Local Government Energy Audit Report

Wanaque Academic Center

July 6, 2023

Prepared for:

Passaic County Community College

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Prepared by:

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Disclaimer

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

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

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

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

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

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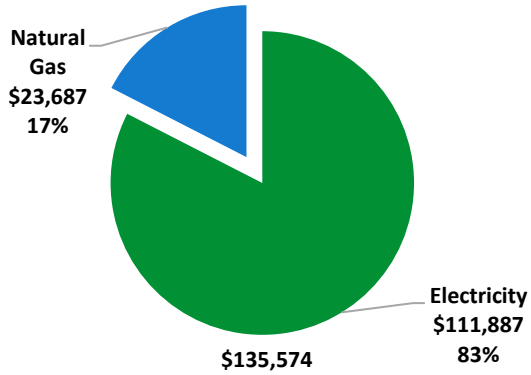
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Wanaque Academic Center. 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: $135,574 Electricity: 988,804 kWh Natural Gas: 29,817 Therms	
ENERGY STAR® Benchmarking Score	N/A *(1-100 scale)*	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.

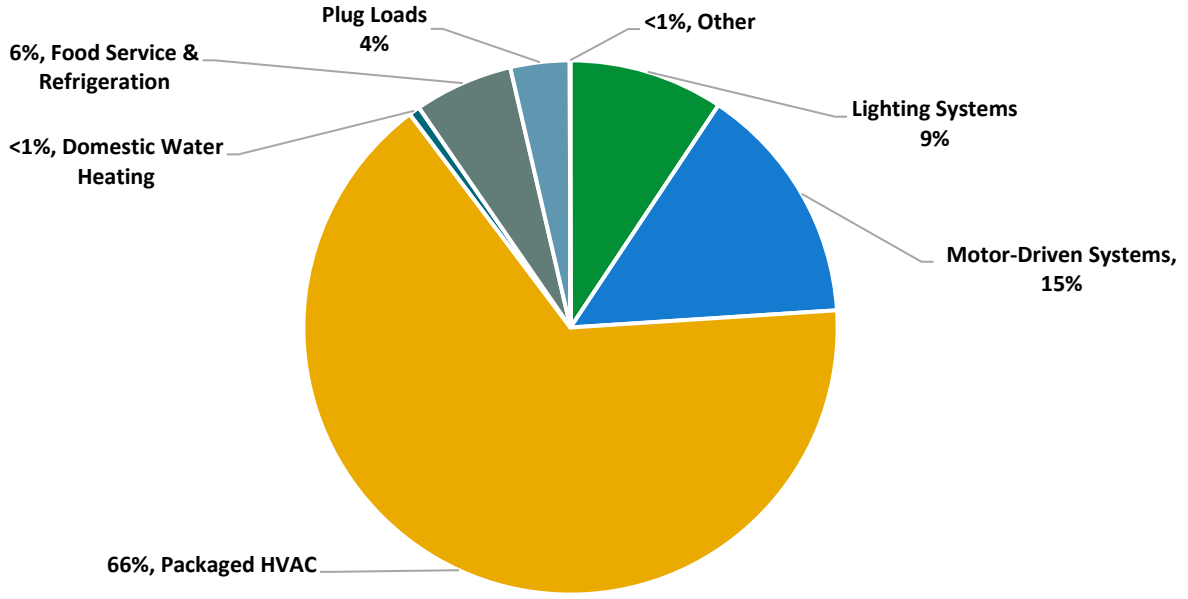


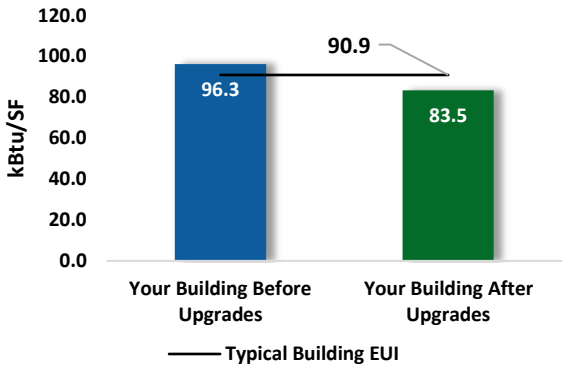
Figure 1 - Energy Use by System

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.

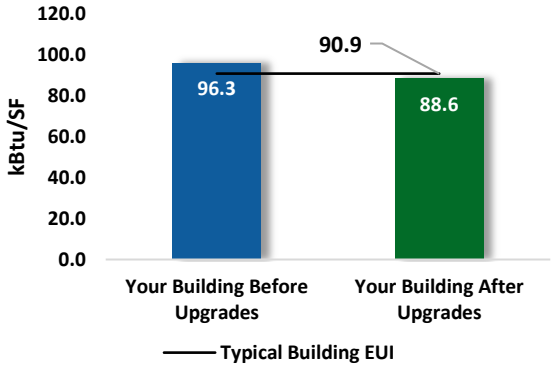
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$384,119
Potential Rebates & Incentives[1]	$37,995
Annual Cost Savings	$25,537
Annual Energy Savings	Electricity: 218,965 kWh Natural Gas: 956 Therms
Greenhouse Gas Emission Savings	116 Tons
Simple Payback	13.6 Years
Site Energy Savings (All Utilities)	13%



Scenario 2: Cost Effective Package[2]

Installation Cost	$115,976
Potential Rebates & Incentives	$23,985
Annual Cost Savings	$17,236
Annual Energy Savings	Electricity: 153,286 kWh Natural Gas: -138 Therms
Greenhouse Gas Emission Savings	76 Tons
Simple Payback	5.3 Years
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			**66,461**	**21.2**	**-14**	**$7,413**	**$34,257**	**$7,840**	**$26,417**	**3.6**	**65,342**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	66,461	21.2	-14	$7,413	$34,257	$7,840	$26,417	3.6	65,342
Lighting Control Measures			**25,183**	**7.2**	**-5**	**$2,808**	**$27,987**	**$6,785**	**$21,202**	**7.6**	**24,743**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	20,600	6.3	-4	$2,297	$23,262	$2,900	$20,362	8.9	20,240
ECM 3	Install High/Low Lighting Controls	Yes	4,583	1.0	-1	$511	$4,725	$3,885	$840	1.6	4,502
Variable Frequency Drive (VFD) Measures			**60,091**	**17.1**	**0**	**$6,799**	**$52,863**	**$9,300**	**$43,563**	**6.4**	**60,511**
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	60,091	17.1	0	$6,799	$52,863	$9,300	$43,563	6.4	60,511
Unitary HVAC Measures			**65,679**	**37.3**	**25**	**$7,631**	**$248,831**	**$12,510**	**$236,321**	**31.0**	**69,079**
ECM 5	Install High Efficiency Air Conditioning Units	No	64,215	35.7	25	$7,466	$242,649	$12,510	$230,139	30.8	67,605
ECM 6	Install High Efficiency Heat Pumps	No	1,464	1.6	0	$166	$6,182	$0	$6,182	37.3	1,474
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**84**	**$670**	**$19,312**	**$1,500**	**$17,812**	**26.6**	**9,868**
ECM 7	Install High Efficiency Furnaces	No	0	0.0	84	$670	$19,312	$1,500	$17,812	26.6	9,868
Domestic Water Heating Upgrade			**0**	**0.0**	**5**	**$40**	**$409**	**$10**	**$399**	**10.0**	**589**
ECM 8	Install Low-Flow DHW Devices	Yes	0	0.0	5	$40	$409	$10	$399	10.0	589
Food Service & Refrigeration Measures			**1,551**	**0.2**	**0**	**$176**	**$460**	**$50**	**$410**	**2.3**	**1,562**
ECM 9	Vending Machine Control	Yes	1,551	0.2	0	$176	$460	$50	$410	2.3	1,562
TOTALS (COST EFFECTIVE MEASURES)			**153,286**	**45.8**	**-14**	**$17,236**	**$115,976**	**$23,985**	**$91,991**	**5.3**	**152,747**
TOTALS (ALL MEASURES)			**218,965**	**83.0**	**96**	**$25,537**	**$384,119**	**$37,995**	**$346,125**	**13.6**	**231,694**

* - 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 Wanaque Academic Center. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

2.1 Site Overview

On January 20, 2023, TRC performed an energy audit at Wanaque Academic Center located in Wanaque Academic Center, New Jersey. TRC met with Brian Egan to review the facility operations and help focus our investigation on specific energy-using systems.

Wanaque Academic Center is a one-story, 66,000 square foot building built in 1999. Spaces include classrooms, theater, offices, dining areas, corridors, teaching kitchen, and mechanical space.

2.2 Building Occupancy

The facility is occupied Monday through Friday during regular business hours.

The facility is occupied intermittently, as needed for maintenance and operations.

Building Name	Weekday/Weekend	Operating Schedule
Wanaque Academic Center	Weekday	7:00 AM - 10:00 PM
	Weekend	7:00 AM - 5:00 PM

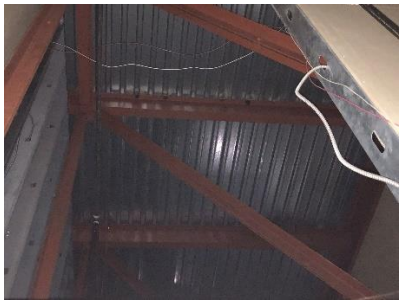
Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with exterior finishing. The roof is flat and covered with white membrane, and it is in fair condition.

Roof

Exterior



Structural Components of Addition

Roof

Exterior

Interior of Original Structure

Most of the windows are double glazed and have aluminum frames with a thermal break. The glass-to-frame seals are in fair condition. The operable window weather seals are in fair condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in fair condition with undamaged door seals. Degraded window and door seals increase drafts and outside air infiltration.

Windows

Exterior Door

Windows

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Fixture types include 2-lamp or 3-lamp, 4-foot-long troffer, recessed, or surface mounted fixtures and 2-foot fixtures with linear tube lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Additionally, there are some plug-in compact fluorescent lamps (CFL), incandescent, and LED lamps. Many of the fixtures in the addition are LED recessed or pendent fixtures.

