Local Government Energy Audit Report

Security Booth, Campus Lighting, & EV/PV Screenings

July 10, 2024

Prepared for:

Ramapo College of New Jersey
523 Route 202
Mahwah, New Jersey 07430

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.

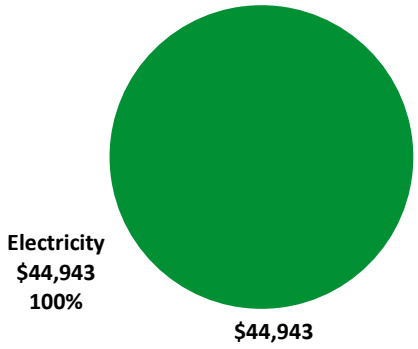
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $44,943 Electricity: 333,783 kWh	
ENERGY STAR® Benchmarking Score	N/A *(1-100 scale)*	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.

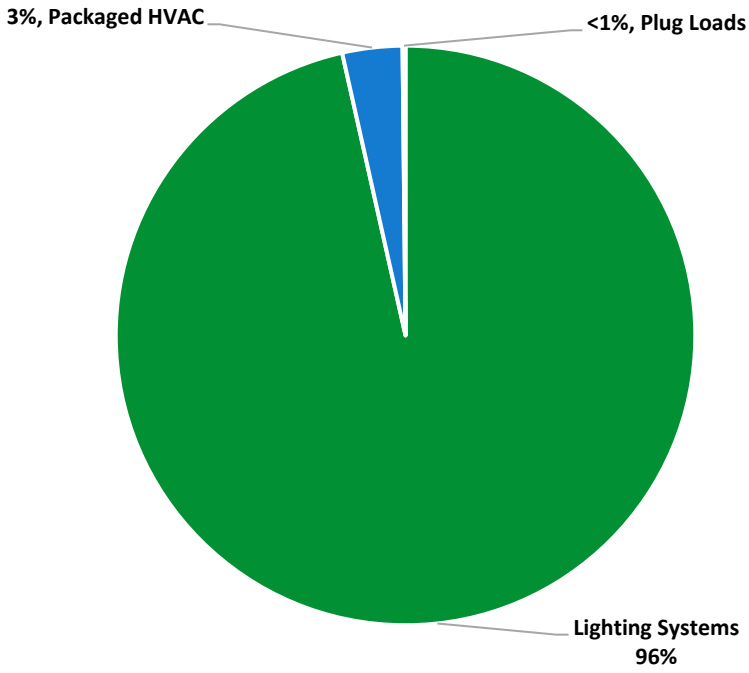


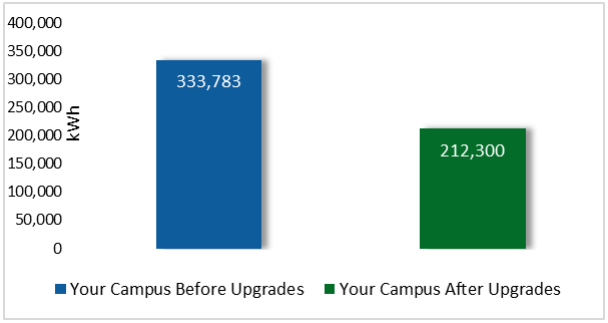
Figure 1 - Energy Use by System

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.

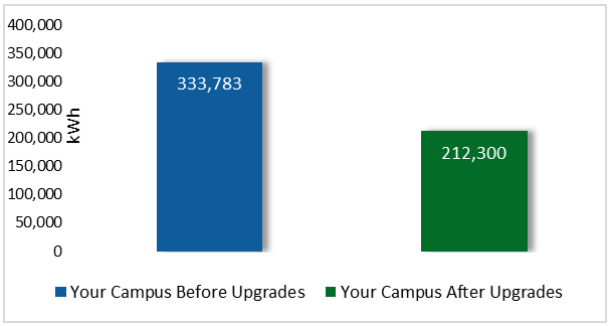
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$67,809
Potential Rebates & Incentives[1]	$20,624
Annual Cost Savings	$28,586
Annual Energy Savings	Electricity: 212,300 kWh
Greenhouse Gas Emission Savings	107 Tons
Simple Payback	1.7 Years
Site Energy Savings (All Utilities)	64%



Scenario 2: Cost Effective Package[2]

Installation Cost	$67,809
Potential Rebates & Incentives	$20,624
Annual Cost Savings	$28,586
Annual Energy Savings	Electricity: 212,300 kWh
Greenhouse Gas Emission Savings	107 Tons
Simple Payback	1.7 Years
Site Energy Savings (all utilities)	64%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	High

[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			**189,305**	**0.0**	**0**	**$25,489**	**$62,409**	**$20,624**	**$41,785**	**1.6**	**190,628**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	1,436	0.0	0	$193	$390	$60	$330	1.7	1,446
ECM 2	Retrofit Fixtures with LED Lamps	Yes	187,868	0.0	0	$25,296	$62,019	$20,564	$41,455	1.6	189,182
Lighting Control Measures			**22,995**	**0.0**	**0**	**$3,096**	**$5,400**	**$0**	**$5,400**	**1.7**	**23,156**
ECM 3	Install Photocell Controls	Yes	22,995	0.0	0	$3,096	$5,400	$0	$5,400	1.7	23,156
TOTALS (COST EFFECTIVE MEASURES)			**212,300**	**0.0**	**0**	**$28,586**	**$67,809**	**$20,624**	**$47,185**	**1.7**	**213,784**
TOTALS (ALL MEASURES)			**212,300**	**0.0**	**0**	**$28,586**	**$67,809**	**$20,624**	**$47,185**	**1.7**	**213,784**

