Local Government Energy Audit Report

Sterling Village

August 10, 2023

Prepared for:
Piscataway Township
1 Sterling Dr
Piscataway Township, New Jersey 08854

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

Disclaimer

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

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

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

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

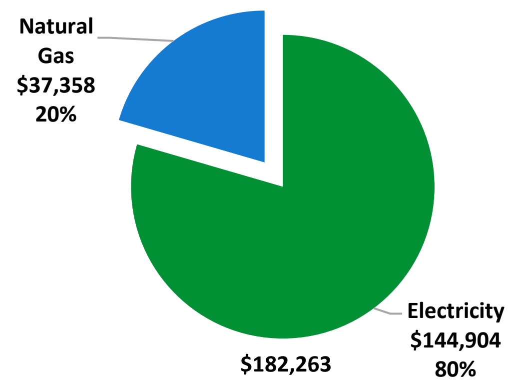
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $182,263 Electricity: 940,043 kWh Natural Gas: 46,777 Therms	
ENERGY STAR® Benchmarking Score	49 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

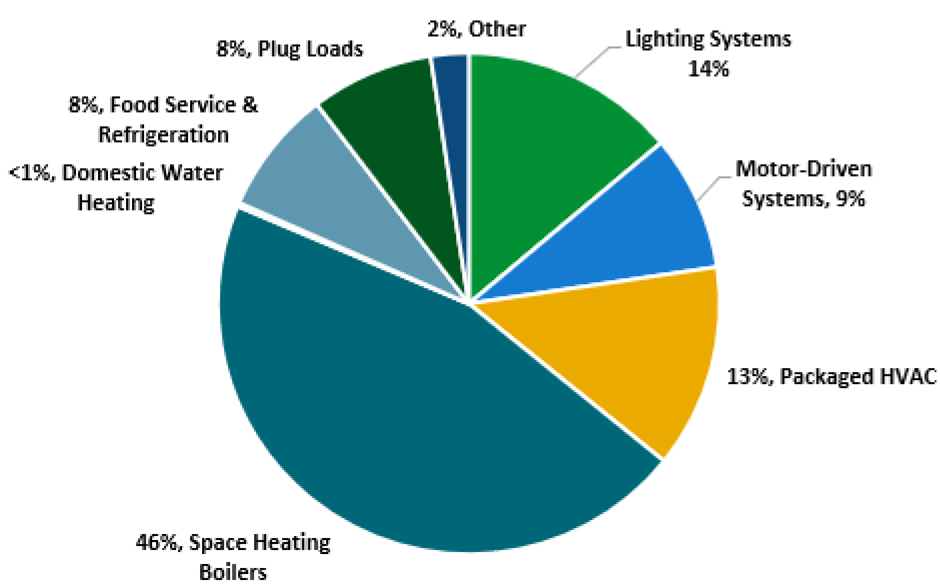


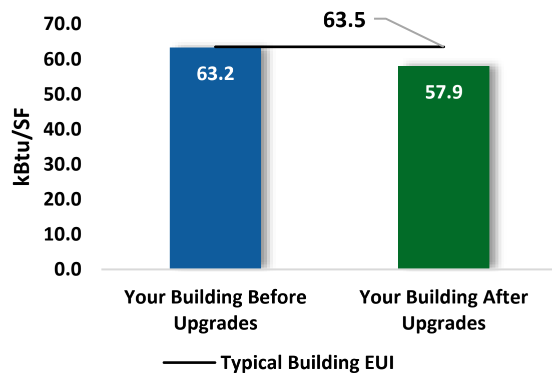
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$89,252
Potential Rebates & Incentives[1]	$27,080
Annual Cost Savings	$27,156
Annual Energy Savings	Electricity: 172,617 kWh Natural Gas: 686 Therms
Greenhouse Gas Emission Savings	91 Tons
Simple Payback	2.3 Years
Site Energy Savings (All Utilities)	8%



Scenario 2: Cost Effective Package[2]

Installation Cost	$89,252
Potential Rebates & Incentives	$27,080
Annual Cost Savings	$27,156
Annual Energy Savings	Electricity: 172,617 kWh Natural Gas: 686 Therms
Greenhouse Gas Emission Savings	91 Tons
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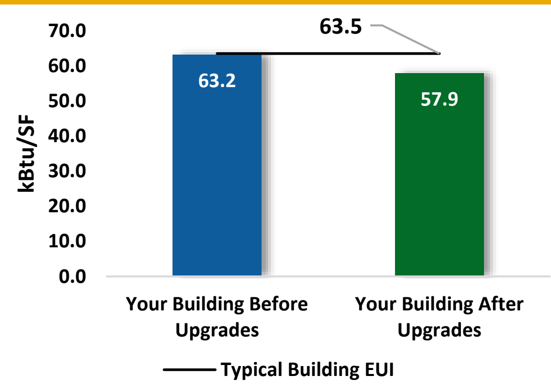
Site Energy Savings (all utilities)	8%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**136,295**	**22.1**	**-29**	**$20,778**	**$39,528**	**$4,470**	**$35,058**	**1.7**	**133,858**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	78,574	14.7	-17	$11,978	$27,340	$2,655	$24,685	2.1	77,164
ECM 2	Retrofit Fixtures with LED Lamps	Yes	57,721	7.4	-12	$8,800	$12,189	$1,815	$10,374	1.2	56,693
Lighting Control Measures			**19,448**	**2.0**	**-4**	**$2,965**	**$22,244**	**$17,510**	**$4,734**	**1.6**	**19,099**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	2,232	0.4	0	$340	$2,894	$395	$2,499	7.3	2,192
ECM 4	Install High/Low Lighting Controls	Yes	17,216	1.6	-4	$2,624	$19,350	$17,115	$2,235	0.9	16,907
Variable Frequency Drive (VFD) Measures			**16,874**	**1.6**	**0**	**$2,601**	**$11,890**	**$2,000**	**$9,890**	**3.8**	**16,992**
ECM 5	Install VFDs on Heating Water Pumps	Yes	16,874	1.6	0	$2,601	$11,890	$2,000	$9,890	3.8	16,992
Domestic Water Heating Upgrade			**0**	**0.0**	**102**	**$812**	**$15,589**	**$3,100**	**$12,489**	**15.4**	**11,902**
ECM 6	Install Low-Flow DHW Devices	Yes	0	0.0	102	$812	$15,589	$3,100	$12,489	15.4	11,902
TOTALS (COST EFFECTIVE MEASURES)			**172,617**	**25.7**	**69**	**$27,156**	**$89,252**	**$27,080**	**$62,172**	**2.3**	**181,850**
TOTALS (ALL MEASURES)			**172,617**	**25.7**	**69**	**$27,156**	**$89,252**	**$27,080**	**$62,172**	**2.3**	**181,850**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

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

Direct Install

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

Engineered Solutions

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

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

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

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

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Sterling Village. 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 April 4, 2023, TRC performed an energy audit at Sterling Village located in Piscataway Township, New Jersey. TRC met with Dan Vandewiele and Joe Fonseca to review the facility operations and help focus our investigation on specific energy-using systems.

Sterling Village is a five-story, 124,735 square foot building built in 1990. Spaces include an office, corridors, restrooms, apartments, laundry room, garbage disposal rooms, utility rooms, and electrical and mechanical spaces. The facility is 80% cooled by window AC units installed in the apartments. Some common areas are conditioned with a 5-ton single package unit capable of cooling and heating located on exterior grounds. A boiler system consisting of eight boiler modules and the single package unit are responsible for heating the residential areas.

Aerial View of Facility

Recent improvements and Facility Concerns

There have been no recent improvements at Sterling Village. The facility staff are concerned with replacing older fluorescent lighting systems with LED technology.

2.2 Building Occupancy

Sterling Village is occupied continuously with maintenance hours occurring during the day. An office located on the first floor is open from 8:00 AM to 4:00 PM.

Note: The energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary depending on changes to building use patterns.