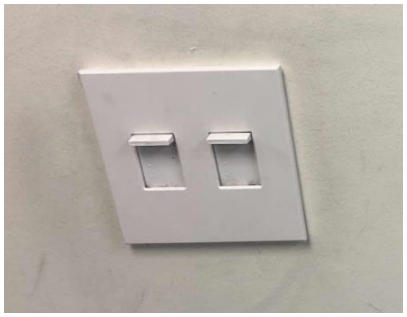
The fitness room fixtures have manually controlled high bay induction lamps. Theater fixtures have manually controlled, linear LED fixtures and are. All exit signs are LED. Most fixtures are in fair condition. Interior lighting levels were generally sufficient.

Recessed Fixture

Recessed Fixture

Pendant Mount Fixture

Most lighting fixtures are controlled manually and the remainder by occupancy sensors.



Manual Controls

Wall Switch Occupancy Sensor

Ceiling Mount Occupancy Sensor

Exterior fixtures include LED wall packs and floodlights and canopy fixtures with CFLs.

The pole mounted flood fixtures incorporate LED lamps. Exterior fixtures are timer and/or photocell controlled.

Recessed Can

Surface Mount Floodlight

Timeclock

Pole Lights Retrofitted with LED Lamps and LED Pole Light Fixture

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

Computer rooms use ductless mini split air conditioning (AC) units. These vary in capacity between 1 ton and 3 tons. The units are in poor and fair condition depending on the unit. They range in efficiency between 10 EER to 11.18 EER.

Outdoor and Indoor Ductless Mini Split AC Components

Unitary Heating Equipment

Mechanical and corridor spaces are heated by electric resistance heaters or suspended gas-fired furnaces. These vary in capacity between 17.06 MBh and 250 MBh. The units are in fair condition. Equipment is controlled by a manual thermostat.

Electric Resistance Heating Units in Mechanical Space and Corridor, and Suspended Gas-fired Furnace

Packaged Units

Most of the facility is served by packaged roof top units (RTUs). There are 19 gas-fired burner units ranging in size from 117 MBh to 650 MBh. Most of these units are equipped with economizers that are in fair condition.

Refer to Appendix A for detailed information about each unit.

Packaged Rooftop Units

Air Handling Units (AHUs)

The library is conditioned by two air handling units. This units are equipped with a supply fan motor, 400 MBh duct furnace each, and refrigerant coil for cooling. They are physically located in a mechanical room above the library. The supply fan motors are 5 hp, constant speed, and standard efficiency.

This system includes two outdoor condensing units, one is 10.3 tons and EER of 9, and the other is 23.4 tons with an EER of 8. Both are in poor condition. This is a split air-conditioning (AC) system configuration.

The HVAC systems is controlled by thermostats.

Air Handling Unit

Duct Furnace

Remote Outdoor Condensing Unit

2.6 Building Automation System (BAS)

A Carrier BAS controls the addition HVAC equipment, and addition package units. The BAS provides equipment scheduling control and monitors space temperatures, supply air temperatures, humidity.

The site staff expressed an interest in expanding the level of control provided by the BAS, replacing the BAS, and receiving additional training on operating the BAS.

BAS diagrams

2.7 Domestic Hot Water

Hot water is produced by a 91-gallon, 199 MBh gas-fired storage water heater with an efficiency of 80% and two, 97-gallon direct vent 199 MBh gas-fired storage water heaters with efficiencies of 97% used for the kitchen.

Two fractional hp circulation pumps distribute water to end uses. The circulation pumps operate continuously. The domestic hot water pipes are insulated, and the insulation is in fair condition.

Storage Water Heaters

Storage Water Heaters and Domestic Hot Water Pump

2.8 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used for teaching. Most cooking is done using a gas-fired oven. Equipment is a mix of standard and high efficiency and is in good condition.

The facility has three dishwashers all an ENERGY STAR rated.

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

Bread Oven

Mix of Cooking Equipment

Rack Oven

2.9 Refrigeration

The kitchen has several stand-up refrigerators with solid doors. There is also a stand-up solid door freezer. All equipment is standard and in good condition. The walk-in refrigerator has an estimated .15 ton to .25-ton compressor located above the unit and a two-fan evaporator.

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

Stand-up refrigerators

2.10 Plug Load and Vending Machines

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

There are 274 computer workstations throughout the facility. Plug loads include general cafe and office equipment. There are classroom typical loads such as smartboards, projectors, and fans.

There are several residential-style refrigerators and mini refrigerators throughout the building.

There is one refrigerated beverage vending machine and one non-refrigerated vending machine. Vending machines are not equipped with occupancy-based controls.

Desktop Computers

Copier

Ice Cream Machine

2.11 Water-Using Systems

There are ten restrooms with toilets and sinks. Faucet flow rates are at 0.5 gallons per minute (gpm) or higher.

Lavatory Sink

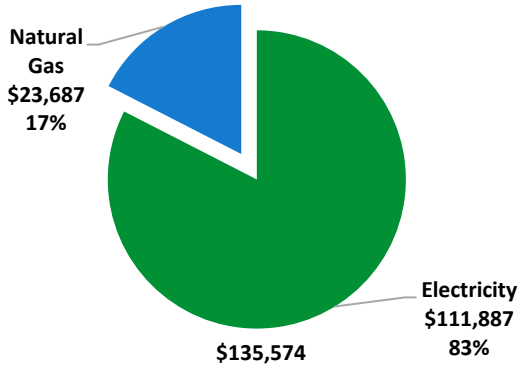
Spray Valve

Kitchen Sink

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	988,804 kWh	$111,887
Natural Gas	29,817 Therms	$23,687
Total		**$135,574**



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.

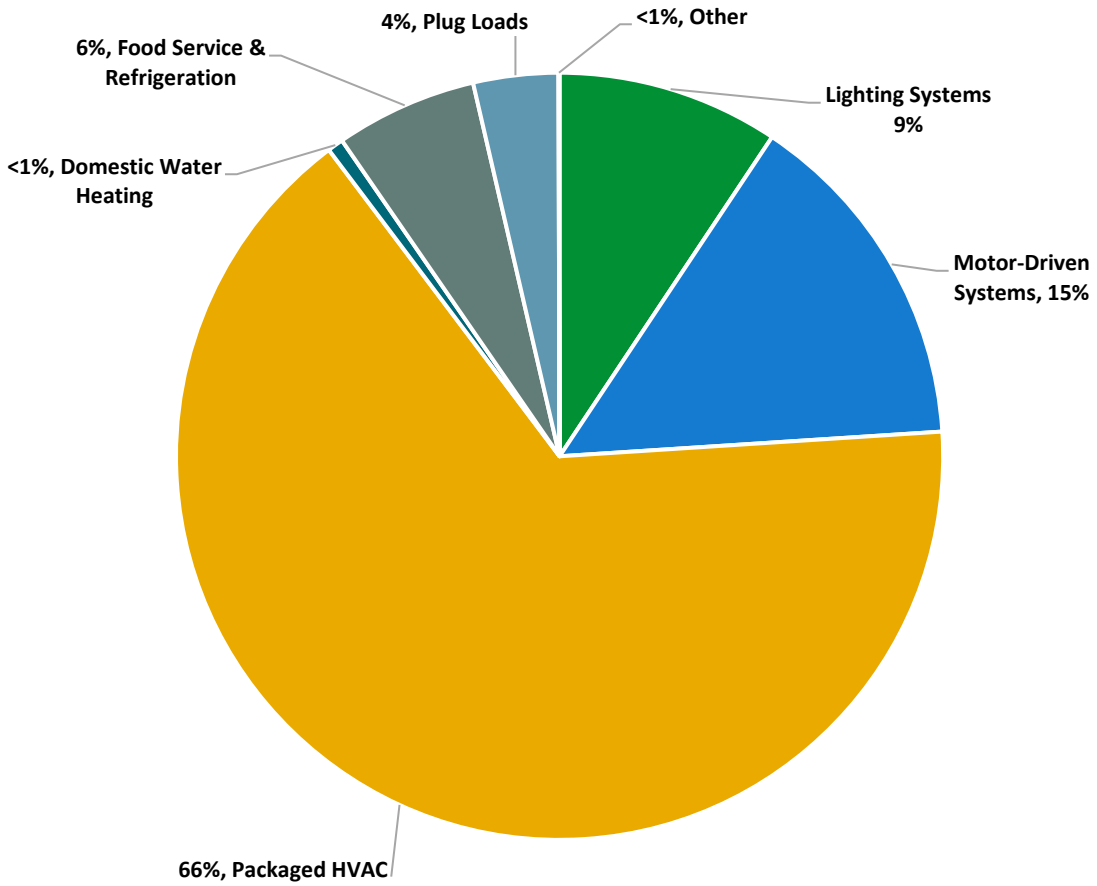
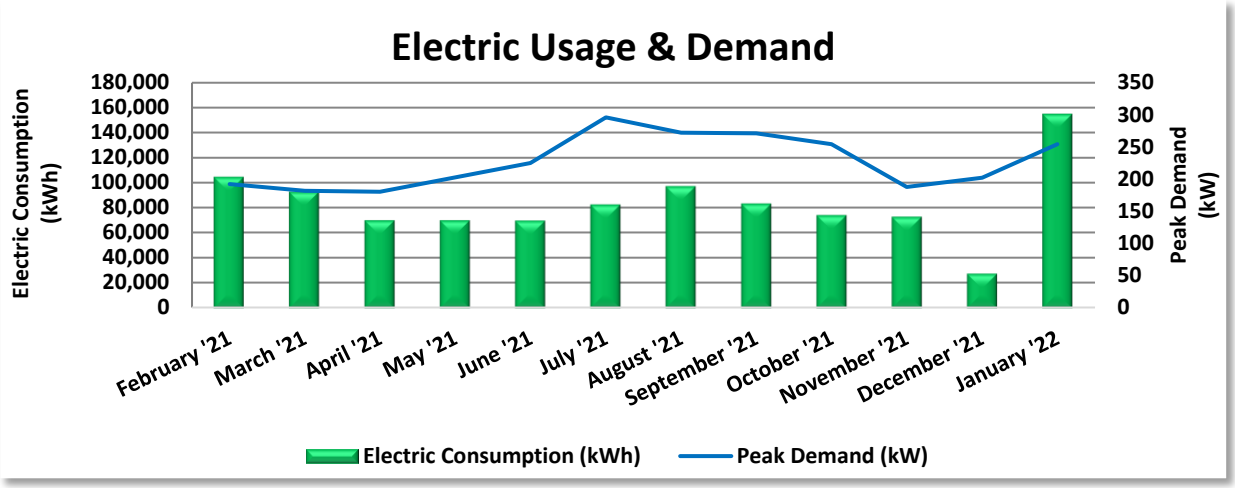