* - 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 Campus Lighting, PV, EV & Security Booth. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

2.1 Site Overview

On August 27, 2023, TRC performed an energy audit of the Ramapo College campus lighting including the security booth, along with an assessment of solar electric potential and electric vehicle charging in Mahwah, New Jersey. TRC met with facility staff to review the facility operations and help focus our investigation on specific energy-using systems. Ramapo College of New Jersey is a public institution that was founded in 1969. It has a suburban setting, and the campus size is 300 acres.

2.2 Building Occupancy

The booth is occupied year-round. The facility is occupied intermittently, as needed for maintenance and operations. Campus lighting generally operates from dusk to dawn and is mainly photocell controlled.

Building Name	Weekday/Weekend	Operating Schedule
Security Booth	Weekday	Varied
	Weekend	Varied

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

The security booth is a small block building with a brick façade and standing seam roof. Windows are single-glazed, and the door is made of aluminum.

Security Booth

2.4 Lighting Systems

The security booth has CFL and LED lamps inside.

Recessed Can and Bollard

Building mounted fixtures have been audited and accounted for in the various building reports

The tennis courts are illuminated with manually controlled flood lights with high bay high intensity discharge (HID) lamps.

The site has pole-mounted acorn top high-pressure sodium fixtures illuminating roadways and parking lots throughout the complex. The site lighting is fed from the main campus electric meter. Condition of these fixtures vary. The facility staff is in the process of converting HID lighting to LED.

Fixtures are controlled by a timeclock; however, several were observed to be operating during the day.

Pole Top Lighting, Walkway Lighting, and Tennis Court Lighting

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

The security booth is conditioned by a Ductless Mini Split Heat Pump. It is rated at ¾ of ton with an EER of 11 and 11 MBh of heating. It is in fair condition. It is not ENERGY STAR labeled.


Ductless Mini Split Heat Pump

Unitary Heating Equipment

The security booth is heated by electric resistance heaters. They are rated at 4 kW each. The units are in fair condition. Equipment is controlled by a manual dial thermostat, which was off at the time of the audit.


Electric Resistance Heater and Thermostat

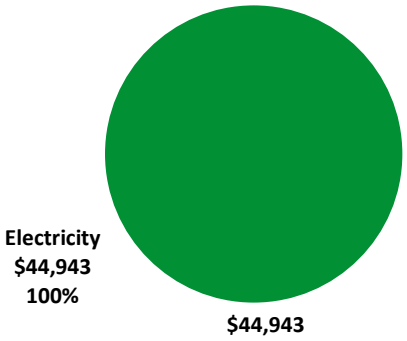
2.6 Plug Load and Vending Machines

There are few exterior plug loads, however, this report makes additional suggestions for ECMs in this area as well as energy efficient best practices. The security booth has a computer workstation, microwave, printer, and mini refrigerator.

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	333,783 kWh	$44,943
Total		**$44,943**



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.