Building Name	Weekday/Weekend	Operating Schedule
Sterling Village Hours	Weekday	12:00 AM – 12:00 AM
	Weekend	12:00 AM – 12:00 AM
Sterling Village Office Hours	Weekday	8:00 AM – 4:00 PM
	Weekend	N/A

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Sterling Village is made of multiple individual buildings which have been connected by corridors to form a singular complex. Sterling Village buildings are comprised of concrete masonry units (CMUs) with an exterior red brick façade on the first floor and vinyl siding on floors two through five. Two different roof types are present at Sterling Village. Residential buildings have pitched roofs with asphalt shingles while a white membrane EPDM roof covers the hallways that connect the different building sections together. The white EPDM roof was not accessible during the audit.

The building envelope and pitched roof are in good condition. Facility windows consist of operable, double-paned glass windows with aluminum frames. All windows are in good condition and are well sealed. Exterior doors consist of a mix of solid metal and aluminum framed glass units; both types are in good condition.

Sterling Village includes a total of 150 apartments which vary in size and accommodation needs, shown in the table below. TRC audited each apartment type and extrapolated the data to account for all the apartments. Accuracy was verified by comparing the utility history of the site to the extrapolated data.

Apartment Type	Apartment Quantity
1 Bedroom	103
1 Bedroom ADA	3
Studio	5
Studio ADA	2
2 Bedroom	5
Corner Bedroom	32


Exterior Walls

Asphalt Shingle Roof

Facility Windows

Glass Door

Solid Metal Doors

2.4 Lighting Systems

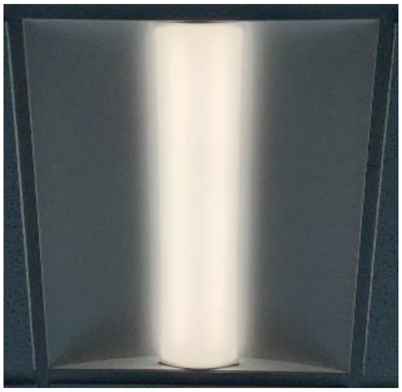
Sterling Village's primary lighting system consists mainly of fluorescent lighting. Common indoor lighting includes 3-foot T12 linear fluorescent lamps, U-bend T12 fluorescent lamps, 4-foot T8 linear fluorescent and U-bend T8 lamps. T12 lamps typically use magnetic ballasts while T8 lamps use solid state ballasts. Other lighting sources include A19 LED bulbs, halogen incandescent, and compact fluorescent biaxial plug-in lamps (CFL).

All emergency exit signs are up to date with LED technology. Common fixtures include, socket, wall mounted sconces, can, and retrofit drop ceiling fixtures with one, two, three, or four lamps per fixture.

All interior lighting is controlled by manual wall switches. During the audit, all corridor and stairwell lighting were observed to be running continuously. Additionally, numerous corridor lights were close to failing and or had failed. Retrofitting inefficient fixtures and installing automatic lighting controls such as occupancy sensors and high-low control sensors will help reduce lighting energy consumption. Overall, the current lighting system is in fair condition with adequate light levels.

Exterior lighting includes pole mounted LED lights, LED recessed can lights, and CFL wall pack lighting. Fixtures are in good condition and a timeclock controls all exterior lighting.

Wall Mounted Sconce



Ambient 2x2 LED Fixture

Exit Sign

Wall Switch

3-Foot T12 Linear Fluorescent Tube

Exterior Pole Mounted LED

CFL Wall Pack

LED Recessed Can

Timeclock

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators (UVs) throughout Sterling Village are equipped with supply fan motors and are controlled by local thermostats. The UVs are connected to the hot water distribution system to provide heating to various spaces. UVs also modulate ventilation. The units are in good condition.

Unit Ventilator

Unitary Electric HVAC Equipment

Window AC units provide most of the cooling at Sterling Village. Each apartment typically contains at least one window unit. Multiple window AC units can be installed in the larger apartments. Units have an estimated capacity of 0.8 tons of cooling and an energy efficiency ratio (EER) of 10.7. The units are in good condition and are not Energy Star labeled.

Window AC Units

Apartment Type	Apartment Quantity	Typical Window AC Quantity Per Apartment	Estimated Total AC Unit Quantity
1 Bedroom	103	2	206
1 Bedroom ADA	3	2	6
Studio	5	1	5
Studio ADA	2	1	2
2 Bedroom	5	3	15
Corner Bedroom	32	2	64

Window AC Unit Quantity (Estimated)

Packaged Units

One ground mounted exterior package unit supplements the cooling and heating for some Sterling Village common areas. The unit has 5-ton cooling capacity and a Seasonal Energy Efficiency Ratio (SEER) of 14. The gas-fired burner has a heating capacity of 120 MBh. The 1 hp supply fan and 0.3 hp exhaust fan operate at constant speed. The unit is in good condition and is operating within its useful life.

Refer to Appendix A for detailed information about each unit.

Single Package Unit

Name Plate

2.6 Building General Exhaust Air Systems

Apartment bathrooms at Sterling Village each include a single heat-light-exhaust fan unit.

Depending on how they are switched, fans can serve to ventilate the bathroom or can provide electric resistance heating. The fans are in good condition. The electric resistance heater component has relatively low usage and has been accounted for under Section 2.10, Plug Load.

Bathroom Heated Exhaust Fan with Light

2.7 Heating Hot Water Systems

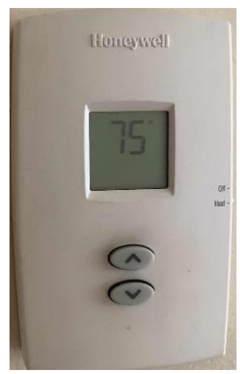
Eight Slant Fin modular hot water boilers with a total capacity of 2,432 MBh serve the building's heating demand. The boilers are configured to modulate the load and have a heating efficiency rating of 81%. The units are in good condition and the pipes are insulated.

Two, 7.5 horsepower heating hot water (HHW) pumps located in the boiler room distribute hot water to fan coil units and baseboard radiators which are controlled by local thermostats. These motors operate at constant speed and are not controlled by variable frequency drives (VFDs). The HHW pipes are insulated, and the pumps are in good condition. At the time of the audit, the outside air temperature was 56°F and the HHW supply temperature was 168°F.

Modular Boilers

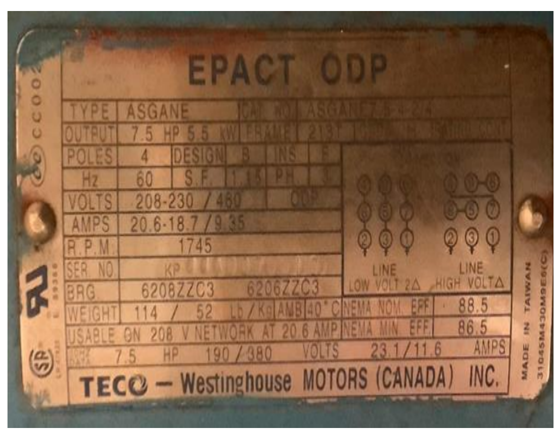
Boiler Control


HHW Baseboard



Thermostat

HHW Pumps



Name Plate

2.8 Domestic Hot Water

Domestic hot water (DHW) demand at Sterling Village is mainly supplied by individual 38-gallon electric storage water heaters located in each apartment. These units have an input capacity of 4.5 kW and are well insulated. The age and make of each unit varies, however, they are in good condition.

The laundry room at Sterling Village uses a dedicated Bradford White electric water heater located in the mechanical room. This tank has estimated capacity of 80 gallons and a 4.5 kW input capacity. Two fractional horsepower DHW pumps circulate the water. The storage tank is in good condition and the water pipes are insulated.

Laundry Room DHW Tank

Apartment 38 Gallon DHW

2.9 Food Service Equipment

Every apartment at Sterling Village is equipped with a four-burner residential gas range except for five ADA compliant apartments which use electric ranges. The electric ranges have been accounted for in Section 2.10 Plug Load. The 145 gas ranges vary in age and make and are in good condition. The daily usage for the ranges are low. These units are not rated by ENERGY STAR.