Figure 4 - Energy Balance

3.1 Electricity

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



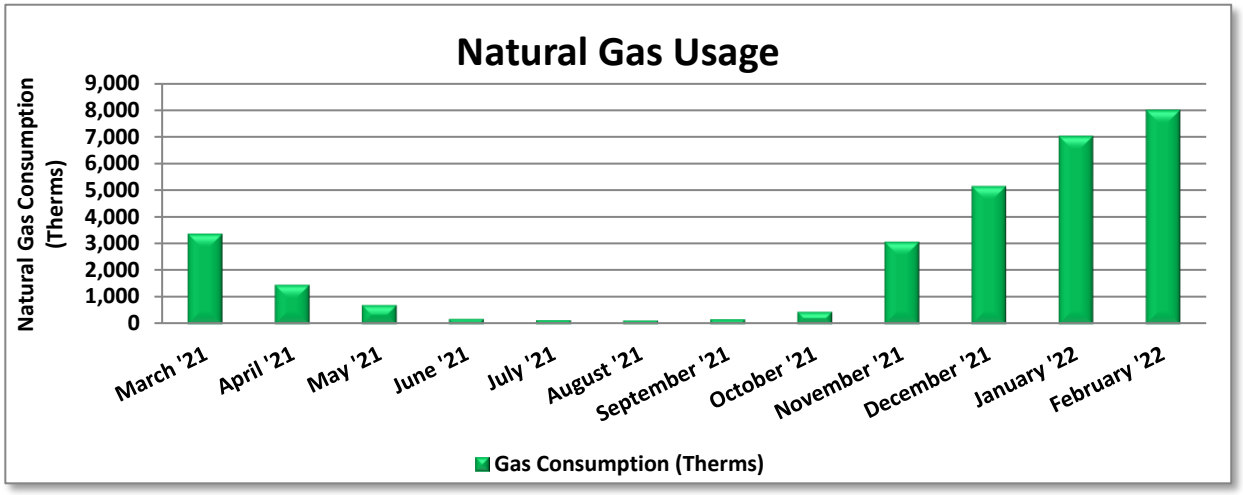
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
3/2/21	33	104,560	192	$1,186	$11,065
4/1/21	30	92,800	182	$1,120	$9,845
4/30/21	29	70,000	180	$1,111	$7,785
6/2/21	33	69,960	202	$1,342	$8,280
7/1/21	29	69,920	225	$1,490	$8,276
8/2/21	32	82,560	296	$1,962	$10,014
8/31/21	29	97,200	272	$1,804	$10,874
10/1/21	31	83,280	271	$1,672	$9,451
11/1/21	31	74,160	254	$1,578	$8,586
12/1/21	30	72,960	188	$1,386	$8,320
1/3/22	33	27,680	202	$1,492	$4,161
2/1/22	29	154,560	254	$1,876	$16,456
Totals	**369**	**999,640**	**296**	**$18,020**	**$113,113**
Annual	**365**	**988,804**	**296**	**$17,824**	**$111,887**

Notes:

- Peak demand of 296 kW occurred in July '21.
- Average demand over the past 12 months was 227 kW.
- The average electric cost over the past 12 months was $0.113/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, with natural gas supply provided by Direct Energy, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
3/30/21	32	3,377	$3,006
4/28/21	29	1,470	$961
5/26/21	28	719	$544
6/28/21	33	203	$253
7/28/21	30	156	$231
8/25/21	28	149	$227
9/24/21	30	188	$246
10/26/21	32	462	$403
11/24/21	29	3,080	$2,888
12/28/21	34	5,153	$4,116
1/26/22	29	7,025	$5,175
2/28/22	33	7,998	$5,768
Totals	**367**	**29,981**	**$23,817**
Annual	**365**	**29,817**	**$23,687**

Notes:

- The average gas cost for the past 12 months is $0.794/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	**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.

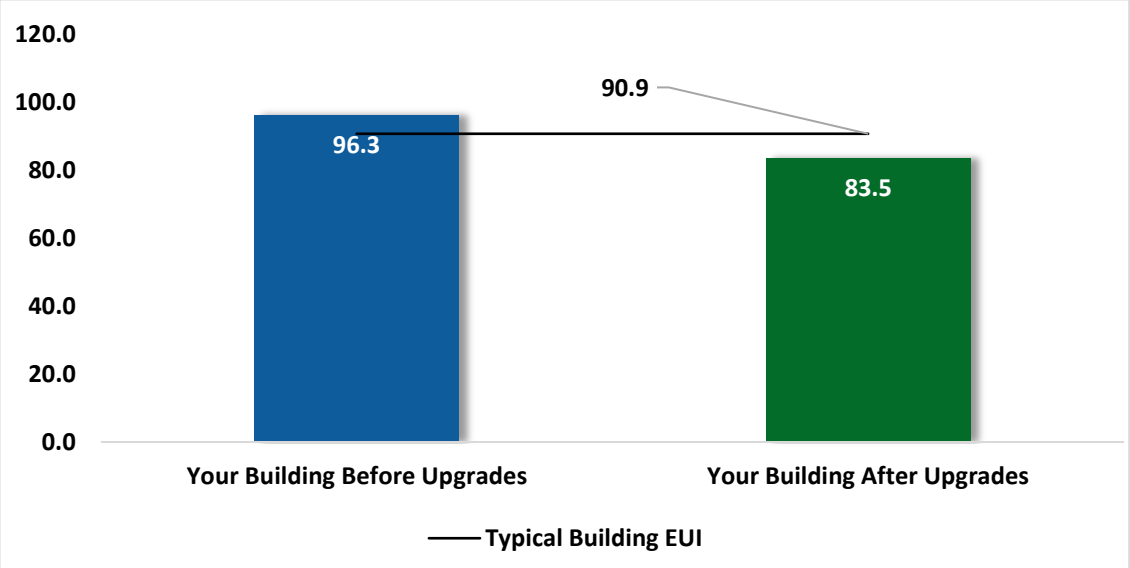


Figure 5 - Energy Use Intensity Comparison[3]

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. 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			**66,461**	**21.2**	**-14**	**$7,413**	**$34,257**	**$7,840**	**$26,417**	**3.6**	**65,342**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	66,461	21.2	-14	$7,413	$34,257	$7,840	$26,417	3.6	65,342
Lighting Control Measures			**25,183**	**7.2**	**-5**	**$2,808**	**$27,987**	**$6,785**	**$21,202**	**7.6**	**24,743**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	20,600	6.3	-4	$2,297	$23,262	$2,900	$20,362	8.9	20,240
ECM 3	Install High/Low Lighting Controls	Yes	4,583	1.0	-1	$511	$4,725	$3,885	$840	1.6	4,502
Variable Frequency Drive (VFD) Measures			**60,091**	**17.1**	**0**	**$6,799**	**$52,863**	**$9,300**	**$43,563**	**6.4**	**60,511**
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	60,091	17.1	0	$6,799	$52,863	$9,300	$43,563	6.4	60,511
Unitary HVAC Measures			**65,679**	**37.3**	**25**	**$7,631**	**$248,831**	**$12,510**	**$236,321**	**31.0**	**69,079**
ECM 5	Install High Efficiency Air Conditioning Units	No	64,215	35.7	25	$7,466	$242,649	$12,510	$230,139	30.8	67,605
ECM 6	Install High Efficiency Heat Pumps	No	1,464	1.6	0	$166	$6,182	$0	$6,182	37.3	1,474
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**84**	**$670**	**$19,312**	**$1,500**	**$17,812**	**26.6**	**9,868**
ECM 7	Install High Efficiency Furnaces	No	0	0.0	84	$670	$19,312	$1,500	$17,812	26.6	9,868
Domestic Water Heating Upgrade			**0**	**0.0**	**5**	**$40**	**$409**	**$10**	**$399**	**10.0**	**589**
ECM 8	Install Low-Flow DHW Devices	Yes	0	0.0	5	$40	$409	$10	$399	10.0	589
Food Service & Refrigeration Measures			**1,551**	**0.2**	**0**	**$176**	**$460**	**$50**	**$410**	**2.3**	**1,562**
ECM 9	Vending Machine Control	Yes	1,551	0.2	0	$176	$460	$50	$410	2.3	1,562
TOTALS			**218,965**	**83.0**	**96**	**$25,537**	**$384,119**	**$37,995**	**$346,125**	**13.6**	**231,694**

* - 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		**66,461**	**21.2**	**-14**	**$7,413**	**$34,257**	**$7,840**	**$26,417**	**3.6**	**65,342**
ECM 1	Retrofit Fixtures with LED Lamps	66,461	21.2	-14	$7,413	$34,257	$7,840	$26,417	3.6	65,342
Lighting Control Measures		**25,183**	**7.2**	**-5**	**$2,808**	**$27,987**	**$6,785**	**$21,202**	**7.6**	**24,743**
ECM 2	Install Occupancy Sensor Lighting Controls	20,600	6.3	-4	$2,297	$23,262	$2,900	$20,362	8.9	20,240
ECM 3	Install High/Low Lighting Controls	4,583	1.0	-1	$511	$4,725	$3,885	$840	1.6	4,502
Variable Frequency Drive (VFD) Measures		**60,091**	**17.1**	**0**	**$6,799**	**$52,863**	**$9,300**	**$43,563**	**6.4**	**60,511**
ECM 4	Install VFDs on Constant Volume (CV) Fans	60,091	17.1	0	$6,799	$52,863	$9,300	$43,563	6.4	60,511
Domestic Water Heating Upgrade		**0**	**0.0**	**5**	**$40**	**$409**	**$10**	**$399**	**10.0**	**589**
ECM 8	Install Low-Flow DHW Devices	0	0.0	5	$40	$409	$10	$399	10.0	589
Food Service & Refrigeration Measures		**1,551**	**0.2**	**0**	**$176**	**$460**	**$50**	**$410**	**2.3**	**1,562**
ECM 9	Vending Machine Control	1,551	0.2	0	$176	$460	$50	$410	2.3	1,562
TOTALS		**153,286**	**45.8**	**-14**	**$17,236**	**$115,976**	**$23,985**	**$91,991**	**5.3**	**152,747**