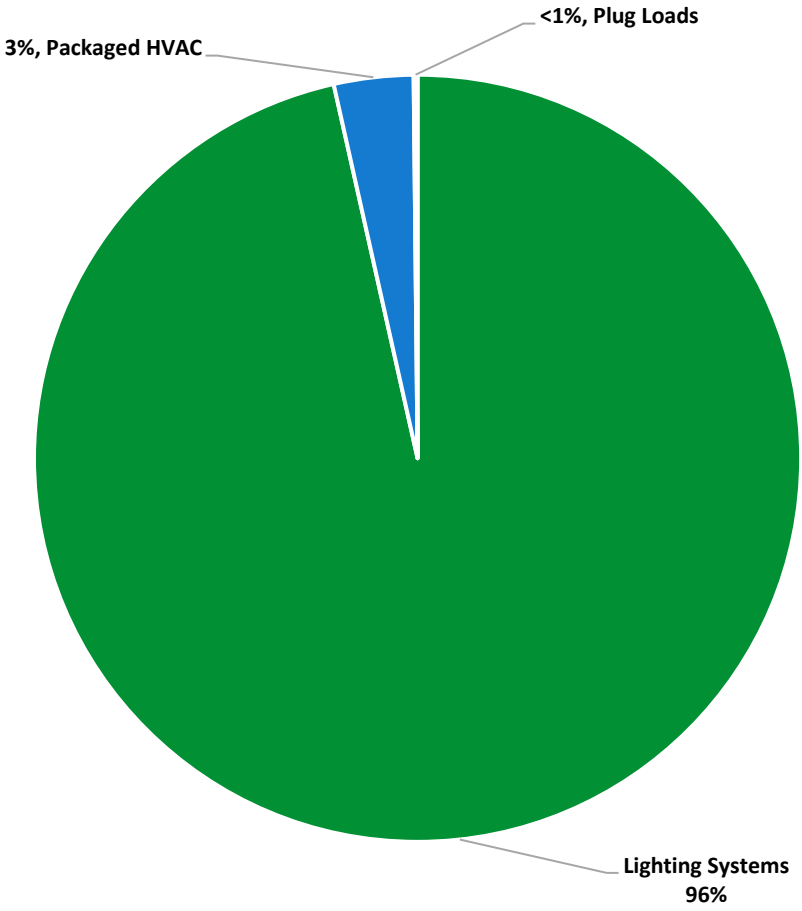
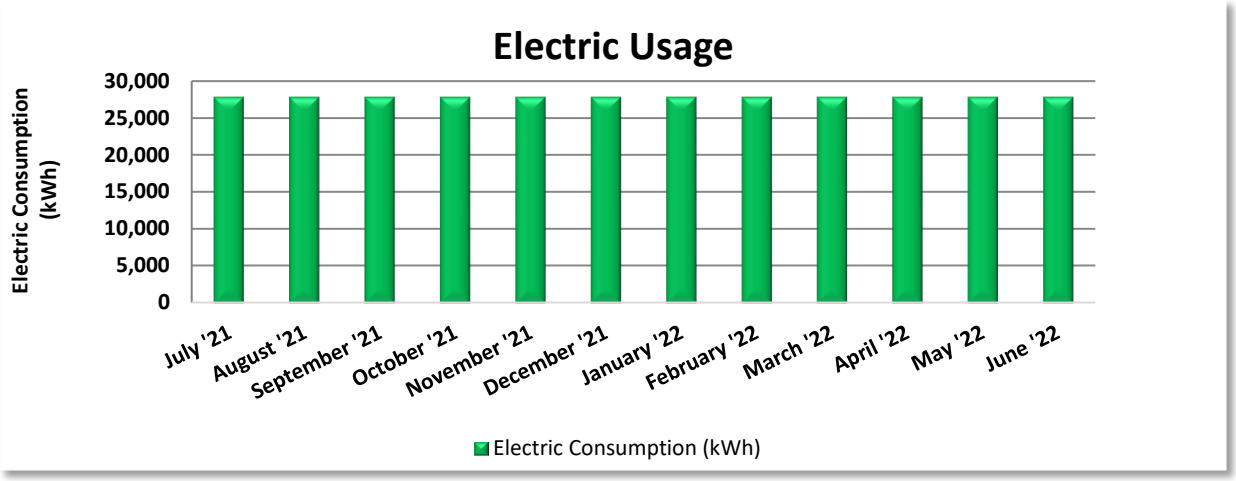


Figure 4 - Energy Balance

3.1 Electricity

Rockland Electric delivers electricity under rate class Electric Comm Prim (TOU-RE-DEL-PJM), with electric production provided by Direct Energy, a third-party supplier.



Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
7/26/21	33	27,816			$3,264
8/24/21	29	27,816			$3,309
9/23/21	30	27,815			$3,293
10/25/21	32	27,815			$3,288
11/23/21	29	27,815			$3,319
12/27/21	34	27,815			$3,224
1/26/22	30	27,815			$4,153
2/24/22	29	27,815			$4,173
3/25/22	29	27,815			$4,196
4/25/22	31	27,815			$4,250
5/23/22	28	27,815			$4,240
6/23/22	31	27,816			$4,234
Totals	**365**	**333,783**	**0**	**$0**	**$44,943**
Annual	**365**	**333,783**	**0**	**$0**	**$44,943**

Notes:

- The average electric cost over the past 12 months was $0.135/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.
- This building is served from the main campus electric meter along with several others. Energy usage (kWh) and demand (kW) was apportioned among those buildings using a formula that accounts for building area (sf) and presumed energy intensity (EUI) by building type.

3.2 Benchmarking

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

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

Benchmarking Score	**N/A**

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

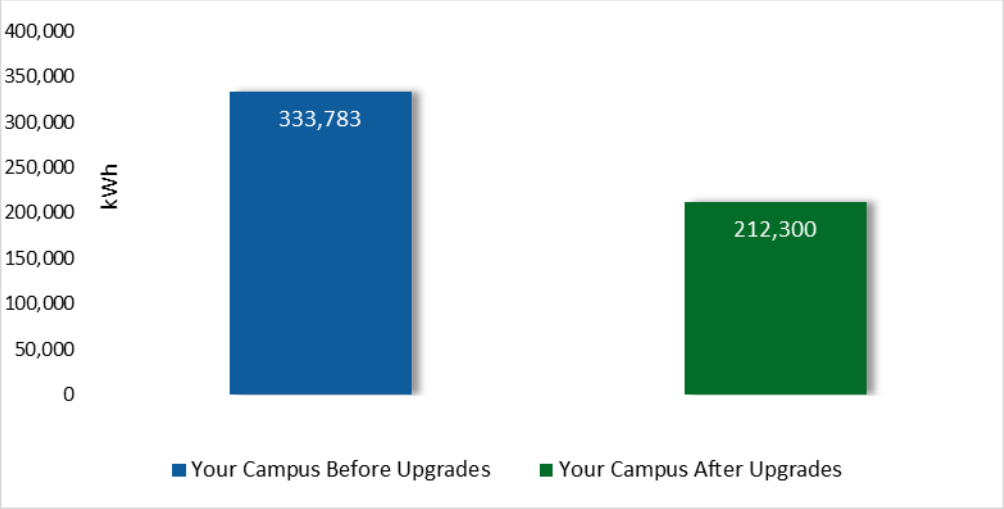


Figure 5 - Energy Use Intensity Comparison[3]

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. However, such a metric has no meaning for outside lighting, because the campus is extensive in size relative to the energy consumption of the site lighting.

