Local Government Energy Audit Report

Garage Egg Harbor Maintenance

October 12, 2023

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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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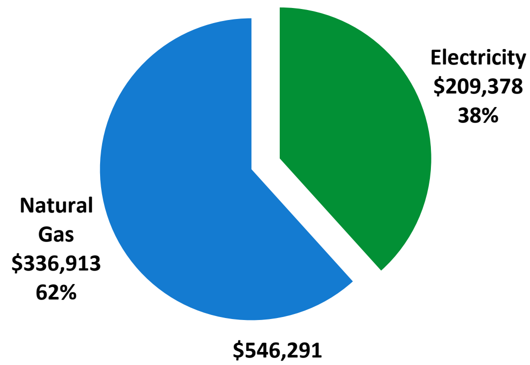
1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Garage Egg Harbor Maintenance. 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: $546,291 Electricity: 1,692,300 kWh Natural Gas: 301,531 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.

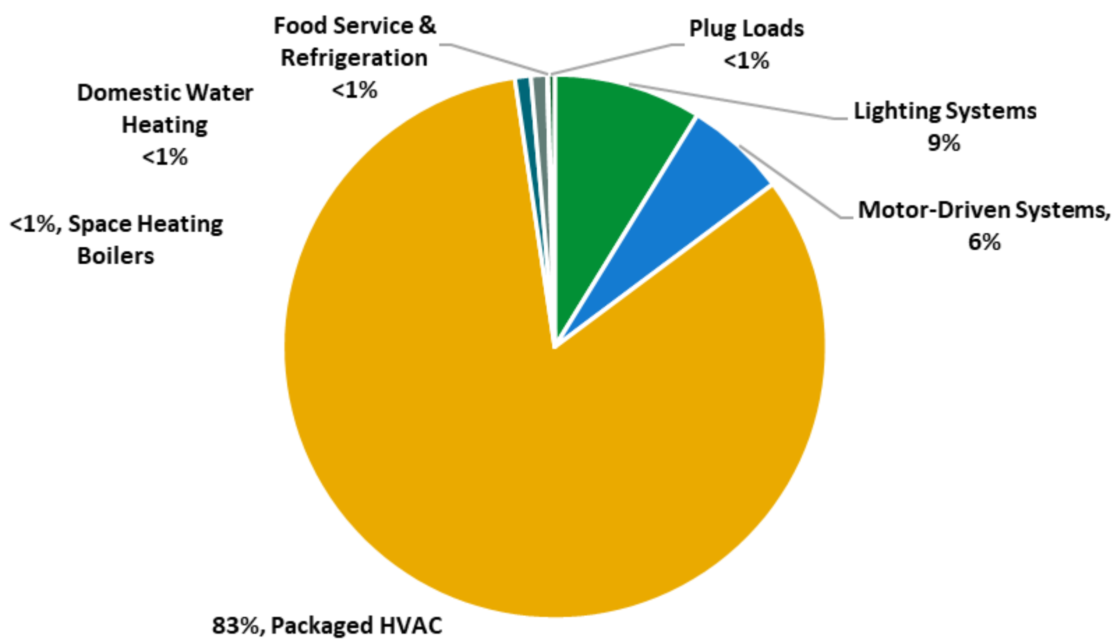


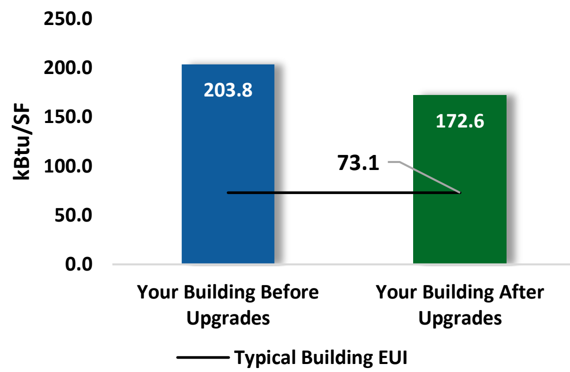
Figure 1 - Energy Use by System

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.

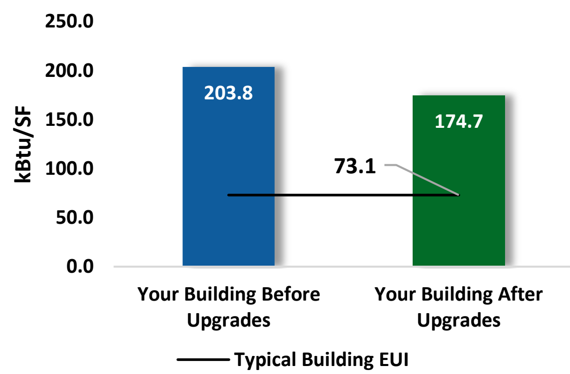
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$535,069
Potential Rebates & Incentives[1]	$44,576
Annual Cost Savings	$112,538
Annual Energy Savings	Electricity: 597,762 kWh Natural Gas: 34,528 Therms
Greenhouse Gas Emission Savings	503 Tons
Simple Payback	4.4 Years
Site Energy Savings (All Utilities)	15%



Scenario 2: Cost Effective Package[2]

Installation Cost	$392,174
Potential Rebates & Incentives	$38,777
Annual Cost Savings	$109,399
Annual Energy Savings	Electricity: 609,256 kWh Natural Gas: 30,447 Therms
Greenhouse Gas Emission Savings	485 Tons
Simple Payback	3.2 Years
Site Energy Savings (all utilities)	14%