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

Residential Gas Range

2.10 Plug Load and Vending Machines

Plug loads at Sterling Village include standard office equipment and residential appliances. Typical residential loads include computers, refrigerators, printers, coffee machines, microwaves, electric ranges, and televisions. There are an estimated 35 desktops throughout Sterling Village. Office plug loads include computers, printers, and a server room. There are 152 full-size residential refrigerators and an estimated 150 heat-light-exhaust fan units in restrooms. Equipment conditions and efficiencies vary.

Residential Refrigerator

Large Copier

2.11 Water-Using Systems

There are numerous restrooms with toilets, showers, and sinks throughout Sterling Village.

Faucet flow rates are 2.2 gallons per minute (gpm) or lower. Toilets are rated at 2.5 gallons per flush (gpf) and showers are rated at 1.5 gpf. There is room for improvement to reduce water usage.

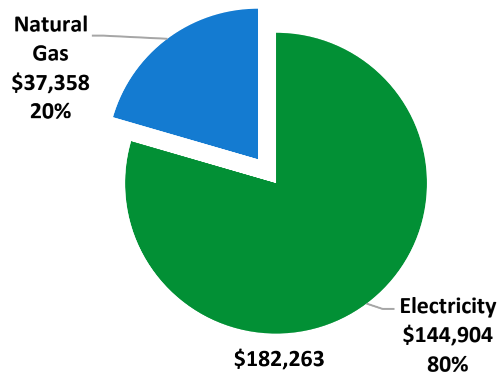
Bathroom Faucet

Showerhead

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	940,043 kWh	$144,904
Natural Gas	46,777 Therms	$37,358
Total		**$182,263**



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

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

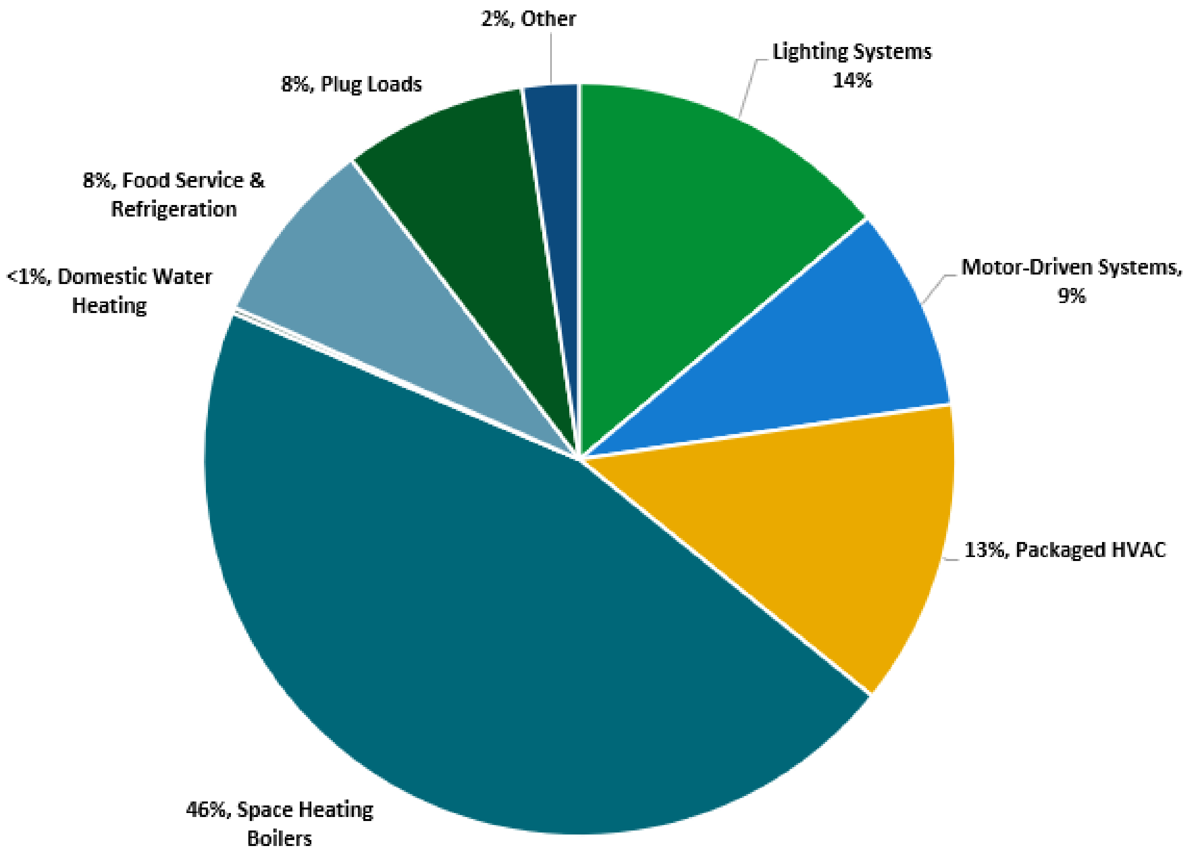
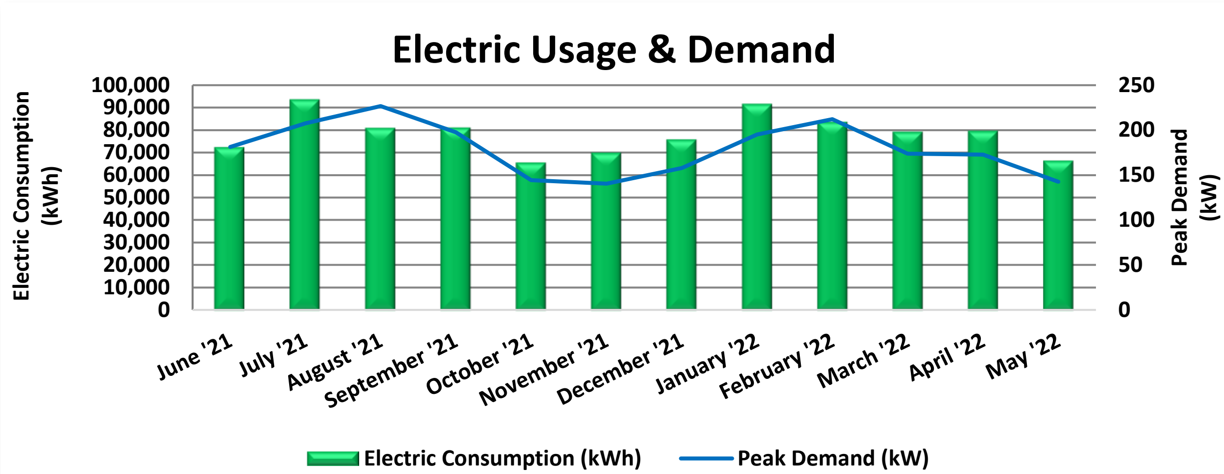


