - Willow Hall	10	LED - Fixtures: Wall Pack	Photocell		100	4,380		None	No	10	LED - Fixtures: Wall Pack	Photocell	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior - Willow Hall	10	Metal Halide: (1) 70W Lamp	Photocell		95	4,380	1	Fixture Replacement	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	21	4,380	0.0	3,241	0	$485	$2,650	$500	4.4
Exterior - Hemlock Hall	2	LED Lamps: (1) 50W Corn Bulb Screw-In Lamp	Photocell		50	4,380		None	No	2	LED Lamps: (1) 50W Corn Bulb Screw-In Lamp	Photocell	50	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior - Hemlock Hall	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		100	4,380		None	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior - Hemlock Hall	1	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	45	4,380	0.0	635	0	$95	$400	$100	3.2
Exterior - Hemlock Hall	1	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.0	635	0	$95	$440	$50	4.1

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical - Basement - Spruce Hall	Condensate Pump	2	Condensate Pump	0.75	75.0%	No			W	2,745		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement Exhaust - Spruce Hall	Exhaust Fan	1	Exhaust Fan	7.50	91.0%	No	Dayton	36VF41	W	3,900	5	No	91.0%	Yes	1	2.2	8,991	0	$1,347	$6,700	$1,000	4.2
Mechanical - Basement - Spruce Hall	Sump Pump	1	Other	0.50	73.0%	No	Dayton	5URJ4	W	1,000		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Elevator - Spruce Hall	Elevator	1	Other	25.00	90.0%	No	MCE	HMC-1000	B	250		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Willow Hall	Condensate Pump	2	Condensate Pump	0.33	70.0%	No	Marathon		W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Willow Hall	Exhaust Fan	1	Exhaust Fan	3.00	90.0%	No	Baldor	37E31Y02	W	3,157	5	No	90.0%	Yes	1	0.9	2,944	0	$441	$5,100	$200	11.1
Mechanical - Basement - Willow Hall	Sump Pump	2	Other	0.50	73.0%	No			W	1,000		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Hemlock Hall	Condensate Pump	2	Condensate Pump	2.00	80.0%	No	Baldor		W	2,745		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Hemlock Hall	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	3,157		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Hemlock Hall	Sump Pump	1	Other	0.50	73.0%	No			W	1,000		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Spruce Hall	DHW Reciculation Pump	2	DHW Circulation Pump	0.01	65.0%	No			W	0		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Basement - Hemlock Hall	DHW Reciculation Pump	1	DHW Circulation Pump	0.01	65.0%	No			W	0		No	65.0%	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
Central Power Plant	Spruce, Willow and Hemlock Hall	1	Forced Draft Steam Boiler	1,736	Proxy Boiler		W		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
Mechanical - Basement - Spruce Hall	DHW Storage Tank	6	20	1.50	0.0	0	17	$192	$490	$40	2.3
Mechanical - Basement - Spruce Hall	DHW Storage Tank	6	20	1.00	0.0	0	12	$132	$360	$40	2.4

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
Central Power Plant	DHW Through Heat Exchanger	1	Boiler	Proxy Boiler		W		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
Restrooms- Willow Hall	7	4	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	2	$21	$30	$20	0.5

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Office - 161 Maintenance	1	Fan (Ceiling)	150	No		

Appendix B: ENERGY STAR Statement of Energy Performance

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

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ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

DHS - Ancora Psychiatric Hospital (APH Campus)

Primary Property Type: Other - Specialty Hospital
Gross Floor Area (ft²): 833,680
Built: 1953

For Year Ending: April 30, 2023
Date Generated: August 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
DHS - Ancora Psychiatric Hospital (APH Campus) 301 Spring Garden Road Hammonton, New Jersey 08037	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 (609) 633-9666 BPU.EnergyServices@bpu.nj.gov

Property ID: 29865004
Unique Building Identifier (UBID): 87F7M4MQ+39R-448-488-439-512

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
212.3 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	154,445,594 (87%)
Electric - Grid (kBtu)	22,538,831 (13%)

Source EUI
270.2 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	340.9
National Median Source EUI (kBtu/ft²)	433.9
% Diff from National Median Source EUI	-38%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	10,229

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.