* - 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		**66,461**	**21.2**	**-14**	**$7,413**	**$34,257**	**$7,840**	**$26,417**	**3.6**	**65,342**
ECM 1	Retrofit Fixtures with LED Lamps	66,461	21.2	-14	$7,413	$34,257	$7,840	$26,417	3.6	65,342

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 Fixtures with LED Lamps

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

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

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes, CFL, or incandescent lamps

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		**25,183**	**7.2**	**-5**	**$2,808**	**$27,987**	**$6,785**	**$21,202**	**7.6**	**24,743**
ECM 2	Install Occupancy Sensor Lighting Controls	20,600	6.3	-4	$2,297	$23,262	$2,900	$20,362	8.9	20,240
ECM 3	Install High/Low Lighting Controls	4,583	1.0	-1	$511	$4,725	$3,885	$840	1.6	4,502

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 2: 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: offices, classrooms, fitness room, library, restrooms, and storage rooms

ECM 3: Install High/Low Lighting Controls

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

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

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

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

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

Affected Building Areas: hallways and stairwells

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		**60,091**	**17.1**	**0**	**$6,799**	**$52,863**	**$9,300**	**$43,563**	**6.4**	**60,511**
ECM 4	Install VFDs on Constant Volume (CV) Fans	60,091	17.1	0	$6,799	$52,863	$9,300	$43,563	6.4	60,511

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 4: Install VFDs on Constant Volume (CV) Fans

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

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

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

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

Affected Air Handlers: library, theater, and classrooms

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**65,679**	**37.3**	**25**	**$7,631**	**$248,831**	**$12,510**	**$236,321**	**31.0**	**69,079**
ECM 5	Install High Efficiency Air Conditioning Units	64,215	35.7	25	$7,466	$242,649	$12,510	$230,139	30.8	67,605
ECM 6	Install High Efficiency Heat Pumps	1,464	1.6	0	$166	$6,182	$0	$6,182	37.3	1,474

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

ECM 5: Install High Efficiency Air Conditioning Units

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

Affected Units: split system and RTUs

ECM 6: Install High Efficiency Heat Pumps

We evaluated replacing standard efficiency heat pumps with high efficiency heat pumps. A higher EER or SEER rating indicates a more efficient cooling system, and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours.

Affected Units: ductless mini split

4.5 Gas-Fired 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)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**84**	**$670**	**$19,312**	**$1,500**	**$17,812**	**26.6**	**9,868**
ECM 7	Install High Efficiency Furnaces	0	0.0	84	$670	$19,312	$1,500	$17,812	26.6	9,868

ECM 7: Install High Efficiency Furnaces

We evaluated replacing standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases, which can significantly improve furnace efficiency. Savings result from improved system efficiency.

Note: these units produce acidic condensate that require proper drainage.

Affected Units: ducted furnaces

4.6 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**5**	**$40**	**$409**	**$10**	**$399**	**10.0**	**589**
ECM 8	Install Low-Flow DHW Devices	0	0.0	5	$40	$409	$10	$399	10.0	589

ECM 8: Install Low-Flow DHW Devices

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

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

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. Pre-rinse spray valves (PRSVs), often used in commercial and institutional kitchens, remove food waste from dishes prior to dishwashing.

Additional cost savings may result from reduced water usage.

4.7 Food Service & Refrigeration Measures

#	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)
Food Service & Refrigeration Measures		**1,551**	**0.2**	**0**	**$176**	**$460**	**$50**	**$410**	**2.3**	**1,562**
ECM 9	Vending Machine Control	1,551	0.2	0	$176	$460	$50	$410	2.3	1,562

ECM 9: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

4.8 Measures for Future Consideration

There are additional opportunities for improvement that Passaic County Community College 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.

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

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

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

Upgrade/Replace Building Automation System

Based on our site survey and on conversations with facility staff, it appears that the existing building automation system (BAS) is substantially limited in its capabilities, means of control, monitoring/ reporting function, or condition relative to new systems available in the marketplace. A substantial upgrade to your site's BAS could increase the efficiency of your building HVAC system operation.

The current generation BAS typically provides building systems with a network of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems to adjust system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatics controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

A controls upgrade would enable automated equipment start and stop times, temperature setpoints, and lockouts and deadbands to be programmed remotely using a graphic interface. Controls can be configured to optimize ventilation and outside air intake by adjusting economizer position, damper function, and fan speed. Existing chilled and hot water distribution system controls are typically tied in, including associated pumps and valves. Coordinated control of HVAC systems is dependent on a network of sensors and status points. A comprehensive building control system provides monitoring and control for all HVAC systems, so operators can adjust system programming for optimal comfort and energy savings.

It is recommended that an HVAC engineer or contractor who specializes in BAS be contacted for a detailed evaluation and implementation costs. A controls expert will be able to tell you to what extent an existing system can be refurbished or expanded, what sensors should be replaced, what additional HVAC systems could be controlled, and what monitoring and graphic capabilities can be added. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis, nor should be used as a basis for design and construction.

Revolving Doors

Revolving doors are much more energy efficient than traditional doors. The installation of revolving doors increase comfort, improve traffic flow, and increase security. This allows for a significant amount of uncontrolled air exchange between the outside and inside of the building. The installation of revolving doors would greatly reduce this and thus reduce the load on the HVAC system, which serves these lobby/corridor spaces. However, the design and installation of vestibule doors involve an architectural element and would potentially require a high cost for implementation. The measure would require more evaluation to determine feasibility.

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.

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.

Economizer Maintenance

Economizers can significantly reduce cooling system load. A malfunctioning economizer can increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air. Common economizer malfunctions include broken outdoor thermostat or enthalpy control or dampers that are stuck or improperly adjusted.

Periodic inspection and maintenance will keep economizers working in sync with the heating and cooling system. This maintenance should be part of annual system maintenance, and it should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position.

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

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

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

Furnace Maintenance

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

Optimize HVAC Equipment Schedules

Energy management systems (BAS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The BAS monitors and reports operational status, schedules equipment start and stop times, locks out equipment operation based on outside air or space temperature, and often optimizes damper and valve operation based on complex algorithms. These BAS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your BAS scheduling capabilities. Regularly monitor HVAC equipment operating schedules and match them to building operating hours in order to eliminate unnecessary equipment operation and save energy. Monitoring should be performed often at sites with frequently changing usage patterns – daily in some cases. We recommend using the *optimal start* feature of the BAS (if available) to optimize the building warmup sequence. Most BAS scheduling programs provide for holiday schedules, which can be used during reduced use or shutdown periods. Finally, many systems are equipped with a one-time override function, which can be used to provide additional space conditioning due to a one-time, special event. When available this override feature should be used rather than changing the base operating schedule.

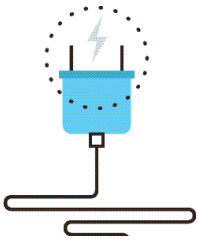
Water Heater Maintenance

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.

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.

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices

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

for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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.

[7] 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.

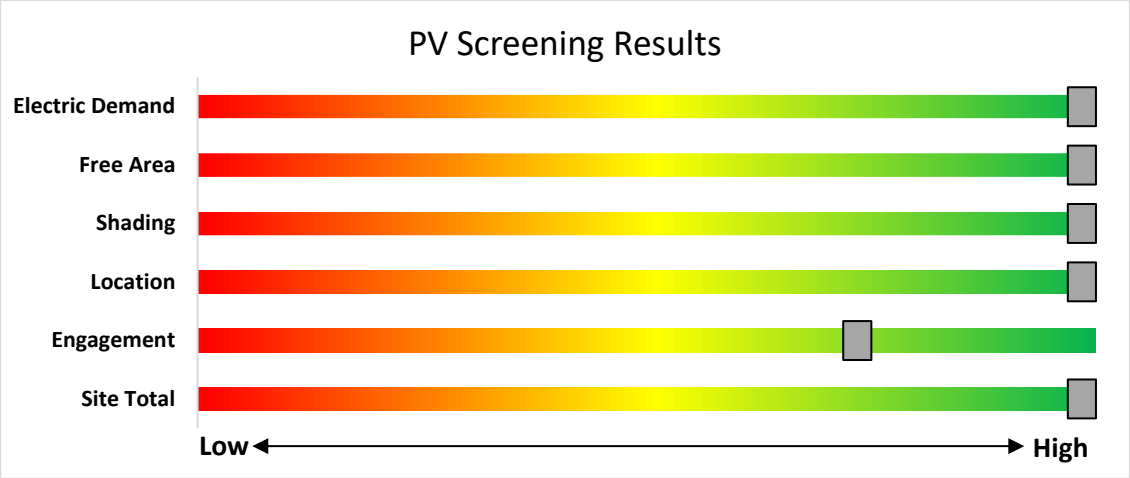
6.1 Solar Photovoltaic

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	234	kW DC STC
Electric Generation	278,780	kWh/yr
Displaced Cost	$31,550	/yr
Installed Cost	$608,400	

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 lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

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

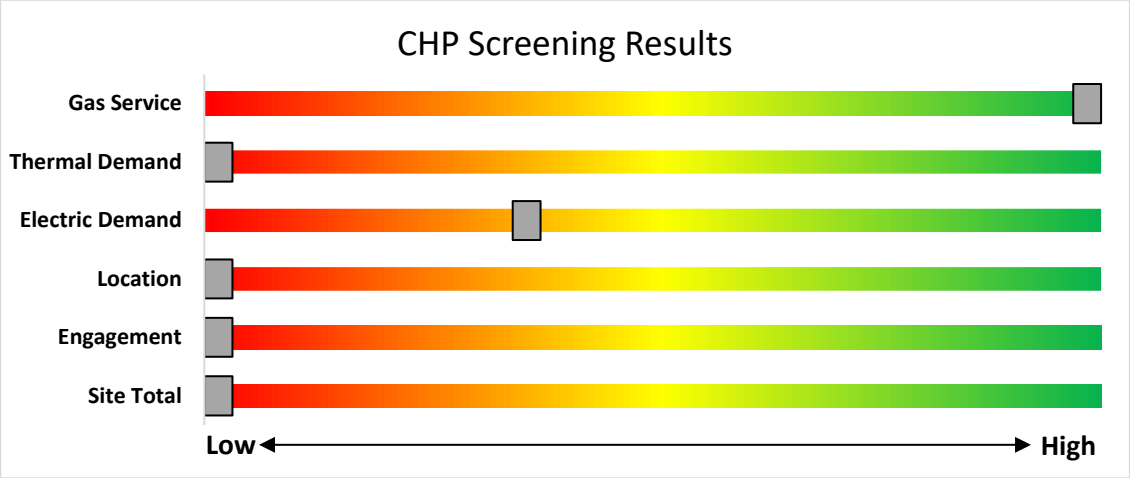


Figure 9 - Combined Heat and Power Screening

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)