Figure 4 - Energy Balance

3.1 Electricity

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



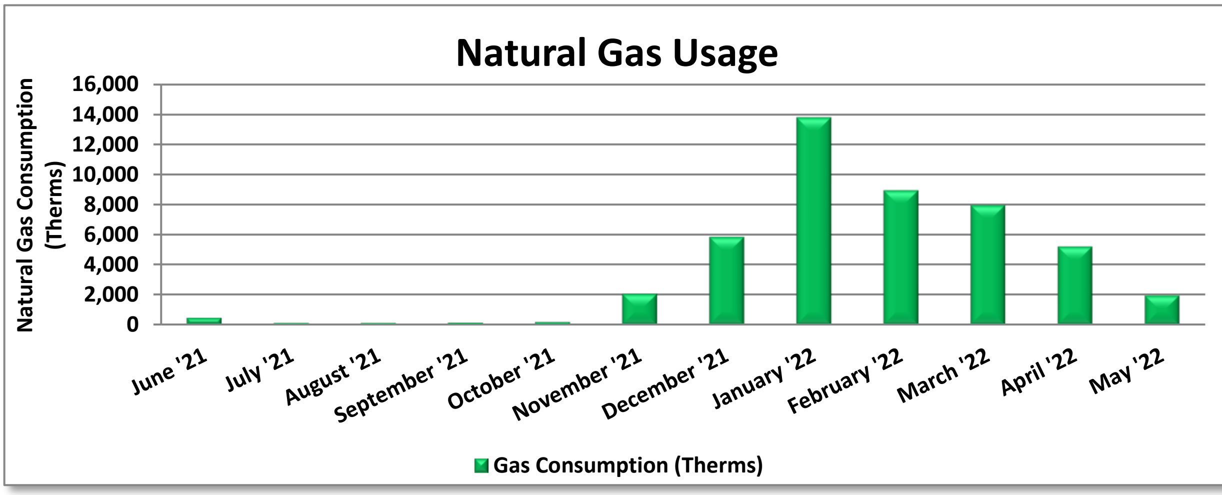
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/17/21	30	72,472	181	$2,316	$12,754
7/19/21	32	93,521	208	$2,657	$15,806
8/17/21	29	80,893	227	$2,901	$13,911
9/16/21	30	81,102	198	$2,526	$13,548
10/15/21	29	65,587	145	$547	$9,554
11/15/21	31	69,951	140	$531	$10,147
12/16/21	31	75,800	158	$597	$10,985
1/19/22	34	91,632	195	$739	$13,219
2/16/22	28	83,656	212	$803	$12,228
3/18/22	30	79,297	174	$658	$11,505
4/19/22	32	79,604	173	$654	$11,542
5/18/22	29	66,528	143	$540	$9,703
Totals	**365**	**940,043**	**227**	**$15,469**	**$144,904**
Annual	**365**	**940,043**	**227**	**$15,469**	**$144,904**

Notes:

- Peak demand of 227 kW occurred in August '21.
- Average demand over the past 12 months was 179 kW.
- The average electric cost over the past 12 months was $0.154/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class Large Volume Gas (LVG), with natural gas supply provided by Direct Energy Business, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/14/21	32	469	$432
7/14/21	30	127	$233
8/12/21	29	123	$229
9/14/21	33	140	$239
10/12/21	28	194	$273
11/10/21	29	2,064	$1,550
12/13/21	33	5,838	$4,147
1/13/22	31	13,769	$10,284
2/11/22	29	8,940	$7,706
3/15/22	32	7,965	$7,028
4/13/22	29	5,194	$3,742
5/13/22	30	1,954	$1,496
Totals	**365**	**46,777**	**$37,358**
Annual	**365**	**46,777**	**$37,358**

Notes:

- The average gas cost for the past 12 months is $0.799/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	49

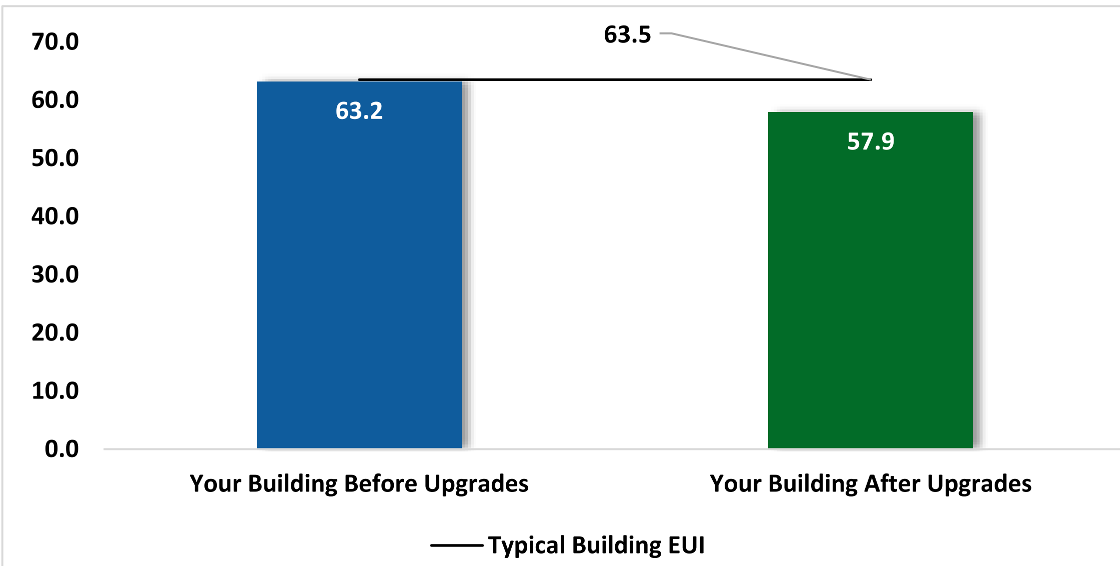


Figure 5 - Energy Use Intensity Comparison[3]

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

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**136,295**	**22.1**	**-29**	**$20,778**	**$39,528**	**$4,470**	**$35,058**	**1.7**	**133,858**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	78,574	14.7	-17	$11,978	$27,340	$2,655	$24,685	2.1	77,164
ECM 2	Retrofit Fixtures with LED Lamps	Yes	57,721	7.4	-12	$8,800	$12,189	$1,815	$10,374	1.2	56,693
Lighting Control Measures			**19,448**	**2.0**	**-4**	**$2,965**	**$22,244**	**$17,510**	**$4,734**	**1.6**	**19,099**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	2,232	0.4	0	$340	$2,894	$395	$2,499	7.3	2,192
ECM 4	Install High/Low Lighting Controls	Yes	17,216	1.6	-4	$2,624	$19,350	$17,115	$2,235	0.9	16,907
Variable Frequency Drive (VFD) Measures			**16,874**	**1.6**	**0**	**$2,601**	**$11,890**	**$2,000**	**$9,890**	**3.8**	**16,992**
ECM 5	Install VFDs on Heating Water Pumps	Yes	16,874	1.6	0	$2,601	$11,890	$2,000	$9,890	3.8	16,992
Domestic Water Heating Upgrade			**0**	**0.0**	**102**	**$812**	**$15,589**	**$3,100**	**$12,489**	**15.4**	**11,902**
ECM 6	Install Low-Flow DHW Devices	Yes	0	0.0	102	$812	$15,589	$3,100	$12,489	15.4	11,902
TOTALS			**172,617**	**25.7**	**69**	**$27,156**	**$89,252**	**$27,080**	**$62,172**	**2.3**	**181,850**

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

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**136,295**	**22.1**	**-29**	**$20,778**	**$39,528**	**$4,470**	**$35,058**	**1.7**	**133,858**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	78,574	14.7	-17	$11,978	$27,340	$2,655	$24,685	2.1	77,164
ECM 2	Retrofit Fixtures with LED Lamps	57,721	7.4	-12	$8,800	$12,189	$1,815	$10,374	1.2	56,693
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ECM 3	Install Occupancy Sensor Lighting Controls	2,232	0.4	0	$340	$2,894	$395	$2,499	7.3	2,192
ECM 4	Install High/Low Lighting Controls	17,216	1.6	-4	$2,624	$19,350	$17,115	$2,235	0.9	16,907
Variable Frequency Drive (VFD) Measures		**16,874**	**1.6**	**0**	**$2,601**	**$11,890**	**$2,000**	**$9,890**	**3.8**	**16,992**
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Domestic Water Heating Upgrade		**0**	**0.0**	**102**	**$812**	**$15,589**	**$3,100**	**$12,489**	**15.4**	**11,902**
ECM 6	Install Low-Flow DHW Devices	0	0.0	102	$812	$15,589	$3,100	$12,489	15.4	11,902
TOTALS		**172,617**	**25.7**	**69**	**$27,156**	**$89,252**	**$27,080**	**$62,172**	**2.3**	**181,850**

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

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

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**136,295**	**22.1**	**-29**	**$20,778**	**$39,528**	**$4,470**	**$35,058**	**1.7**	**133,858**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	78,574	14.7	-17	$11,978	$27,340	$2,655	$24,685	2.1	77,164
ECM 2	Retrofit Fixtures with LED Lamps	57,721	7.4	-12	$8,800	$12,189	$1,815	$10,374	1.2	56,693

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

ECM 1: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit T-12 fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

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

Affected Building Areas: kitchens and restrooms of all 1-bedroom, 2-bedroom, corner bedroom, and ADA 1-bedroom apartments.