The graph above plots the estimated current electricity usage (kWh) and the estimated electricity usage following project implementation.

[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			**189,305**	**0.0**	**0**	**$25,489**	**$62,409**	**$20,624**	**$41,785**	**1.6**	**190,628**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	1,436	0.0	0	$193	$390	$60	$330	1.7	1,446
ECM 2	Retrofit Fixtures with LED Lamps	Yes	187,868	0.0	0	$25,296	$62,019	$20,564	$41,455	1.6	189,182
Lighting Control Measures			**22,995**	**0.0**	**0**	**$3,096**	**$5,400**	**$0**	**$5,400**	**1.7**	**23,156**
ECM 3	Install Photocell Controls	Yes	22,995	0.0	0	$3,096	$5,400	$0	$5,400	1.7	23,156
TOTALS			**212,300**	**0.0**	**0**	**$28,586**	**$67,809**	**$20,624**	**$47,185**	**1.7**	**213,784**

* - 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)
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** - 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		**189,305**	**0.0**	**0**	**$25,489**	**$62,409**	**$20,624**	**$41,785**	**1.6**	**190,628**
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ECM 2	Retrofit Fixtures with LED Lamps	187,868	0.0	0	$25,296	$62,019	$20,564	$41,455	1.6	189,182

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 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: all areas with fluorescent fixtures with T12 tubes

ECM 2: Retrofit Fixtures with LED Lamps

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

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

Affected Building Areas: HID or CFLs

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)
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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 Photocell Controls

Install photocells to eliminate exterior lighting use during daytime periods.

Photocells or photocell sensors are lighting controls used for dusk to dawn applications to automatically turn the fixtures on or off. Photo controls detect the amount of light outside and once the light level reaches a low point, the fixture will switch on. During the day, the photocell will detect higher amounts of light and will turn the fixture off.

Photocells may be fixture mounted or wired externally and connected by line voltage to a single light fixture or to a series of fixtures.

This measure reduces energy use in exterior areas to restrict operation to non-daylight periods.

Note that maintenance of existing photocells will help ensure that lamps are operational only when needed.

Affected Building Areas: exterior LED ceiling mount fixtures under solar canopy (observed operating during daylight hours)

4.3 Measures for Future Consideration

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

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

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

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

Electric Sub Metering

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

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.

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.

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

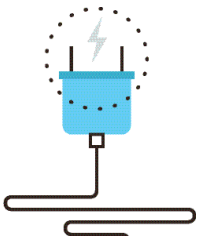
Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure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

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.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[5]. Your local utility may offer incentives or rebates for this equipment.

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.

[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

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

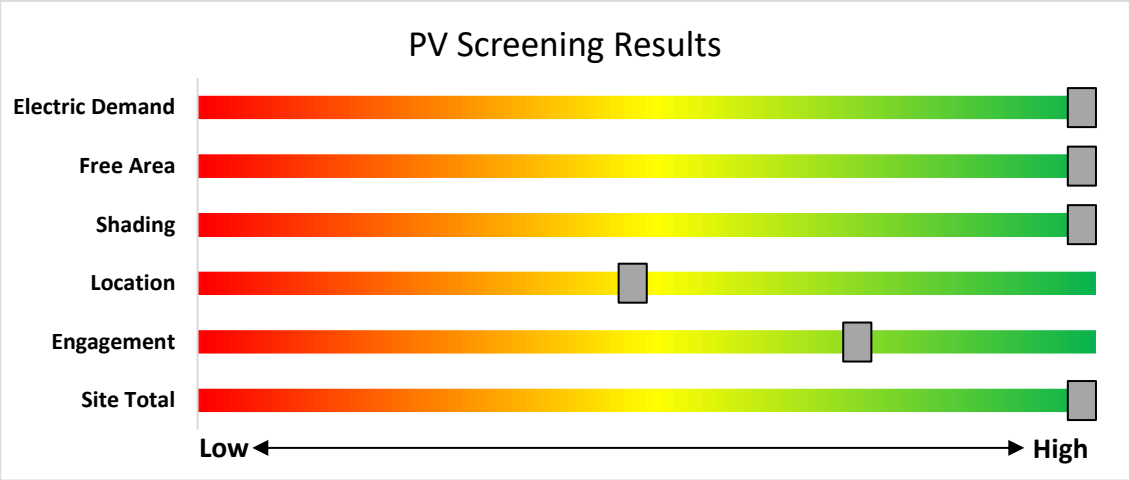
Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution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

The campus has solar installed at multiple locations. We evaluated the available rooftop spaces of buildings on the main campus meter.

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	1,457	kW DC STC
Electric Generation	1,735,827	kWh/yr
Displaced Cost	$233,720	/yr
Installed Cost	$5,682,300	

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

7 Electric Vehicles (EV)

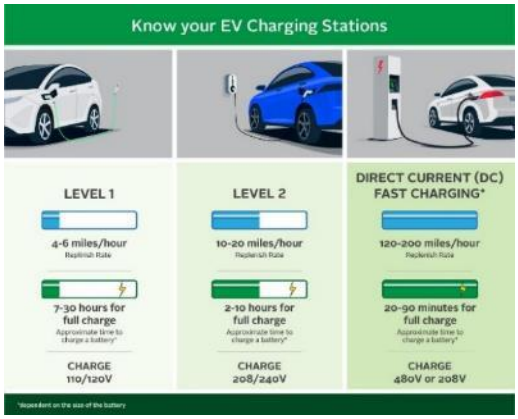
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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

7.1 Electric Vehicle Charging

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

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



The preliminary assessment of EV charging at the facility shows that there is medium to 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.