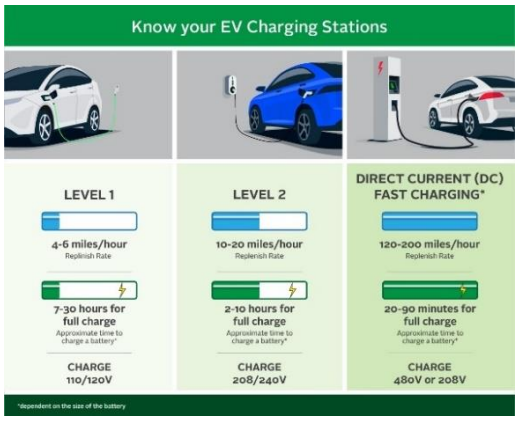
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

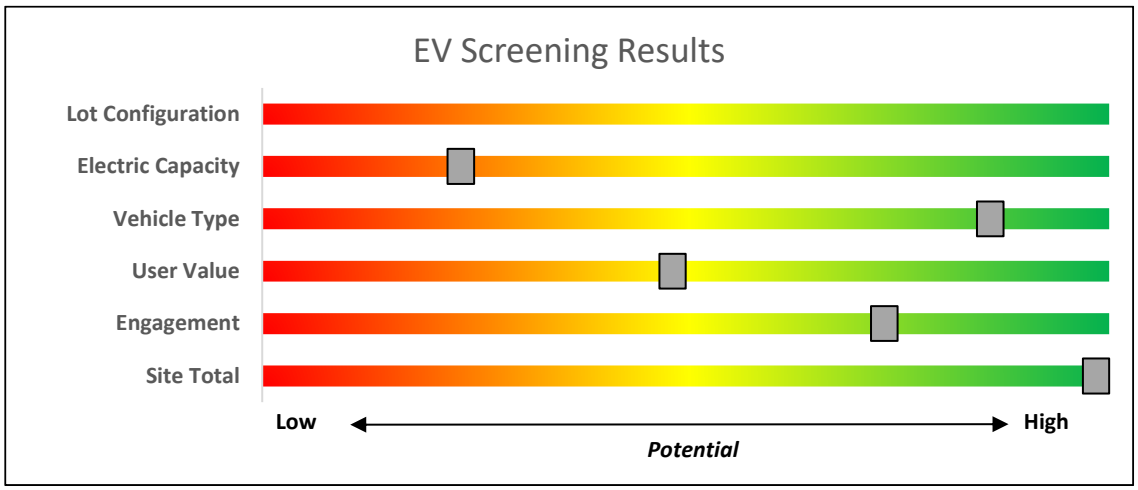


Figure 10 – EV Charger Screening

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 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.

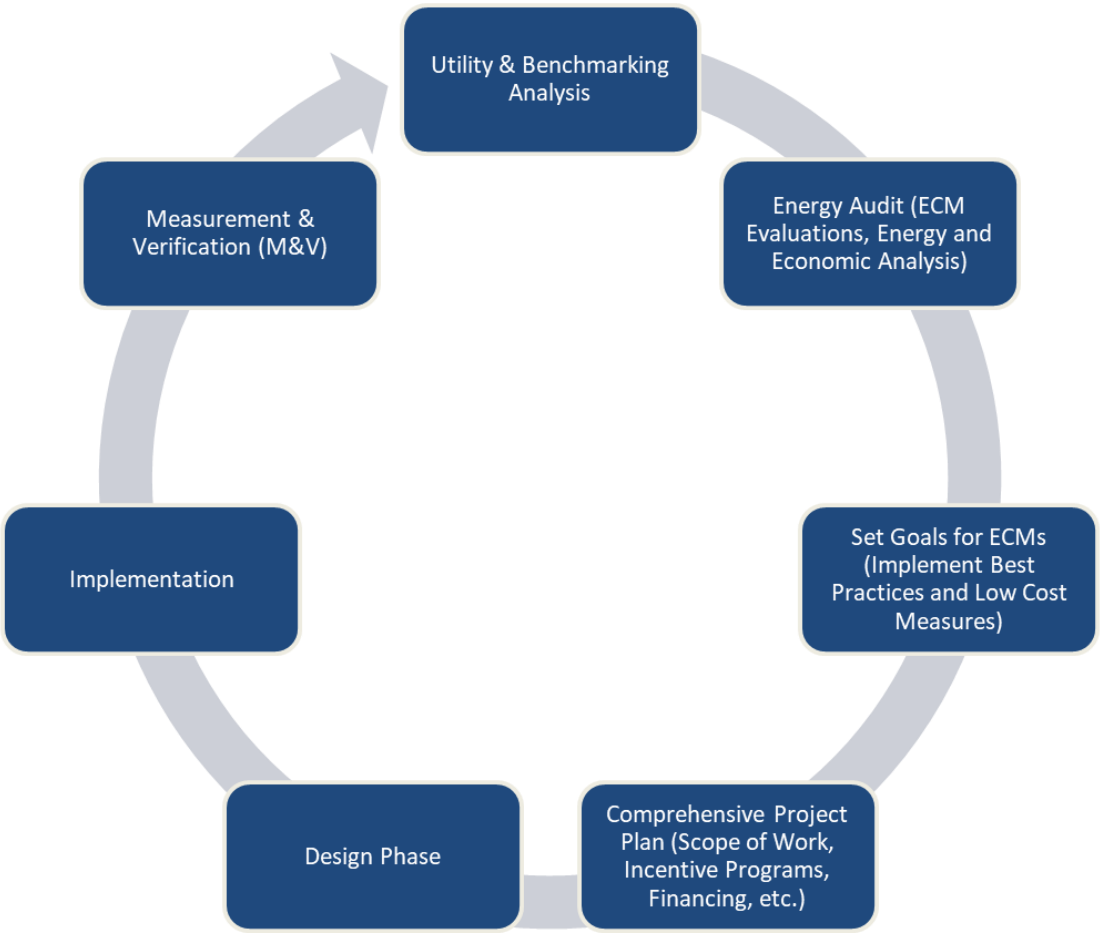


Figure 11 – Project Development Cycle

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[8].

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[9].

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

[9] 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
Classroom Music	15	LED Lamps: (1) 20W MR16 Plug-In Lamp	Wall Switch	S	20	2,000	2	None	Yes	15	LED Lamps: (1) 20W MR16 Plug-In Lamp	Occupancy Sensor	20	1,380	0.1	205	0	$23	$270	$35	10.3
Classroom Music	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.3	831	0	$93	$599	$125	5.1
Classroom Music WAC132	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,000	0.0	109	0	$12	$55	$15	3.3
Classroom Music WAC133	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,000	0.0	109	0	$12	$55	$15	3.3
Classroom WAC098	3	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,000	1, 2	Relamp	Yes	3	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,380	0.0	85	0	$9	$308	$38	28.4
Classroom WAC098	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
Classroom WAC098	50	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	50	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	1.5	4,619	-1	$515	$2,906	$640	4.4
Classroom WAC105	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
Classroom WAC105	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.5	1,663	0	$185	$927	$215	3.8
Classroom WAC106	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
Classroom WAC106	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.5	1,663	0	$185	$927	$215	3.8
Classroom WAC107	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
Classroom WAC107	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.5	1,386	0	$154	$818	$185	4.1
Classroom WAC108	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
Classroom WAC108	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.5	1,663	0	$185	$927	$215	3.8
Classroom WAC109	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.6	1,848	0	$206	$1,270	$270	4.9
Classroom WAC110	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
Classroom WAC110	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.8	2,309	0	$257	$1,453	$320	4.4
Classroom WAC111	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
Classroom WAC111	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.8	2,309	0	$257	$1,453	$320	4.4
Classroom WAC112	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
Classroom WAC112	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.8	2,309	0	$257	$1,453	$320	4.4
Classroom WAC113	22	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,000	1, 2	Relamp	Yes	22	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,380	0.2	624	0	$70	$815	$92	10.4
Classroom WAC113	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Classroom WAC114	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