ECM 2: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, u-bend fluorescent, CFL, and halogen 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: community room, community room kitchen, exterior wall packs, office, corridors, recycling room, elevator lobby, stairwells, ADA 1 bedroom kitchens, ADA studio bedroom kitchens, studio bedroom kitchens, studio bedroom restrooms, garbage room, electrical room, elevator machine rooms, fire pump room, laundry room, mail room, mechanical room, public men’s restroom, public women’s restroom, first floor storage room, telephone closet, all supply rooms, and all utility rooms.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**19,448**	**2.0**	**-4**	**$2,965**	**$22,244**	**$17,510**	**$4,734**	**1.6**	**19,099**
ECM 3	Install Occupancy Sensor Lighting Controls	2,232	0.4	0	$340	$2,894	$395	$2,499	7.3	2,192
ECM 4	Install High/Low Lighting Controls	17,216	1.6	-4	$2,624	$19,350	$17,115	$2,235	0.9	16,907

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: community room, laundry room, mail room, main entrance, office, public men's restroom, public women's restroom, recycling room, and elevator lobby.

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: all corridors.

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		**16,874**	**1.6**	**0**	**$2,601**	**$11,890**	**$2,000**	**$9,890**	**3.8**	**16,992**
ECM 5	Install VFDs on Heating Water Pumps	16,874	1.6	0	$2,601	$11,890	$2,000	$9,890	3.8	16,992

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 Heating Water Pumps

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

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

Affected Pumps: two, 7.5 hp HHW pumps.

4.4 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**	**102**	**$812**	**$15,589**	**$3,100**	**$12,489**	**15.4**	**11,902**
ECM 6	Install Low-Flow DHW Devices	0	0.0	102	$812	$15,589	$3,100	$12,489	15.4	11,902

ECM 6: Install Low-Flow DHW Devices

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

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

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. The payback period may appear long due to relatively limited patterns of use; however, the projected savings are conservative and additional cost savings may result from reduced water usage.

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[4]. 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.

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

Lighting Maintenance

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

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

Lighting Controls

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

Motor Maintenance

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

Fans to Reduce Cooling Load

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

Thermostat Schedules and Temperature Resets

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

HVAC Filter Cleaning and Replacement

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

Boiler Maintenance

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

Label HVAC Equipment

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

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

Water Heater Maintenance

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

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

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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense website[5] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[6] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

Procurement Strategies

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

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

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

6 On-site Generation

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

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

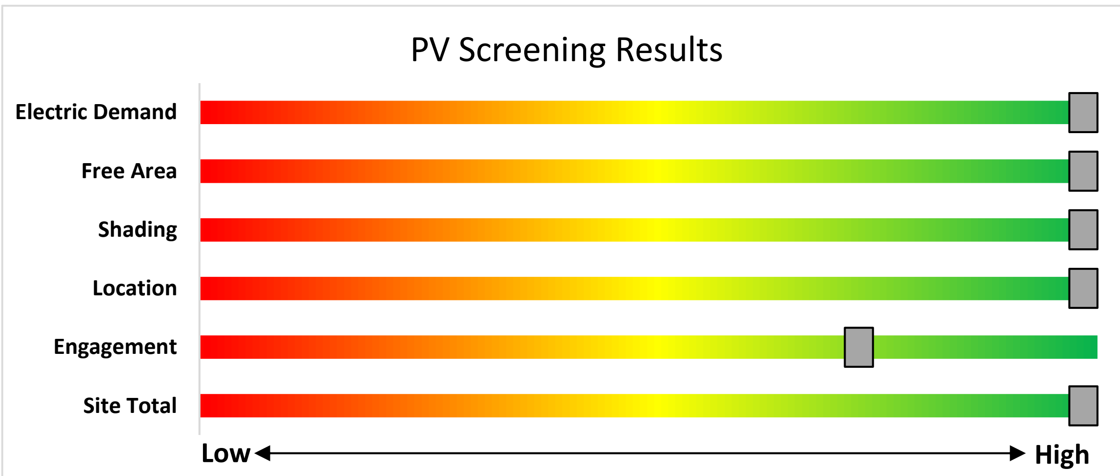
6.1 Solar Photovoltaic

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

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

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

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



Potential	High	
System Potential	179	kW DC STC
Electric Generation	213,255	kWh/yr
Displaced Cost	$32,870	/yr
Installed Cost	$465,400	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

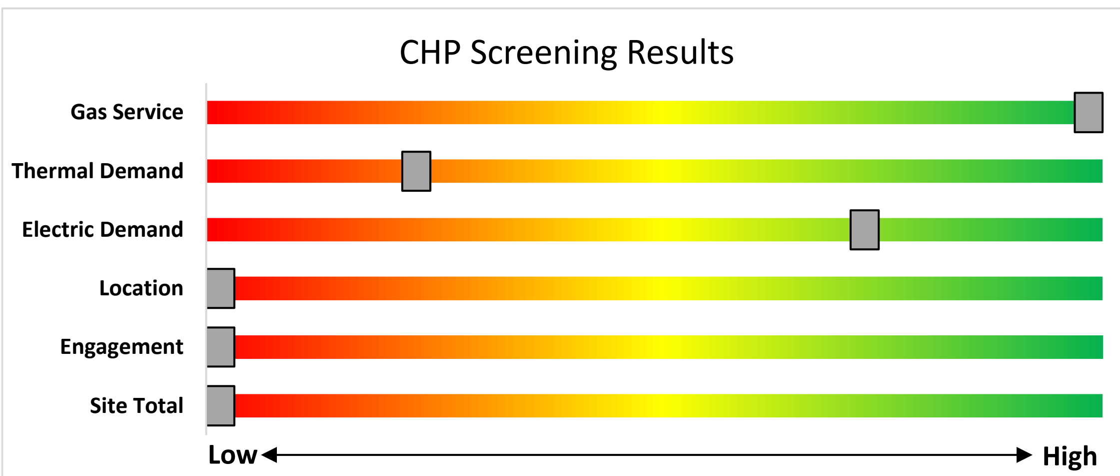


Figure 9 - Combined Heat and Power Screening

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

7 ELECTRIC VEHICLES (EV)

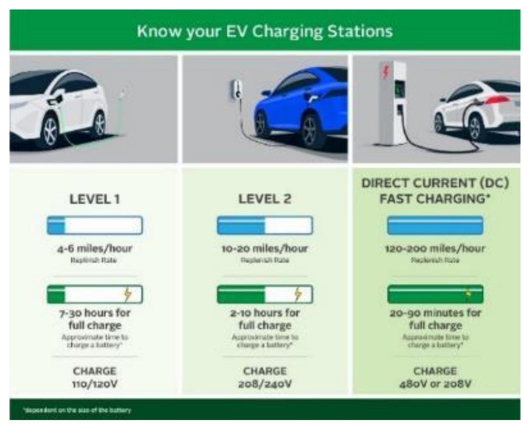
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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