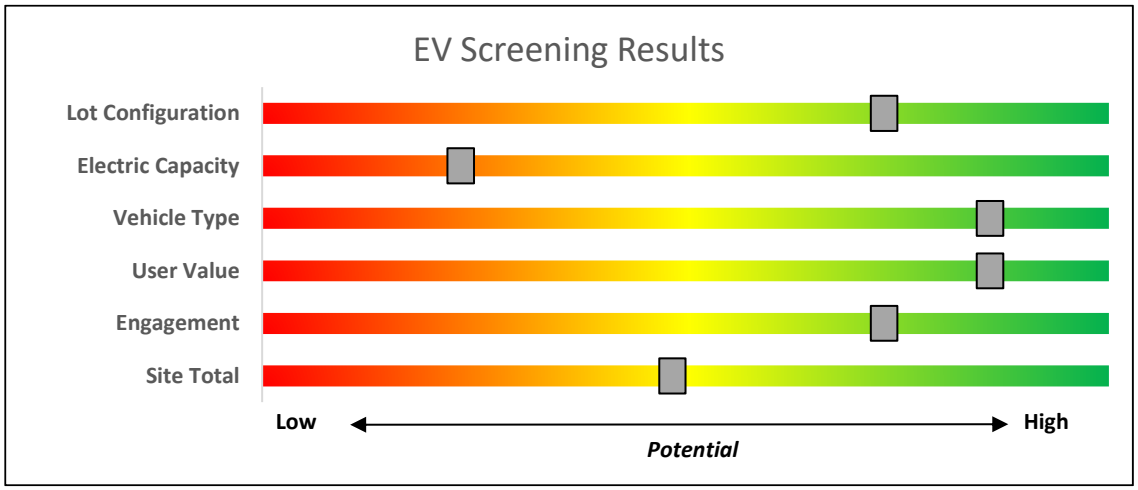


Figure 9 – EV Charger Screening

Electric Vehicle Programs Available

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

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

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

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

8 Project Funding and Incentives

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

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

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

Equipment Examples

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

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

Direct Install

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

Incentives

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

How to Participate

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

Engineered Solutions

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

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

8.2 New Jersey's Clean Energy Programs

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

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

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

Competitive Solar Incentive Program

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

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 PROJECT DEVELOPMENT

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

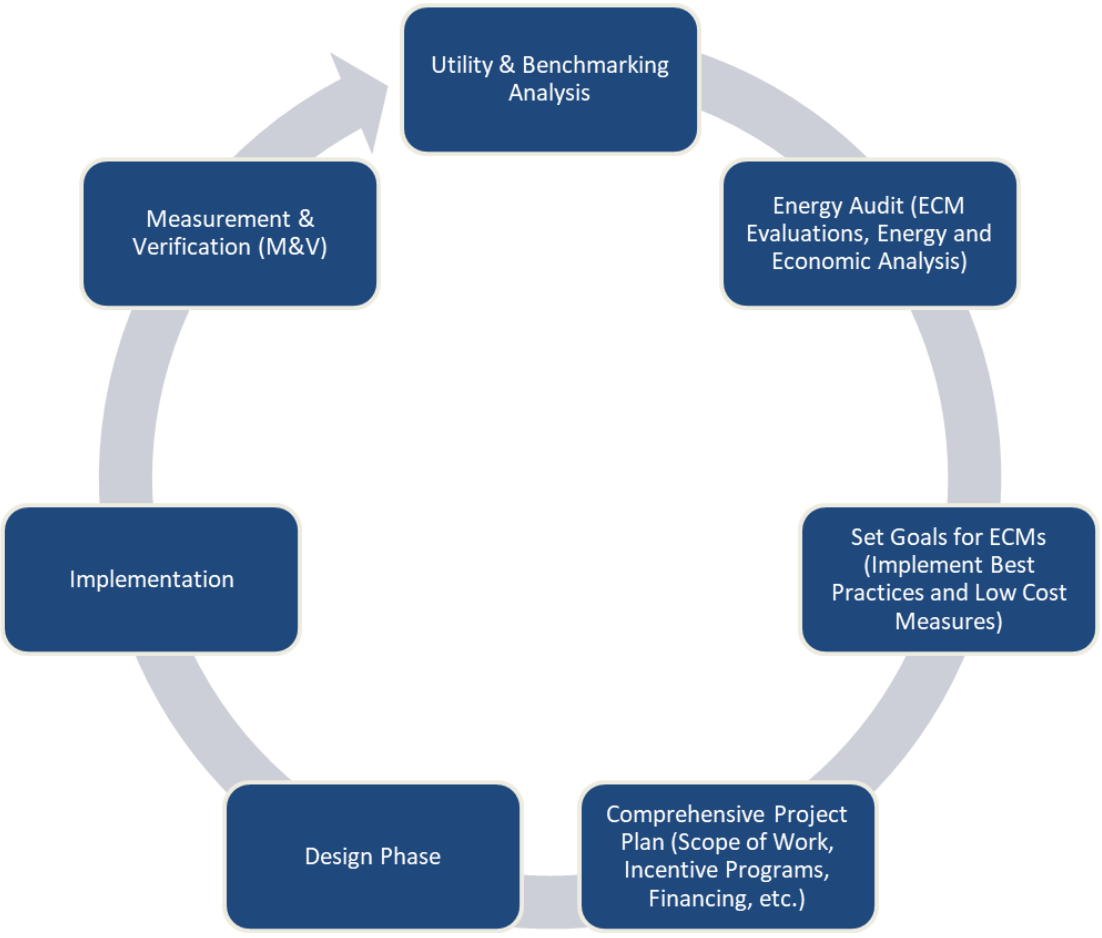


Figure 10 – Project Development Cycle

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[6].

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[7].