	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
Classroom WAC114	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.8	2,309	0	$257	$1,453	$320	4.4
Classroom WAC115	36	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,000	1, 2	Relamp	Yes	36	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,380	0.3	1,021	0	$114	$1,260	$141	9.8
Classroom WAC115	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
Classroom WAC123	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
Classroom WAC123	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,000	1	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,000	0.5	1,525	0	$170	$767	$210	3.3
Classroom WAC124	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
Classroom WAC124	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,000	1	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,000	0.5	1,525	0	$170	$767	$210	3.3
Classroom WAC125	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
Classroom WAC125	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.6	1,801	0	$201	$982	$230	3.7
Classroom WAC126	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
Classroom WAC126	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	S	33	2,000	1	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,000	0.0	70	0	$8	$65	$12	6.8
Classroom WAC126	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,000	1	Relamp	No	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,000	0.6	1,851	0	$206	$931	$255	3.3
Classroom WAC127	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
Classroom WAC127	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	S	33	2,000	1	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,000	0.0	70	0	$8	$65	$12	6.8
Classroom WAC127	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,000	1	Relamp	No	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,000	0.6	1,851	0	$206	$931	$255	3.3
Classroom WAC128	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
Classroom WAC128	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	S	33	2,000	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,000	0.0	35	0	$4	$33	$6	6.8
Classroom WAC128	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,000	1	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,000	0.6	1,960	0	$219	$986	$270	3.3
Classroom WAC130	12	Incandescent: (1) 25W R16 Screw-In Lamp	Wall Switch	S	25	2,000	1, 2	Relamp	Yes	12	LED Lamps: R16 Lamps	Occupancy Sensor	4	1,380	0.2	587	0	$65	$510	$59	6.9
Classroom WAC130	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.6	1,801	0	$201	$982	$230	3.7
Computer Lab WAC92	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.5	1,663	0	$185	$1,197	$250	5.1
Conference 2	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
Conference 2	24	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	500	1, 2	Relamp	Yes	24	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	345	0.4	281	0	$31	$1,320	$214	35.3
Conference WAC104	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.4	1,386	0	$154	$708	$155	3.6
Corridor Kitchen	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	1, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,070	0.1	624	0	$70	$389	$150	3.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor Music	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Music	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	25	3,000	3	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	25	2,070	0.0	102	0	$11	$225	$140	7.5
Corridor New School A	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor New School A	32	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	25	2,100		None	No	32	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	25	2,100	0.0	0	0	$0	$0	$0	0.0
Corridor New School A	8	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	12	2,100		None	No	8	LED - Fixtures: Ceiling Mount	Occupancy Sensor	12	2,100	0.0	0	0	$0	$0	$0	0.0
Corridor Old School	33	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	3,000	1, 3	Relamp	Yes	33	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	19	2,070	0.3	1,404	0	$157	$1,763	$1,188	3.7
Corridor Old School	62	Compact Fluorescent: (2) 40W Biaxial Plug-In Lamps	Wall Switch	S	80	3,000	1, 3	Relamp	Yes	62	LED Lamps: PL-L (Biax) Lamps	High/Low Control	56	2,070	1.8	8,462	-2	$943	$4,149	$2,294	2.0
Corridor Old School	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Old School	3	Linear Fluorescent - T8: 3' T8 (25W) - 1L	Wall Switch	S	27	3,000	1, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 3' Lamp	High/Low Control	11	2,070	0.0	196	0	$22	$280	$120	7.3
Dining Area 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
Dining Area 1	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.6	1,801	0	$201	$982	$230	3.7
Dining Area Side Station	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.1	277	0	$31	$226	$50	5.7
Electrical Room 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	500	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	500	0.0	27	0	$3	$55	$15	13.1
Electrical Room 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	500	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	500	0.0	27	0	$3	$55	$15	13.1
Electrical Room 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	500	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	500	0.0	18	0	$2	$37	$10	13.1
Electrical Room 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	36	0	$4	$73	$20	13.1
Exterior 2	8	Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps	Photocell	S	26	4,380	1	Relamp	No	8	LED Lamps: GX23 (Plug-In) Lamps	Photocell	19	4,380	0.0	245	0	$28	$200	$16	6.6
Exterior 2	1	High-Pressure Sodium: (1) 400W Lamp	Timeclock	S	465	4,380	1	Relamp	No	1	LED Lamps - E39: 125 - 250W Lamp	Timeclock	120	4,380	0.0	1,511	0	$171	$299	$0	1.8
Exterior 2	9	LED - Fixtures: Bollard Fixture	Photocell	S	20	4,380		None	No	9	LED - Fixtures: Bollard Fixture	Photocell	20	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	1	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock	S	100	4,380		None	No	1	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	2	LED - Fixtures: Flood Fixture	Photocell	S	26	4,380		None	No	2	LED - Fixtures: Flood Fixture	Photocell	26	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	1	LED - Fixtures: Flood Fixture	Photocell	S	35	4,380		None	No	1	LED - Fixtures: Flood Fixture	Photocell	35	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	8	LED - Fixtures: Flood Fixture	Photocell	S	45	4,380		None	No	8	LED - Fixtures: Flood Fixture	Photocell	45	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	3	LED - Fixtures: Flood Fixture	Photocell	S	82	4,380		None	No	3	LED - Fixtures: Flood Fixture	Photocell	82	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	27	LED Lamps: (1) 10W MR16 Plug-In Lamp	Photocell	S	10	4,380		None	No	27	LED Lamps: (1) 10W MR16 Plug-In Lamp	Photocell	10	4,380	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 2	14	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	S	120	4,380		None	No	14	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	120	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	12	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	S	120	4,380		None	No	12	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	120	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	2	LED Lamps: (1) 12W PAR20 Screw-In Lamp	Photocell	S	12	4,380		None	No	2	LED Lamps: (1) 12W PAR20 Screw-In Lamp	Photocell	12	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Small Garage	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	500	1	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	500	0.0	26	0	$3	$17	$1	5.6
Exterior Small Garage	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	500	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	500	0.0	8	0	$1	$33	$6	29.3
Garage Loading Dock	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
Garage Loading Dock	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1, 2	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	345	0.3	208	0	$23	$599	$125	20.4
Gymnasium Fitness Rm	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
Gymnasium Fitness Rm	11	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	S	165	2,000	2	None	Yes	11	High-Pressure Sodium: (1) 150W Lamp	Occupancy Sensor	165	1,380	0.4	1,238	0	$138	$270	$35	1.7
Gymnasium Fitness Rm	5	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	25	2,000	2	None	Yes	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	25	1,380	0.0	85	0	$10	$270	$35	24.7
Janitorial 1	1	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	500	1	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	500	0.0	4	0	$0	$13	$1	26.8
Janitorial 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$2	$37	$10	13.1
Kitchen 1	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	6	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	2,000	1, 2	Relamp	Yes	6	LED Lamps: A19 Lamps	Occupancy Sensor	9	1,380	0.2	710	0	$79	$373	$41	4.2
Kitchen 1	5	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	25	2,000	2	None	Yes	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	25	1,380	0.0	85	0	$10	$270	$35	24.7
Kitchen 1	13	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	25	2,000	2	None	Yes	13	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	25	1,380	0.1	222	0	$25	$270	$35	9.5
Kitchen 2	12	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	25	2,000	2	None	Yes	12	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	25	1,380	0.1	205	0	$23	$270	$35	10.3
Laboratory 114	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.1	370	0	$41	$416	$75	8.3
Library 1	5	Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps	Wall Switch	S	26	2,500	1, 2	Relamp	Yes	5	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,725	0.0	177	0	$20	$395	$45	17.7
Library 1	4	Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps	Wall Switch	S	26	2,500	1, 2	Relamp	Yes	4	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,725	0.0	142	0	$16	$370	$43	20.7
Library 1	6	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,500	1, 2	Relamp	Yes	6	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,725	0.1	213	0	$24	$345	$41	12.8
Library 1	11	Compact Fluorescent: (2) 26W Biaxial Plug-In Lamps	Wall Switch	S	52	2,500	1, 2	Relamp	Yes	11	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	37	1,725	0.2	801	0	$89	$545	$57	5.5
Library 1	4	Compact Fluorescent: (2) 26W Biaxial Plug-In Lamps	Wall Switch	S	52	2,500	1, 2	Relamp	Yes	4	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	37	1,725	0.1	291	0	$32	$370	$43	10.1
Library 1	13	Compact Fluorescent: (4) 40W Biaxial Plug-In Lamps	Wall Switch	S	160	2,500	1, 2	Relamp	Yes	13	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	112	1,725	0.8	2,957	-1	$330	$972	$87	2.7
Library 1	14	Compact Fluorescent: (4) 40W Biaxial Plug-In Lamps	Wall Switch	S	160	2,500	1, 2	Relamp	Yes	14	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	112	1,725	0.8	3,185	-1	$355	$1,026	$91	2.6

	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
Library 1	14	Compact Fluorescent: (4) 40W Biaxial Plug-In Lamps	Wall Switch	S	160	2,500	1, 2	Relamp	Yes	14	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	112	1,725	0.8	3,185	-1	$355	$1,026	$91	2.6
Library 1	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Lobby 1	6	LED - Fixtures: Ceiling Mount	Wall Switch	S	12	4,940	3	None	Yes	6	LED - Fixtures: Ceiling Mount	High/Low Control	12	3,409	0.0	121	0	$14	$225	$210	1.1
Locker Room Men's	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,400	1	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.2	457	0	$51	$329	$90	4.7
Locker Room Women's	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,400	1	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.2	457	0	$51	$329	$90	4.7
Lounge 2	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
Lounge 2	1	Incandescent: (1) 25W Screw-in Lamps	Wall Switch	S	25	3,000	1	Relamp	No	1	LED Lamps: (1) 4W Screw-In Lamps	Wall Switch	4	3,000	0.0	69	0	$8	$23	$0	3.0
Lounge 2	7	Incandescent: (1) 25W Screw-in Lamps	Wall Switch	S	25	3,000	1, 2	Relamp	Yes	7	LED Lamps: (1) 4W Screw-In Lamps	Occupancy Sensor	4	2,070	0.1	514	0	$57	$433	$35	6.9
Lounge 2	6	LED - Fixtures: Ambient - 8' - Direct Fixture	Wall Switch	S	30	3,000	2	None	Yes	6	LED - Fixtures: Ambient - 8' - Direct Fixture	Occupancy Sensor	30	2,070	0.0	184	0	$21	$270	$35	11.4
Lounge 2	1	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Wall Switch	S	15	3,000		None	No	1	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Wall Switch	15	3,000	0.0	0	0	$0	$0	$0	0.0
Lounge 2	9	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Wall Switch	S	15	3,000	2	None	Yes	9	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Occupancy Sensor	15	2,070	0.0	138	0	$15	$270	$35	15.3
Lounge 2	14	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Wall Switch	S	15	3,000	2	None	Yes	14	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Occupancy Sensor	15	2,070	0.0	215	0	$24	$270	$35	9.8
Lounge 2	8	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Wall Switch	S	15	3,000	2	None	Yes	8	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Occupancy Sensor	15	2,070	0.0	123	0	$14	$270	$35	17.2
Lounge 2	7	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Wall Switch	S	15	3,000	2	None	Yes	7	LED Lamps: (1) 15W PAR20 Screw-In Lamp	Occupancy Sensor	15	2,070	0.0	107	0	$12	$270	$35	19.6
Lounge Faculty	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
Lounge Faculty	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.5	2,079	0	$232	$927	$215	3.1
Mechanical 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
Mechanical 1	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.2	145	0	$16	$292	$80	13.1
Mechanical 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	$2	$37	$10	13.1
Office - Enclosed W117	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Enclosed WAC101	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.2	693	0	$77	$489	$95	5.1
Office - Enclosed WAC102	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Enclosed WAC103	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Enclosed WAC116A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	231	0	$26	$189	$40	5.8