7.1 Electric Vehicle Charging

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

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



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

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

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

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

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

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

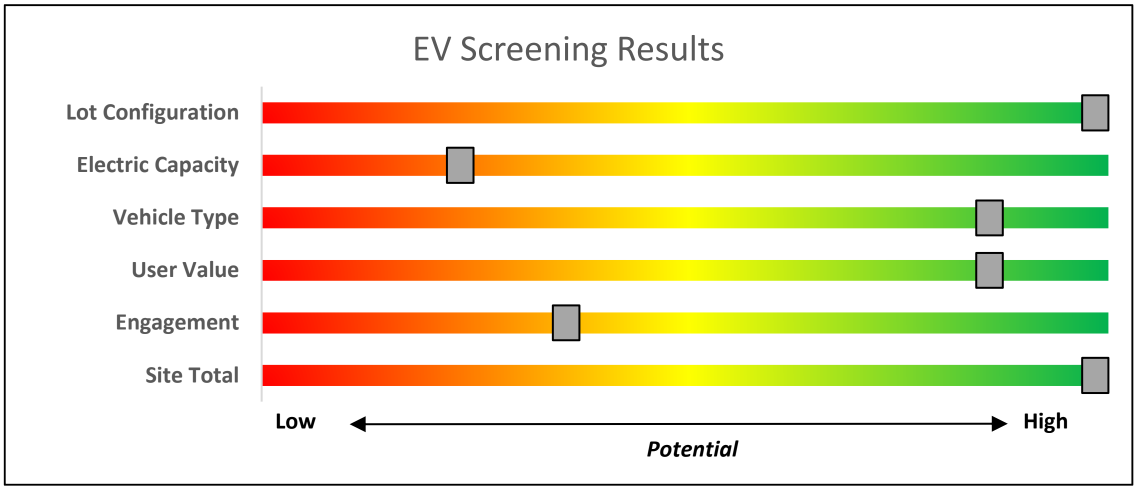


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

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

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

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

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

8 Project Funding and Incentives

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

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

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

Equipment Examples

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

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

Direct Install

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

Incentives

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

How to Participate

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

Engineered Solutions

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

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

8.2 New Jersey's Clean Energy Programs

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

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

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

Competitive Solar Incentive Program

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

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 Project Development

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

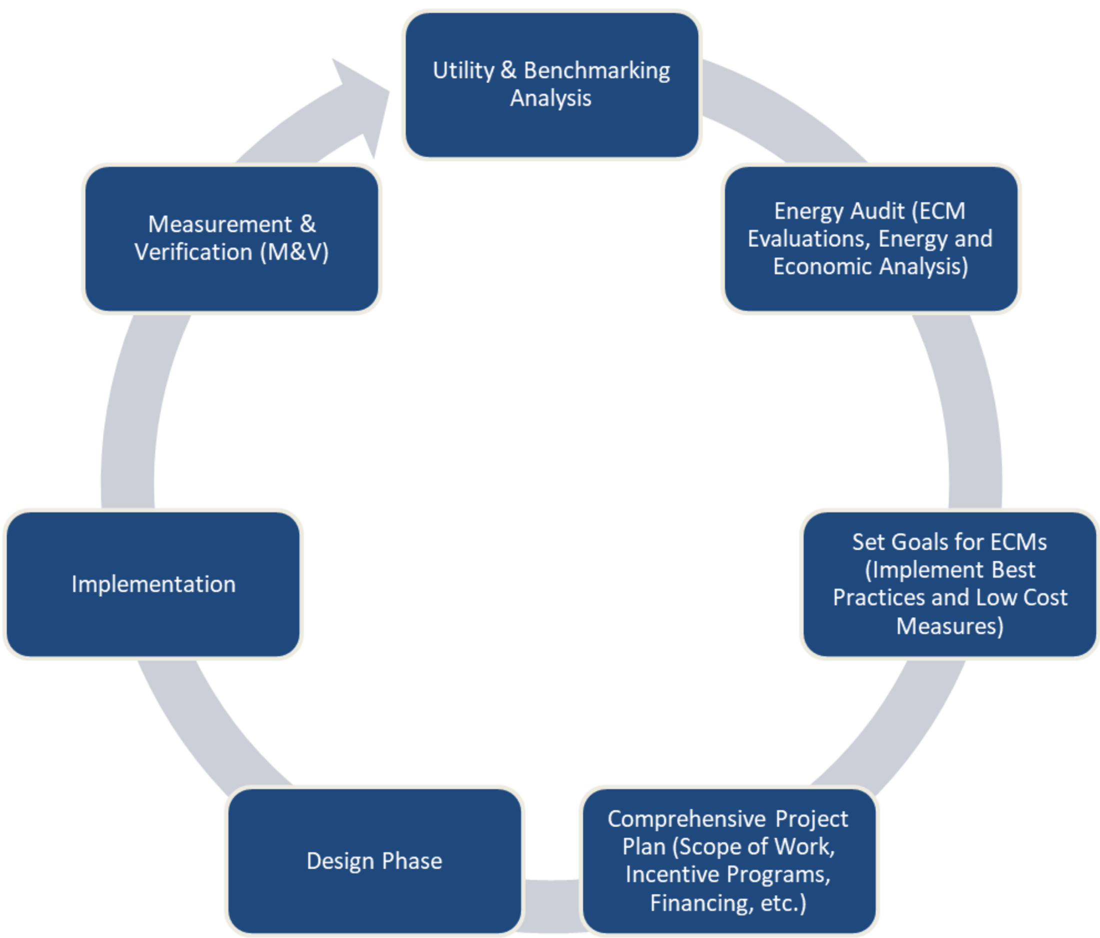


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[7].

10.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[8].

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

[8] 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
Garbage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	125	0	$19	$37	$10	1.4
1 Bedroom Kitchen (x103)	103	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	103	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
1 Bedroom Kitchen (x103)	103	U-Bend Fluorescent - T12: U T12 (40W) - 2L	Wall Switch	S	88	4,380	1	Relamp & Reballast	No	103	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	5.0	26,798	-6	$4,085	$10,786	$1,030	2.4
1 Bedroom Restroom (x103)	206	Linear Fluorescent - T12: 3' T12 (30W) - 1L	Wall Switch	S	46	4,380	1	Relamp & Reballast	No	206	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	4,380	6.5	34,593	-7	$5,274	$10,406	$1,030	1.8
Community Room	8	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	8,760	2, 3	Relamp	Yes	8	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	6,044	0.1	976	0	$149	$370	$43	2.2
Community Room	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Community Room	16	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	4,380	3	None	Yes	16	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	3,022	0.1	751	0	$114	$540	$70	4.1
Community Room Kitchen	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,500	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,500	0.0	60	0	$9	$33	$6	2.9
Corner Bedroom (x32)	96	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	96	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
Corner Bedroom Kitchen (x32)	32	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	32	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
Corner Bedroom Kitchen (x32)	32	U-Bend Fluorescent - T12: U T12 (40W) - 2L	Wall Switch	S	88	4,380	1	Relamp & Reballast	No	32	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	1.6	8,326	-2	$1,269	$3,351	$320	2.4
Corner Bedroom Retroom (x32)	32	Linear Fluorescent - T12: 3' T12 (30W) - 1L	Wall Switch	S	46	4,380	1	Relamp & Reballast	No	32	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	4,380	1.0	5,374	-1	$819	$1,616	$160	1.8
Electrical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.1	71	0	$11	$73	$20	4.9
Elevator Machine Room 1&2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
Elevator Machine Room 3 U Portion	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
Exterior Parking Lot Lights	1	LED - Fixtures: Flood Fixture	Timeclock		13	4,380		None	No	1	LED - Fixtures: Flood Fixture	Timeclock	13	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Parking Lot Lights	22	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		69	4,380		None	No	22	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	69	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Perimeter	9	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		69	4,380		None	No	9	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	69	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed	14	LED Lamps: (1) 9W GX23 Screw-In Lamp	Timeclock		9	4,380		None	No	14	LED Lamps: (1) 9W GX23 Screw-In Lamp	Timeclock	9	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	11	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Timeclock		26	4,380	2	Relamp	No	11	LED Lamps: GX23 (Plug-In) Lamps	Timeclock	19	4,380	0.0	337	0	$52	$138	$11	2.4
Fire Pump Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.1	36	0	$5	$73	$20	9.8
Laundry Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,000	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.2	680	0	$104	$453	$85	3.5
Mail Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	91	0	$14	$189	$40	10.8
Main Entrance	3	LED Lamps: (1) 9W GX23 Screw-In Lamp	Wall Switch	S	9	8,760	3	None	Yes	3	LED Lamps: (1) 9W GX23 Screw-In Lamp	Occupancy Sensor	9	6,044	0.0	79	0	$12	$270	$35	19.5
Mechanical Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,500	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.1	214	0	$33	$146	$40	3.3