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

[7] 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
Exterior 1	1	Compact Fluorescent: (1) 13W Biaxial Plug-In Lamp	Photocell		13	4,300	2	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Photocell	10	4,300	0.0	13	0	$2	$13	$1	6.6
Exterior 1	1	High-Pressure Sodium: (1) 150W Lamp	Photocell		188	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	45	4,300	0.0	615	0	$83	$184	$50	1.6
Exterior 1	1	High-Pressure Sodium: (1) 175W Lamp	Photocell		210	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	675	0	$91	$199	$50	1.6
Exterior 1	5	High-Pressure Sodium: (1) 200W Lamp	Photocell		250	4,300	2	Relamp	No	5	LED Lamps - E39: ≤125 W Lamp	Photocell	60	4,300	0.0	4,085	0	$550	$1,061	$250	1.5
Exterior 1	7	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	7	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	6,622	0	$892	$1,666	$350	1.5
Exterior 1	7	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	7	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	6,622	0	$892	$1,666	$350	1.5
Exterior 1	5	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	5	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	4,730	0	$637	$1,190	$250	1.5
Exterior 1	2	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	1,892	0	$255	$476	$100	1.5
Exterior 1	2	High-Pressure Sodium: (1) 400W Lamp	Photocell		465	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	120	4,300	0.0	2,967	0	$399	$599	$100	1.2
Exterior 1	3	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	3	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	2,838	0	$382	$714	$150	1.5
Exterior 1	6	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	6	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	5,676	0	$764	$1,428	$300	1.5
Exterior 1	3	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	3	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	2,838	0	$382	$714	$150	1.5
Exterior 1	17	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	17	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	16,082	0	$2,165	$4,046	$850	1.5
Exterior 1	4	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	4	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	3,784	0	$510	$952	$200	1.5
Exterior 1	6	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	6	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	5,676	0	$764	$1,428	$300	1.5
Exterior 1	1	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	946	0	$127	$238	$50	1.5
Exterior 1	2	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	1,892	0	$255	$476	$100	1.5
Exterior 1	2	High-Pressure Sodium: (1) 400W Lamp	Photocell		465	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	120	4,300	0.0	2,967	0	$399	$599	$100	1.2
Exterior 1	3	High-Pressure Sodium: (1) 400W Lamp	Photocell		465	4,300	2	Relamp	No	3	LED Lamps - E39: ≤125 W Lamp	Photocell	120	4,300	0.0	4,451	0	$599	$898	$150	1.2
Exterior 1	3	High-Pressure Sodium: (1) 400W Lamp	Photocell		465	4,300	2	Relamp	No	3	LED Lamps - E39: ≤125 W Lamp	Photocell	120	4,300	0.0	4,451	0	$599	$898	$150	1.2
Exterior 1	6	LED - Fixtures: Other	Photocell		15	4,300		None	No	6	LED - Fixtures: Other	Photocell	15	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	1	LED - Fixtures: Other	Photocell		15	4,300		None	No	1	LED - Fixtures: Other	Photocell	15	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	14	LED - Fixtures: Other	Photocell		5	4,300		None	No	14	LED - Fixtures: Other	Photocell	5	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	3	LED - Fixtures: Other	Photocell		6	4,300		None	No	3	LED - Fixtures: Other	Photocell	6	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	4	LED - Fixtures: Other	Photocell		7	4,300		None	No	4	LED - Fixtures: Other	Photocell	7	4,300	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
Exterior 1	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Photocell		30	4,300		None	No	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Photocell	30	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	8	LED - Fixtures: Bollard Fixture	Photocell		20	4,300		None	No	8	LED - Fixtures: Bollard Fixture	Photocell	20	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	1	LED - Fixtures: Flood Fixture	Photocell		250	4,300		None	No	1	LED - Fixtures: Flood Fixture	Photocell	250	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	8	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell		100	4,300		None	No	8	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell	100	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell		50	4,300		None	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell	50	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	8	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell		75	4,300		None	No	8	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell	75	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	16	LED - Fixtures: Outdoor Post-Mount	Photocell		30	4,300		None	No	16	LED - Fixtures: Outdoor Post-Mount	Photocell	30	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	7	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		300	4,300		None	No	7	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	300	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		50	4,300		None	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	50	4,300	0.0	0	0	$0	$0	$0	0.0