	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 - Enclosed WAC118	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,750	1	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.1	191	0	$21	$110	$30	3.7
Office - Enclosed WAC119	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,750	1	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.1	191	0	$21	$110	$30	3.7
Office - Enclosed WAC120	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,750	1	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.1	191	0	$21	$110	$30	3.7
Office - Enclosed WAC121	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,750	1	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.1	191	0	$21	$110	$30	3.7
Office - Enclosed WAC122	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,750	1	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.1	191	0	$21	$110	$30	3.7
Office - Enclosed WAC129	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	520	0	$58	$434	$80	6.1
Office - Enclosed WAC139	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
Office - Enclosed WAC139	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.3	1,039	0	$116	$599	$125	4.1
Office - Enclosed WAC140	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
Office - Enclosed WAC140	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Enclosed WAC141	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Enclosed WAC142	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Enclosed WAC94	2	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	2,500	1, 2	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	9	1,725	0.1	296	0	$33	$150	$22	3.9
Office - Enclosed WAC94	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	520	0	$58	$434	$80	6.1
Office - Enclosed WAC94	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	520	0	$58	$434	$80	6.1
Office - Enclosed WAC95	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.2	693	0	$77	$489	$95	5.1
Office - Enclosed WAC97	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.2	693	0	$77	$489	$95	5.1
Office - Enclosed WAC99	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.1	346	0	$39	$226	$50	4.5
Office - Open Plan W100	6	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,500	1, 2	Relamp	Yes	6	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,725	0.1	213	0	$24	$345	$41	12.8
Office - Open Plan W100	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	1, 2	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.5	1,732	0	$193	$818	$185	3.3
Office - Open Plan W100	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,500	1	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,500	0.0	80	0	$9	$72	$10	7.0
Restroom - Female 1	1	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	1	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	13.4
Restroom - Female 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,000	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.0	18	0	$2	$33	$6	13.5
Restroom - Female 1	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1, 2	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.2	370	0	$41	$562	$115	10.9
Restroom - Female 2	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	12	700		None	No	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	12	700	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
Restroom - Female 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	700	1	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.1	76	0	$8	$110	$30	9.4
Restroom - Male	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	12	700		None	No	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	12	700	0.0	0	0	$0	$0	$0	0.0
Restroom - Male	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	700	1	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.1	76	0	$8	$110	$30	9.4
Restroom - Male 1	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,000	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	690	0.0	70	0	$8	$368	$53	40.2
Restroom - Male 1	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1, 2	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.2	370	0	$41	$562	$115	10.9
Restroom - Unisex 4	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	700	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.0	25	0	$3	$37	$10	9.4
Restroom - Unisex Dining	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	700	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.0	38	0	$4	$55	$15	9.4
Restroom - Unisex Fitness 1	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	12	700		None	No	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	12	700	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex Fitness 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$4	$37	$10	6.6
Restroom - Unisex Fitness 2	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	12	700		None	No	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	12	700	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex Fitness 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$4	$37	$10	6.6
Server Room 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	36	0	$4	$73	$20	13.1
Server Room B	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	500	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	500	0.0	27	0	$3	$55	$15	13.1
Server Room WAC96	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	500	1	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	500	0.1	82	0	$9	$164	$45	13.1
Stewarding	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
Stewarding	15	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	25	2,000	2	None	Yes	15	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	25	1,380	0.1	256	0	$29	$270	$35	8.2
Storage 111	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage 114A	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage 114B	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage 12	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage Kitchen	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.1	139	0	$15	$380	$30	22.6
Storage Kitchen	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage Music	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage Music 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$4	$37	$10	6.6
Storage Theater	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$4	$37	$10	6.6

	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
Storage W100	1	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	1	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	13.4
Storage WAC098	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage WAC107	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage WAC110	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$6	$55	$15	6.6
Storage WAC113A	1	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	1	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	13.4
Storage WAC113B	1	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	1	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	13.4
Storage WAC115	1	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	1	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	13.4
Storage WAC137/138	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	1, 2	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.2	277	0	$31	$489	$60	13.9
Theater 1	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
Theater 1	24	Incandescent: (1) 750W Screw-in Lamps	Wall Switch	S	750	20		None	No	24	Incandescent: (1) 750W Screw-in Lamps	Wall Switch	750	20	0.0	0	0	$0	$0	$0	0.0
Theater 1	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	S	25	2,000		None	No	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	25	2,000	0.0	0	0	$0	$0	$0	0.0
Theater 1	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	S	25	2,000		None	No	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	25	2,000	0.0	0	0	$0	$0	$0	0.0
Theater 1	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	12	2,000		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	12	2,000	0.0	0	0	$0	$0	$0	0.0
Mechanical 2	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	1	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.3	200	0	$22	$402	$110	13.1
Office - Enclosed WAC91	2	Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps	Wall Switch	S	26	2,500	1, 2	Relamp	Yes	2	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,725	0.0	71	0	$8	$166	$24	18.0
Office - Enclosed WAC91	5	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,500	1, 2	Relamp	Yes	5	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	1,725	0.0	177	0	$20	$333	$40	14.8
Office - Enclosed WAC91	18	Compact Fluorescent: (3) 40W Biaxial Plug-In Lamp	Wall Switch	S	120	2,500	2	None	Yes	18	Compact Fluorescent: (3) 40W Biaxial Plug-In Lamp	Occupancy Sensor	120	1,725	0.5	1,841	0	$205	$540	$70	2.3
Office - Enclosed WAC91	1	Compact Fluorescent: (3) 40W Biaxial Plug-In Lamp	Wall Switch	S	120	2,500		None	No	1	Compact Fluorescent: (3) 40W Biaxial Plug-In Lamp	Wall Switch	120	2,500	0.0	0	0	$0	$0	$0	0.0
Storage Theater Controls	4	LED Lamps: (1) 10W MR16 Plug-In Lamp	Wall Switch	S	10	1,000	2	None	Yes	4	LED Lamps: (1) 10W MR16 Plug-In Lamp	Occupancy Sensor	10	690	0.0	14	0	$2	$270	$0	177.5
Storage Theater Controls	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.1	139	0	$15	$380	$30	22.6
Storage Theater Controls 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.1	139	0	$15	$380	$30	22.6
Theater Control Rm	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
Theater Control Rm	5	LED Lamps: (1) 20W MR16 Plug-In Lamp	Wall Switch	S	20	2,000	2	None	Yes	5	LED Lamps: (1) 20W MR16 Plug-In Lamp	Occupancy Sensor	20	1,380	0.0	68	0	$8	$270	$35	30.9
Theater Control Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,000	1, 2	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,380	0.2	554	0	$62	$489	$95	6.4

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
Exterior 1	Wanaque Academic Center	2	Exhaust Fan	0.3	65.0%	No	Unknown	Unknown	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	6	Exhaust Fan	0.2	65.0%	No	Unknown	Unknown	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Exhaust Fan	3.0	86.9%	No	Weg	Unknown	W	2,745		No	86.9%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Exhaust Fan	0.8	70.0%	No	Unknown	Unknown	W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Exhaust Fan	0.3	65.0%	No	Unknown	Unknown	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage Loading Dock	Wanaque Academic Center	1	DHW Circulation Pump	0.0	65.0%	No	Taco	007-SF5	W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Garage Loading Dock	Wanaque Academic Center	1	DHW Circulation Pump	0.2	65.0%	No	Bell & Gossett	LR-15BWR	W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 2	Library	2	Supply Fan	5.0	86.0%	No	Century	E227	W	3,000	4	No	89.5%	Yes	2	3.0	10,446	0	$1,182	$10,055	$1,800	7.0
Exterior 1	Kitchen	2	Supply Fan	7.5	88.5%	No	Unknown	Unknown	W	3,391		No	88.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Supply Fan	10.0	91.7%	Yes	Unknown	Unknown	W	3,391		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Supply Fan	5.0	86.5%	No	Unknown	Unknown	W	3,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	4	Supply Fan	5.0	86.5%	No	Unknown	Unknown	W	3,000	4	No	89.5%	Yes	4	6.0	20,575	0	$2,328	$20,111	$3,600	7.1
Exterior 1	Wanaque Academic Center	1	Supply Fan	7.5	88.5%	No	Unknown	Unknown	W	3,391	4	No	91.0%	Yes	1	2.2	8,437	0	$955	$5,945	$1,000	5.2
Exterior 1	Wanaque Academic Center	1	Supply Fan	10.0	91.7%	No	Unknown	Unknown	W	3,391	4	No	91.7%	Yes	1	2.9	10,345	0	$1,171	$6,697	$1,100	4.8
Exterior 1	Wanaque Academic Center	1	Supply Fan	5.0	89.5%	No	Unknown	Unknown	W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Supply Fan	10.0	91.7%	Yes	Century	850123MM1	W	3,391		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Supply Fan	3.0	86.5%	No	Unknown	Unknown	W	0		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Supply Fan	5.0	89.5%	No	Unknown	Unknown	W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Supply Fan	5.0	86.5%	No	Unknown	Unknown	W	3,000	4	No	89.5%	Yes	2	3.0	10,288	0	$1,164	$10,055	$1,800	7.1
Exterior 1	Wanaque Academic Center	1	Supply Fan	2.0	84.0%	No	Unknown	Unknown	W	3,000		No	84.0%	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
Garage 1	Garage 1	1	Supply Fan	0.5	70.0%	No	Unknown	Unknown	W	3,000		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Exhaust Fan	3.0	89.5%	Yes	Unknown	Unknown	W	3,000		No	89.5%	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 1	Wanaque Academic Center	1	Split-System	10.30		9.00		Carrier	38AKS014---610--	B	5	Yes	1	Split-System	10.30		14.00		2.5	4,414	0	$499	$16,290	$814	31.0
Exterior 1	Wanaque Academic Center	1	Split-System	23.40		8.00		Carrier	38AKS028---600--	B	5	Yes	1	Split-System	23.40		12.50		6.3	11,372	0	$1,287	$42,448	$1,989	31.4
Corridor New School A	Wanaque Academic Center	1	Electric Resistance Heat		17.06		1 COP	Unknown	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Lobby 1	Wanaque Academic Center	2	Electric Resistance Heat		17.06		1 COP	Unknown	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Lounge Faculty	Wanaque Academic Center	2	Electric Resistance Heat		5.12		1 COP	Marley	2548WCSA	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical 1	Mechanical 1	1	Forced Air Furnace		200.00		0.8 AFUE	Reznor	F25	B	7	Yes	1	Forced Air Furnace		200.00		0.97 AFUE	0.0	0	20	$159	$5,486	$500	31.3
Mechanical 2	Mechanical 2	2	Forced Air Furnace		320.00		0.8 AFUE	Reznor	HX400-8-S	B	7	Yes	2	Forced Air Furnace		320.00		0.97 AFUE	0.0	0	64	$510	$13,826	$1,000	25.1
Exterior 1	Wanaque Academic Center	1	Ductless Mini-Split AC	1.00		10.00		Mitsubishi	PUY-A12NHA6	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Ductless Mini-Split AC	3.00		10.00		Mitsubishi	PUY-A36NHA6	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Ductless Mini-Split HP	3.00	40.00	11.18	7.7 HSPF	Mitsubishi	PUMY-P36NHMU	B	6	Yes	1	Ductless Mini-Split HP	3.00	40.00	18.00	3.8 COP	1.6	1,464	0	$166	$6,182	$0	37.3
Exterior 1	Kitchen	2	Package Unit	14.00	243.00	9.00	0.81 AFUE	Carrier	48TJF016	B	5	Yes	2	Package Unit	14.00	243.00	14.00	0.82 Et	8.2	18,636	3	$2,135	$42,516	$2,992	18.5
Exterior 1	Wanaque Academic Center	2	Package Unit	20.00	283.50	9.00	0.81 AFUE	Carrier	48A5S020-NV62GRC	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Package Unit	10.00	200.00	9.00	0.8 AFUE	Carrier	48TJF012---611--	B	5	Yes	2	Package Unit	10.00	200.00	14.00	0.82 Et	5.8	13,311	6	$1,551	$36,388	$2,080	22.1
Exterior 1	Wanaque Academic Center	4	Package Unit	12.50	200.00	9.00	0.8 AFUE	Carrier	48TJE014---631--	B	5	Yes	4	Package Unit	12.50	200.00	14.00	0.82 Et	14.6	33,279	11	$3,854	$80,661	$5,450	19.5
Exterior 1	Wanaque Academic Center	1	Package Unit	14.50	195.00	10.80	0.81 AFUE	Carrier	48TCRD16ACA6A2F1C0	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Package Unit	25.00	283.50	9.00	0.81 AFUE	Carrier	48A3S025-NQ62AVF	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Package Unit	8.08	148.00	11.00	0.82 AFUE	Carrier	48TCRA09A3M6A2F1C0	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Package Unit	50.00	527.00	9.00	0.81 AFUE	Carrier	48P3L0506100RJ8HJC	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Package Unit	6.00	120.00	9.00	0.8 AFUE	Carrier	48TJF007---621	B		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	1	Package Unit	8.83	93.00	11.00	0.81 AFUE	Carrier	48TCRB07A3M6A2F1C0	W		No							0.0	0	0	$0	$0	$0	0.0