	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
Office	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	3,285	2	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	3,285	0.0	25	0	$4	$13	$1	3.0
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,285	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,267	0.1	596	0	$91	$416	$75	3.8
Men's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	4,380	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,022	0.0	208	0	$32	$153	$30	3.9
Men's Restroom	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	4,380	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	557	0	$85	$487	$65	5.0
Women's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	4,380	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,022	0.0	208	0	$32	$153	$30	3.9
Women's Restroom	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	4,380	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	557	0	$85	$487	$65	5.0
Storage Room First Floor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	700	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	700	0.0	25	0	$4	$37	$10	7.0
Telephone Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
2 Bedroom Kitchen (x5)	5	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	5	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
2 Bedroom Kitchen (x5)	5	U-Bend Fluorescent - T12: U T12 (40W) - 2L	Wall Switch	S	88	4,380	1	Relamp & Reballast	No	5	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	0.2	1,301	0	$198	$524	$50	2.4
2 Bedroom Restroom (x5)	10	Linear Fluorescent - T12: 3' T12 (30W) - 1L	Wall Switch	S	46	4,380	1	Relamp & Reballast	No	10	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	4,380	0.3	1,679	0	$256	$505	$50	1.8
ADA 1 Bedroom Kitchen (x3)	6	Halogen Incandescent: (2) 50W MR16 Plug-In Lamps	Wall Switch	S	100	4,380	2	Relamp	No	6	LED Lamps: MR16 Lamps	Wall Switch	15	4,380	0.5	2,413	-1	$368	$326	$12	0.9
ADA 1 Bedroom Kitchen (x3)	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom Restroom (x3)	3	Linear Fluorescent - T12: 3' T12 (30W) - 1L	Wall Switch	S	46	4,380	1	Relamp & Reballast	No	3	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	4,380	0.1	504	0	$77	$152	$15	1.8
Supply Room 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	700	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	700	0.0	25	0	$4	$37	$10	7.0
Supply Room 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	700	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	700	0.0	25	0	$4	$37	$10	7.0
Corridor 1st	76	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2, 4	Relamp	Yes	76	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	10	6,044	0.4	4,386	-1	$669	$3,875	$2,736	1.7
Corridor 1st	15	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	15	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1st	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	8,760		None	No	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1st	1	LED - Fixtures: Ambient - 3' - Direct Fixture	Wall Switch	S	15	8,760		None	No	1	LED - Fixtures: Ambient - 3' - Direct Fixture	Wall Switch	15	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1st	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.5	5,164	-1	$787	$1,150	$585	0.7
Corridor 1st	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	8,760	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	6,044	0.2	2,227	0	$339	$660	$270	1.1
Corridor 2nd	76	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2, 4	Relamp	Yes	76	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	10	6,044	0.4	4,386	-1	$669	$3,875	$2,736	1.7
Corridor 2nd	15	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	15	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2nd	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	8,760		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor 2nd	50	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	8,760	2, 4	Relamp	Yes	50	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	6,044	1.0	10,405	-2	$1,586	$2,938	$2,000	0.6
Corridor 3rd	76	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2, 4	Relamp	Yes	76	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	10	6,044	0.4	4,386	-1	$669	$3,875	$2,736	1.7
Corridor 3rd	15	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	15	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 3rd	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	8,760		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 3rd	50	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	8,760	2, 4	Relamp	Yes	50	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	6,044	1.0	10,405	-2	$1,586	$2,938	$2,000	0.6
Corridor 4th	76	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2, 4	Relamp	Yes	76	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	10	6,044	0.4	4,386	-1	$669	$3,875	$2,736	1.7
Corridor 4th	15	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	15	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 4th	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	8,760		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 4th	50	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	8,760	2, 4	Relamp	Yes	50	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	6,044	1.0	10,405	-2	$1,586	$2,938	$2,000	0.6
Garbage room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	53	0	$8	$37	$10	3.3
Recycle Room	2	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Wall Switch	S	13	1,460	2, 3	Relamp	Yes	2	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	10	1,007	0.0	19	0	$3	$141	$22	40.6
Utility Closet 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
Utility Closet 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
Utility Closet 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
Utility Closet 4	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$3	$37	$10	9.8
5th Floor Elevator Lobby	5	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	8,760	2, 3	Relamp	Yes	5	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	6,044	0.1	610	0	$93	$333	$40	3.1
ADA Studio Bedroom Restroom (x2)	4	Halogen Incandescent: (2) 50W MR16 Plug-In Lamps	Wall Switch	S	100	4,380	2	Relamp	No	4	LED Lamps: MR16 Lamps	Wall Switch	15	4,380	0.3	1,608	0	$245	$217	$8	0.9
ADA Studio Bedroom Restroom (x2)	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	4,380		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,380	0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom (x2)	2	LED - Fixtures: Ambient - 3' - Direct Fixture	Wall Switch	S	15	4,380		None	No	2	LED - Fixtures: Ambient - 3' - Direct Fixture	Wall Switch	15	4,380	0.0	0	0	$0	$0	$0	0.0
Corridor 5th	16	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Wall Switch	S	13	4,380	2, 4	Relamp	Yes	16	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	10	3,022	0.1	462	0	$70	$875	$576	4.2
Corridor 5th	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 5th	4	LED Lamps: (4) 7W A15 Screw-In Lamps	Wall Switch	S	28	4,380		None	No	4	LED Lamps: (4) 7W A15 Screw-In Lamps	Wall Switch	28	4,380	0.0	0	0	$0	$0	$0	0.0
Stairwell 1	16	Compact Fluorescent: (1) 13W Double Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2	Relamp	No	16	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	10	8,760	0.0	454	0	$69	$200	$16	2.7
Stairwell 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairwell 5 1/2	4	Compact Fluorescent: (1) 13W Double Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2	Relamp	No	4	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	10	8,760	0.0	114	0	$17	$50	$4	2.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Stairwell 2	16	Compact Fluorescent: (1) 13W Double Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2	Relamp	No	16	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	10	8,760	0.0	454	0	$69	$200	$16	2.7
Stairwell 2	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairwell 3	16	Compact Fluorescent: (1) 13W Double Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2	Relamp	No	16	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	10	8,760	0.0	454	0	$69	$200	$16	2.7
Stairwell 3	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairwell 4	16	Compact Fluorescent: (1) 13W Double Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2	Relamp	No	16	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	10	8,760	0.0	454	0	$69	$200	$16	2.7
Stairwell 4	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairwell 5 2/2	4	Compact Fluorescent: (1) 13W Double Biaxial Plug-In Lamp	Wall Switch	S	13	8,760	2	Relamp	No	4	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	10	8,760	0.0	114	0	$17	$50	$4	2.7
Studio Bedroom Kitchen (x5)	10	Halogen Incandescent: (2) 50W MR16 Plug-In Lamps	Wall Switch	S	100	4,380	2	Relamp	No	10	LED Lamps: MR16 Lamps	Wall Switch	15	4,380	0.8	4,021	-1	$613	$544	$20	0.9
Studio Bedroom Restroom (x5)	10	Halogen Incandescent: (2) 50W MR16 Plug-In Lamps	Wall Switch	S	100	4,380	2	Relamp	No	10	LED Lamps: MR16 Lamps	Wall Switch	15	4,380	0.8	4,021	-1	$613	$544	$20	0.9
Studio Bedroom Restroom (x5)	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	4,380		None	No	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,380	0.0	0	0	$0	$0	$0	0.0
1 Bedroom (x103)	618	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	618	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
2 Bedroom (x5)	45	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	45	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom (x3)	18	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	18	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom (x2)	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
Studio Bedroom (x5)	15	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	4,380		None	No	15	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	4,380	0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom (x3)	3	LED - Fixtures: Downlight Recessed	Wall Switch	S	15	4,380		None	No	3	LED - Fixtures: Downlight Recessed	Wall Switch	15	4,380	0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom (x2)	2	LED - Fixtures: Downlight Recessed	Wall Switch	S	15	4,380		None	No	2	LED - Fixtures: Downlight Recessed	Wall Switch	15	4,380	0.0	0	0	$0	$0	$0	0.0
Corridor 4th	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	8,760		None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	8,760	0.0	0	0	$0	$0	$0	0.0