Exterior 1	4	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Photocell		127	4,300	1	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Photocell	44	4,300	0.0	1,436	0	$193	$390	$60	1.7
Exterior 1	48	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Photocell		114	4,300	2	Relamp	No	48	LED - Linear Tubes: (4) 4' Lamps	Photocell	58	4,300	0.0	11,558	0	$1,556	$3,505	$960	1.6
Exterior 1	8	Metal Halide: (1) 1000W Lamp	Photocell		1,080	4,300	2	Relamp	No	8	LED Lamps - E39: >250W Lamp	Photocell	300	4,300	0.0	26,832	0	$3,613	$2,447	$1,200	0.3
Exterior 1	9	Metal Halide: (1) 100W Lamp	Photocell		128	4,300	2	Relamp	No	9	LED Lamps - E39: ≤125 W Lamp	Photocell	30	4,300	0.0	3,793	0	$511	$1,375	$450	1.8
Exterior 1	1	Metal Halide: (1) 100W Lamp	Photocell		128	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	30	4,300	0.0	421	0	$57	$153	$50	1.8
Exterior 1	9	Metal Halide: (1) 100W Lamp	Photocell		128	4,300	2	Relamp	No	9	LED Lamps - E39: ≤125 W Lamp	Photocell	30	4,300	0.0	3,793	0	$511	$1,375	$450	1.8
Exterior 1	1	Metal Halide: (1) 175W Lamp	Photocell		215	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	697	0	$94	$199	$50	1.6
Exterior 1	3	Metal Halide: (1) 175W Lamp	Photocell		215	4,300	2	Relamp	No	3	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	2,090	0	$281	$598	$150	1.6
Exterior 1	1	Metal Halide: (1) 175W Lamp	Photocell		215	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	697	0	$94	$199	$50	1.6
Exterior 1	5	Metal Halide: (1) 175W Lamp	Photocell		215	4,300	2	Relamp	No	5	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	3,483	0	$469	$997	$250	1.6
Exterior 1	6	Metal Halide: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	6	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	5,676	0	$764	$1,428	$300	1.5
Exterior 1	1	Metal Halide: (1) 400W Lamp	Photocell		458	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	120	4,300	0.0	1,453	0	$196	$299	$50	1.3
Exterior 1	2	Metal Halide: (1) 70W Lamp	Photocell		95	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	21	4,300	0.0	636	0	$86	$266	$100	1.9
Exterior 1	54	Metal Halide: (1) 70W Lamp	Photocell		95	4,300	2	Relamp	No	54	LED Lamps - E39: ≤125 W Lamp	Photocell	21	4,300	0.0	17,183	0	$2,314	$7,173	$2,700	1.9
Exterior 1	2	Metal Halide: (1) 70W Lamp	Photocell		95	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	21	4,300	0.0	636	0	$86	$266	$100	1.9
Exterior 1	1	Metal Halide: (1) 150W Lamp	Photocell		190	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	45	4,300	0.0	624	0	$84	$184	$50	1.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior 1	4	Metal Halide: (1) 175W Lamp	Photocell		215	4,300	2	Relamp	No	4	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	2,786	0	$375	$797	$200	1.6
Exterior 1	1	Metal Halide: (1) 175W Lamp	Photocell		215	4,300	2	Relamp	No	1	LED Lamps - E39: ≤125 W Lamp	Photocell	53	4,300	0.0	697	0	$94	$199	$50	1.6
Exterior 1	5	Metal Halide: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	5	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	4,730	0	$637	$1,190	$250	1.5
Exterior 1	7	Metal Halide: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	7	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	6,622	0	$892	$1,666	$350	1.5
Exterior 1	2	Metal Halide: (1) 250W Lamp	Photocell		295	4,300	2	Relamp	No	2	LED Lamps - E39: ≤125 W Lamp	Photocell	75	4,300	0.0	1,892	0	$255	$476	$100	1.5
Exterior 1	58	Mercury Vapor: (1) 1000W Lamp	Breaker Panel		1,075	256	2	Relamp	No	58	LED Lamps - E39: >250W Lamp	Breaker Panel	300	256	0.0	11,507	0	$1,549	$17,743	$8,700	5.8
Exterior 1	105	LED - Fixtures: Ceiling Mount	None		50	8,760	3	None	Yes	105	LED - Fixtures: Ceiling Mount	Photocell	50	4,380	0.0	22,995	0	$3,096	$5,400	$0	1.7
Security Booth Exterior 1	4	LED Lamps: (1) 9W Screw-In Lamp	Wall Switch		9	8,736		None	No	4	LED Lamps: (1) 9W Screw-In Lamp	Wall Switch	9	8,736	0.0	0	0	$0	$0	$0	0.0
Security Booth Office	3	Compact Fluorescent: (1) 42W Biaxial Plug-In Lamp	Wall Switch	S	42	8,736	2	Relamp	No	3	LED Lamps: LED Lamps	Wall Switch	29	8,736	0.0	242	0	$33	$38	$3	1.1