		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 (kBtu/hr)	Cooling Mode Efficiency (SEER/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 1	Wanaque Academic Center	2	Package Unit	7.50	179.20	9.00	0.8 AFUE	Carrier	48TJF008---621--	B	5	Yes	2	Package Unit	7.50	179.20	14.00	0.82 Et	4.4	9,984	5	$1,169	$32,745	$1,685	26.6
Exterior 1	Wanaque Academic Center	1	Package Unit	5.83	93.00	11.00	0.81 AFUE	Carrier	48TCRB07A3M6A2F1C0	W		No							0.0	0	0	$0	$0	$0	0.0
Garage 1	Garage 1	1	Unit Heater		25.59		1 COP	TPI	P3PUH07CA1D	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Wanaque Academic Center	2	Forced Air Furnace		263.95		0.8 AFUE	Captive Aire	A3-D.500-G18	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
Garage Loading Dock	Wanaque Academic Center	2	Storage Tank Water Heater (> 50 Gal)	Rheem	GHE100ES-200	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical 1	Wanaque Academic Center	1	Storage Tank Water Heater (> 50 Gal)	Rheem	G91-200	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Wanaque Academic Center	8	5	Faucet Aerator (Kitchen)	2.20	1.50	0.0	0	1	$8	$36	$10	3.3
Wanaque Academic Center	8	3	Pre-Rinse Spray Valve	2.50	1.28	0.0	0	4	$32	$373	$0	11.6

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Manufacturer	Model	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	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
Stewarding	1	Cooler (35F to 55F)	Unknown	Unknown		No	No	No	0.0	0	0	$0	$0	$0	0.0
Stewarding	2	Cooler (35F to 55F)	Unknown	Unknown		No	No	No	0.0	0	0	$0	$0	$0	0.0
Stewarding	1	Cooler (35F to 55F)	Unknown	Unknown		No	No	No	0.0	0	0	$0	$0	$0	0.0

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR 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
Wanaque Academic Center	2	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	Traulsen	AD232N-X0030	No		No	0.0	0	0	$0	$0	$0	0.0
Wanaque Academic Center	2	Stand-Up Freezer, Solid Door (≤15 cu. ft.)	Traulsen	AD232N-X0030	No		No	0.0	0	0	$0	$0	$0	0.0
Wanaque Academic Center	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Auto-Shaam	QC2-40	No		No	0.0	0	0	$0	$0	$0	0.0
Wanaque Academic Center	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Continental	2RF-HD	No		No	0.0	0	0	$0	$0	$0	0.0
Wanaque Academic Center	1	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	Continental	DL1RI	No		No	0.0	0	0	$0	$0	$0	0.0
Wanaque Academic Center	1	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	TRUE	TUC-36	No		No	0.0	0	0	$0	$0	$0	0.0
Wanaque Academic Center	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Continental	DL2RI	No		No	0.0	0	0	$0	$0	$0	0.0

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR 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
Stewarding	1	Ice Making Head (<450 lbs/day), Batch	Hoshizaki	IM-500SAA	Yes		No	0.0	0	0	$0	$0	$0	0.0
Stewarding	1	Ice Making Head (<450 lbs/day), Batch	Hoshizaki	Unknown	Yes		No	0.0	0	0	$0	$0	$0	0.0

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
Kitchen	1	Gas Fryer	Pitco	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Griddle (≤2 Feet Width)	Vulcan	IRX	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	4	Gas Combination Oven/Steam Cooker (<15 Pans)	Southbend	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Insulated Food Holding Cabinet (3/4 Size)	Vulcan	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Convection Oven (Full Size)	Doyon	4T3	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Rack Oven (Double)	Blodgett	Unknown	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Gas Rack Oven (Single)	Auto Shamm	CTP10-20G	No		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions							Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Manufacturer	Model	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Payback w/ Incentives in Years
Kitchen	2	Door Type (High Temp)	Meiko	FV 130.2	Natural Gas	N/A	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Under Counter (Low Temp)	Jackson	Avenger HT E	Natural Gas	N/A	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Single Tank Conveyor (High Temp)	CMA	180-VL	Natural Gas	N/A	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
Lounge	2	Counter Refrigerator	10	No	Bake	Unknown
Kitchen	7	Mixer	500	No	Kitchen Aid	KSM8990WH
Wanaque Academic Center	9	Coffee Machine	600	No	Varied	Varied
Wanaque Academic Center	218	Desktop	150	Yes	Varied	Varied
Wanaque Academic Center	17	Desktop	175	Yes	Apple	Unknown
Wanaque Academic Center	15	Workstation	1,200	No	Varied	Varied
Wanaque Academic Center	1	Electric Space Heater	800	No	Unknown	Unknown
Wanaque Academic Center	1	Fan	200	No	Unknown	Unknown
Wanaque Academic Center	24	Laptop	75	No	Varied	Varied
Wanaque Academic Center	6	Microwave	800	No	Varied	Varied
Wanaque Academic Center	1	Coffee Machine	2,000	No	Bunn	LCA-2
Wanaque Academic Center	1	Air Compressor	200	No	Sears	Unknown
Wanaque Academic Center	2	Fan	699	No	Varied	Varied
Server Room WAC96	1	Misc. Sever Equipment	1,500	No	Varied	Varied
Stewarding	1	Ice Cream Machine	1,500	No	Carpigiani	LB 100B
Wanaque Academic Center	3	Paper Shredder	200	No	Unknown	Unknown
Wanaque Academic Center	40	Printer	150	No	Varied	Varied
Wanaque Academic Center	3	Copier	1,200	Yes	Unknown	Unknown
Wanaque Academic Center	16	Projector	200	Yes	Varied	Varied
Wanaque Academic Center	7	Mini Refrigerator	126	No	Unknown	Unknown
Wanaque Academic Center	2	Refrigerator	300	No	Unknown	Unknown
Wanaque Academic Center	2	Television	75	No	Unknown	Unknown
Wanaque Academic Center	21	Television	150	No	Unknown	Unknown
Wanaque Academic Center	1	Toaster	800	No	Unknown	Unknown
Wanaque Academic Center	1	Water Cooler	100	No	Brio	Unknown
Wanaque Academic Center	3	Water Fountain	115	No	Elkay	LZWSSM_1A

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor	1	Glass Fronted Refrigerated	9	Yes	0.1	1,209	0	$137	$230	$50	1.3
Corridor	1	Non-Refrigerated	9	Yes	0.0	343	0	$39	$230	$0	5.9

Miscellaneous Fuel Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Input Capacity per Unit (MBh)	ENERGY STAR Qualified?	Manufacturer	Model
Exterior	3	Humidifier	100.0	No	GTS	GTS-100

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

N/A

ENERGY STAR® Score[1]

PCCC - Wanaque Academic Center

Primary Property Type: College/University
Gross Floor Area (ft²): 66,000
Built: 1920

For Year Ending: January 31, 2022
Date Generated: January 31, 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
PCCC - Wanaque Academic Center 500 Union Avenue Wanaque, New Jersey 08701	Passaic County College 1 College Blvd. Paterson, NJ 07505 (973) 684-4999	Brian Egan 1 College Boulevard Paterson, NJ 07505 (973) 684-4999 began@pccc.edu

Property ID: 23316271

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
95.5 kBtu/ft²

Source EUI
189.8 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	3,377,325 (54%)
Natural Gas (kBtu)	2,925,887 (46%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	90.9
National Median Source EUI (kBtu/ft²)	180.6
% Diff from National Median Source EUI	5%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	450

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.