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
1 Bedroom Kitchen (x103)	Exhaust Fan - Kitchen	103	Exhaust Fan	0.3	65.0%	No			W	365		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Corner Bedroom Kitchen (x32)	Exhaust Fan - Kitchen	32	Exhaust Fan	0.3	65.0%	No			W	365		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Corner Bedroom Retroom (x32)	Heated Exhaust Fan Light	32	Exhaust Fan	0.3	65.0%	No			W	730		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Telephone Closet	Exhaust Fan - Closet	1	Exhaust Fan	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
2 Bedroom Kitchen (x5)	Exhaust Fan - Kitchen	5	Exhaust Fan	0.3	65.0%	No			W	365		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom Kitchen (x3)	Exhaust Fan - Kitchen	3	Exhaust Fan	0.3	65.0%	No			W	365		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Machine Room 1&2	Hydraulic Elevator Motor	2	Other	30.0	91.7%	No	Schindler Elevator	E2 218L	B	1,643		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Machine Room 3 U Portion	Hydraulic Elevator Motor	2	Other	30.0	91.7%	No	Schindler Elevator	E2 218L	B	1,643		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	DHW Circulation Pump	2	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Hydronic Unit Heater	1	Other	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	HHW Supply Pump	2	Heating Hot Water Pump	7.5	88.5%	No			W	3,391	5	No	91.0%	Yes	2	1.6	16,874	0	$2,601	$11,890	$2,000	3.8
1 Bedroom Restroom (x103)	Heated Exhaust Fan Light	103	Exhaust Fan	0.3	65.0%	No			W	730		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
2 Bedroom Restroom (x5)	Heated Exhaust Fan Light	5	Exhaust Fan	0.3	65.0%	No			W	730		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom Restroom (x3)	Heated Exhaust Fan Light	3	Exhaust Fan	0.3	65.0%	No			W	730		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Studio Bedroom Kitchen (x5)	Exhaust Fan - Kitchen	5	Exhaust Fan	0.3	65.0%	No			W	365		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Studio Bedroom Restroom (x5)	Heated Exhaust Fan Light	5	Exhaust Fan	0.3	65.0%	No			W	730		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom Kitchen (x2)	Exhaust Fan - Kitchen	2	Exhaust Fan	0.3	65.0%	No			W	365		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom Restroom (x2)	Heated Exhaust Fan Light	2	Exhaust Fan	0.3	65.0%	No			W	730		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Main Entrance	Fan Coil Unit	1	Fan Coil Unit	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Corridor 1st	Fan Coil Unit	8	Fan Coil Unit	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions											Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Fire Pump Room	Hydronic Unit Heater	1	Other	0.3	65.0%	No	Reed National	HV-48S	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Grounds	Package Unit Supply Fan	1	Supply Fan	1.0	85.5%	No			W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Grounds	Package Unit Exhaust Fan	1	Exhaust Fan	0.3	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Grounds	Sterling Village - Single Packaged Unit	1	Package Unit	5.00	120.00	14.00	0.8 Et	Lennox	KGB060S4BH1Y	W		No							0.0	0	0	$0	$0	$0	0.0
1 Bedroom (x103)	Window AC - 1 Bedroom	206	Window AC	0.80		10.70		Various		W		No							0.0	0	0	$0	$0	$0	0.0
2 Bedroom (x5)	Window AC - 2 Bedroom	15	Window AC	0.80		10.70		Various		W		No							0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom (x3)	Window AC - ADA 1 Bedroom	6	Window AC	0.80		10.70		Various		W		No							0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom (x2)	Window AC - ADA Studio Bedroom	2	Window AC	0.80		10.70		Various		W		No							0.0	0	0	$0	$0	$0	0.0
Studio Bedroom (x5)	Window AC - Studio Bedroom	5	Window AC	0.80		10.70		Various		W		No							0.0	0	0	$0	$0	$0	0.0
Corner Bedroom (x32)	Window AC - Corner Bedroom	64	Window AC	0.80		10.70		Various		W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Hydronic Boiler - 8 Modules	1	Non-Condensing Hot Water Boiler	2,432	Slant Fin	GGHT-3000	W		No						0.0	0	0	$0	$0	$0	0.0

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
Corner Bedroom Retroom (x32)	Corner Bedroom - DHW	32	Storage Tank Water Heater (≤ 50 Gal)			W		No						0.0	0	0	$0	$0	$0	0.0
1 Bedroom Restroom (x103)	1 Bedroom - DHW	103	Storage Tank Water Heater (≤ 50 Gal)			W		No						0.0	0	0	$0	$0	$0	0.0
2 Bedroom Restroom (x5)	2 Bedroom - DHW	5	Storage Tank Water Heater (≤ 50 Gal)			W		No						0.0	0	0	$0	$0	$0	0.0
ADA 1 Bedroom Restroom (x3)	ADA 1 Bedroom - DHW	3	Storage Tank Water Heater (≤ 50 Gal)			W		No						0.0	0	0	$0	$0	$0	0.0
Studio Bedroom Restroom (x5)	Studio Bedroom - DHW	5	Storage Tank Water Heater (≤ 50 Gal)			W		No						0.0	0	0	$0	$0	$0	0.0
ADA Studio Bedroom Restroom (x2)	ADA Studio Bedroom - DHW	2	Storage Tank Water Heater (≤ 50 Gal)			W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Sterling Village - DHW	1	Storage Tank Water Heater (> 50 Gal)	Bradford White		W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommendation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom	6	150	Showerhead	1.50	1.50	0.0	0	0	$0	$13,395	$2,250	0.0
Restroom	6	150	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	71	$568	$1,076	$538	0.9
Kitchen	6	151	Faucet Aerator (Kitchen)	2.20	1.50	0.0	0	30	$236	$1,083	$302	3.3
Utility Closet	6	5	Faucet Aerator (Kitchen)	2.20	1.50	0.0	0	1	$8	$36	$10	3.3

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Sterling Village Residential Rooms	145	Gas Combination Oven/Steam Cooker (<15 Pans)	Various	Various	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Sterling Village	7	Clothes Washer	800	No		
Sterling Village	120	Coffee Machine	900	No		
Sterling Village	35	Desktop	270	No		
Sterling Village	152	Microwave	1,000	No		
Sterling Village	1	Printer/Copier (Large)	600	No		
Sterling Village	152	Refrigerator (Residential)	220	No		
Sterling Village	1	Server	1,000	No		
Sterling Village	130	Television	70	No		
Sterling Village	35	Toaster Oven	1,200	No		
Sterling Village	5	Electric Residential Oven	3,000	No		
Sterling Village	150	Heated Exhaust Fan Light	1,300	No		

Miscellaneous Fuel Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Input Capacity per Unit (MBh)	ENERGY STAR Qualified?	Manufacturer	Model
Sterling Village	6	Natural Gas Clothes Dryer	30.0	No	LG	GDP1329CGW2

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Sterling Village Senior Housing

Primary Property Type: Multifamily Housing
Gross Floor Area (ft²): 124,735
Built: 1990

For Year Ending: April 30, 2022
Date Generated: June 12, 2023

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Sterling Village Senior Housing 1 Sterling Drive Piscataway, New Jersey 08854	Township of Piscataway 455 Hoes Lane Piscataway, NJ 08854 (732) 529-2528	Timothy Dacey 455 Hoes Lane Piscataway, NJ 08854 (732) 529-2528 tdacey@piscatawaynj.org

Property ID: 25066715

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
63.5 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	4,712,302 (60%)
Electric - Grid (kBtu)	3,205,598 (40%)

Source EUI
111.6 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	63.5
National Median Source EUI (kBtu/ft²)	111.6
% Diff from National Median Source EUI	0%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	530

Signature & Stamp of Verifying Professional

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

LP Signature: ______________________Date: ___________

Licensed Professional

____ ________
,
(___)___-_____
____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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