Packaged HVAC Inventory & Recommendations

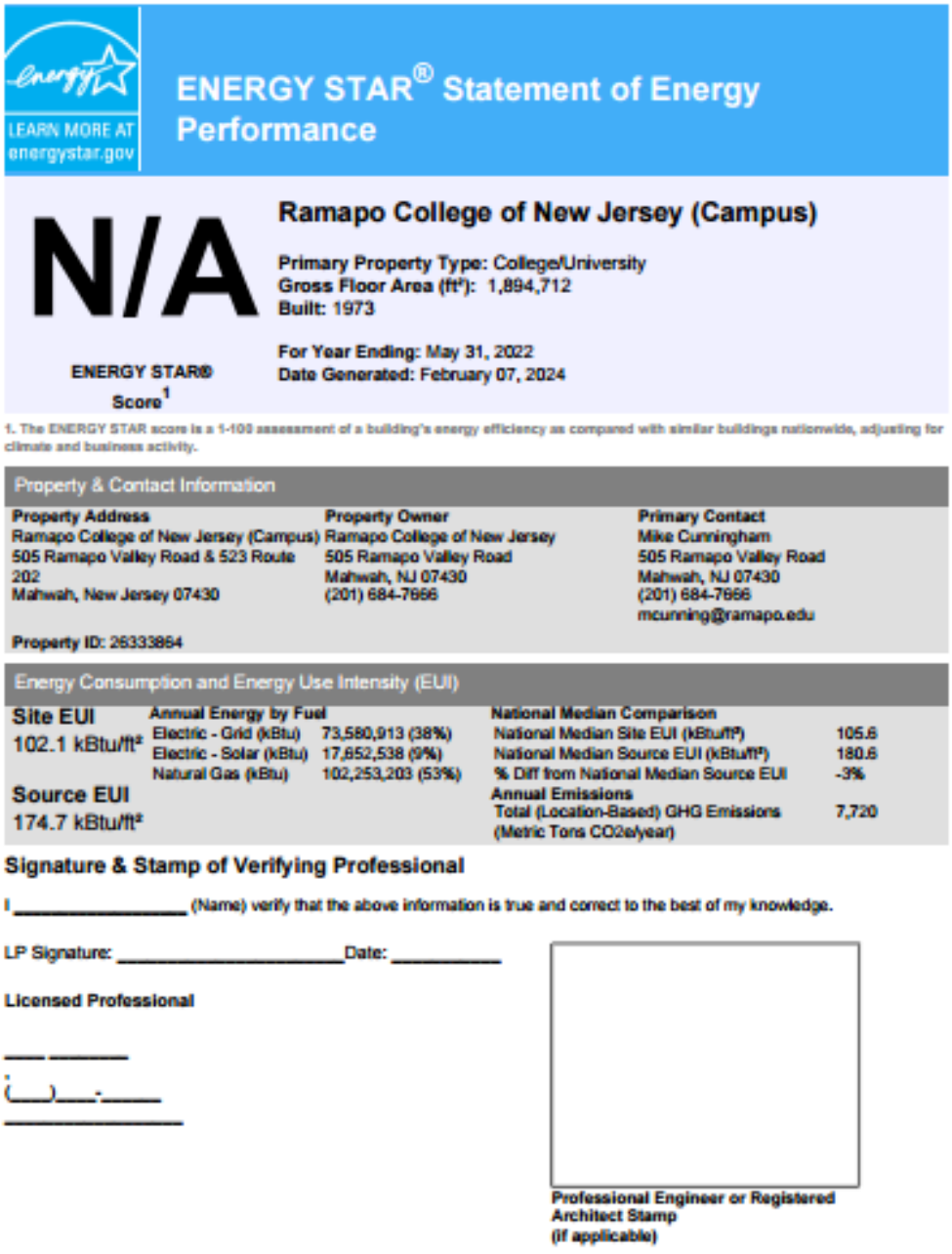
		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	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
Security Booth - Office	Security Booth - Office	1	Electric Resistance Heat		13.70		1 COP	Dayton	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Security Booth - Office	Security Booth - Office	1	Electric Resistance Heat		13.70		1 COP	Dayton	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Security Booth	Security Booth - Office	1	Ductless Mini-Split HP	0.75	11.00	11.00	3.3 COP	Samsung	Unknown	W		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
Security Booth Office	1	Desktop Computer	200	Yes	Unknown	Unknown
Security Booth Office	1	Microwave	1,000	Yes	Unknown	Unknown
Security Booth Office	1	Printer	150	Yes	Unknown	Unknown
Security Booth Office	1	Mini Refrigerator	126	No	Unknown	Unknown

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.



ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Ramapo College of New Jersey (Campus)

Primary Property Type: College/University
Gross Floor Area (ft²): 1,894,712
Built: 1973

For Year Ending: May 31, 2022
Date Generated: February 07, 2024

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Ramapo College of New Jersey (Campus) 505 Ramapo Valley Road & 523 Route 202 Mahwah, New Jersey 07430	Ramapo College of New Jersey 505 Ramapo Valley Road Mahwah, NJ 07430 (201) 684-7666	Mike Cunningham 505 Ramapo Valley Road Mahwah, NJ 07430 (201) 684-7666 mcunning@ramapo.edu

Property ID: 26333864

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
102.1 kBtu/ft²

Source EUI
174.7 kBtu/ft²

Annual Energy by Fuel		National Median Comparison	
Electric - Grid (kBtu)	73,580,913 (38%)	National Median Site EUI (kBtu/ft²)	105.6
Electric - Solar (kBtu)	17,652,538 (9%)	National Median Source EUI (kBtu/ft²)	180.6
Natural Gas (kBtu)	102,253,203 (53%)	% Diff from National Median Source EUI	-3%
		Annual Emissions	
		Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	7,720

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 $1/8^{th}$ 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.