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			**29,168**	**1.6**	**-1**	**$3,592**	**$12,487**	**$1,990**	**$10,497**	**2.9**	**29,197**
ECM 1	Install LED Fixtures	Yes	24,112	0.9	0	$2,980	$11,430	$1,800	$9,630	3.2	24,242
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	4,948	0.6	-1	$599	$947	$160	$787	1.3	4,849
ECM 3	Retrofit Fixtures with LED Lamps	Yes	108	0.1	0	$13	$110	$30	$80	6.1	106
Lighting Control Measures			**252,158**	**21.3**	**-58**	**$30,550**	**$39,062**	**$6,170**	**$32,892**	**1.1**	**247,131**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	248,405	21.0	-57	$30,095	$37,262	$4,700	$32,562	1.1	243,452
ECM 5	Install High/Low Lighting Controls	Yes	3,754	0.3	-1	$455	$1,800	$1,470	$330	0.7	3,679
Motor Upgrades			**424**	**0.1**	**0**	**$52**	**$3,207**	**$0**	**$3,207**	**61.1**	**427**
ECM 6	Premium Efficiency Motors	No	424	0.1	0	$52	$3,207	$0	$3,207	61.1	427
Variable Frequency Drive (VFD) Measures			**253,681**	**102.5**	**0**	**$31,386**	**$273,093**	**$28,925**	**$244,168**	**7.8**	**255,455**
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	253,681	102.5	0	$31,386	$273,093	$28,925	$244,168	7.8	255,455
Unitary HVAC Measures			**18,281**	**7.9**	**8**	**$2,353**	**$60,789**	**$2,199**	**$58,590**	**24.9**	**19,366**
ECM 8	Install High Efficiency Air Conditioning Units	No	16,478	6.9	8	$2,130	$54,607	$2,199	$52,408	24.6	17,550
ECM 9	Install High Efficiency Heat Pumps	No	1,803	1.0	0	$223	$6,182	$0	$6,182	27.7	1,815
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**181**	**$2,021**	**$84,978**	**$5,100**	**$79,878**	**39.5**	**21,182**
ECM 10	Install High Efficiency Furnaces	Yes	0	0.0	103	$1,150	$13,289	$1,500	$11,789	10.2	12,056
ECM 11	Install High Efficiency Unit Heaters	No	0	0.0	20	$222	$13,352	$0	$13,352	60.1	2,328
ECM 12	Install Infrared Heaters	No	0	0.0	58	$649	$58,337	$3,600	$54,737	84.4	6,799
HVAC System Improvements			**0**	**0.0**	**15**	**$167**	**$362**	**$56**	**$306**	**1.8**	**1,752**
ECM 13	Install Pipe Insulation	Yes	0	0.0	15	$167	$362	$56	$306	1.8	1,752
Domestic Water Heating Upgrade			**0**	**0.0**	**9**	**$106**	**$72**	**$36**	**$36**	**0.3**	**1,111**
ECM 14	Install Low-Flow DHW Devices	Yes	0	0.0	9	$106	$72	$36	$36	0.3	1,111
Food Service & Refrigeration Measures			**3,103**	**0.4**	**0**	**$384**	**$920**	**$100**	**$820**	**2.1**	**3,124**
ECM 15	Vending Machine Control	Yes	3,103	0.4	0	$384	$920	$100	$820	2.1	3,124
Custom Measures			**40,946**	**0.0**	**3,299**	**$41,925**	**$60,100**	**$0**	**$60,100**	**1.4**	**427,471**
ECM 16	Installation of an Energy Management System	Yes	71,146	0.0	2,977	$42,063	$52,890	$0	$52,890	1.3	420,180
ECM 17	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-30,200	0.0	322	-$138	$7,210	$0	$7,210	-52.2	7,291
TOTALS (COST EFFECTIVE MEASURES)			**609,256**	**125.7**	**3,045**	**$109,399**	**$392,174**	**$38,777**	**$353,397**	**3.2**	**970,007**
TOTALS (ALL MEASURES)			**597,762**	**133.7**	**3,453**	**$112,538**	**$535,069**	**$44,576**	**$490,493**	**4.4**	**1,006,217**

* - 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).

*** - Negative payback explained is section 4.10

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 Garage Egg Harbor Maintenance. 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 26, 2023, TRC performed an energy audit at Garage Egg Harbor Maintenance located in Egg Harbor, New Jersey. TRC met with Tom Schwartz to review the facility operations and help focus our investigation on specific energy-using systems.

Garage Egg Harbor Maintenance is a one-story, 176,300 square foot building built in 1996. Spaces include classrooms, offices, conference rooms, lounges, garages, shop areas, dining areas, corridors, stairwells, restrooms, locker rooms, storage rooms, electrical and mechanical spaces.

Lighting for the facility is provided mainly by LED fixtures. Two condensing hot water boilers, 15 gas-fired furnaces, and seven packaged rooftop units provide heating and cooling to most spaces.

2.2 Building Occupancy

The facility is fully occupied year-round, with a typical occupancy of 316 staff.

Building Name	Weekday/Weekend	Operating Schedule
Garage Egg Harbor Maintenance	Weekday	24/7
	Weekend	24/7

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a block facade. The flat roof is covered with a black membrane and in poor condition. The windows are single glazed and have aluminum frames with thermal breaks. 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 worn door seals. Degraded window and door seals increase drafts and outside air infiltration. The garage areas are equipped with motorized metal doors. Overall, the building envelope appears in fair condition.

Building Walls

Building Windows

Entrance Doors

Exit Doors

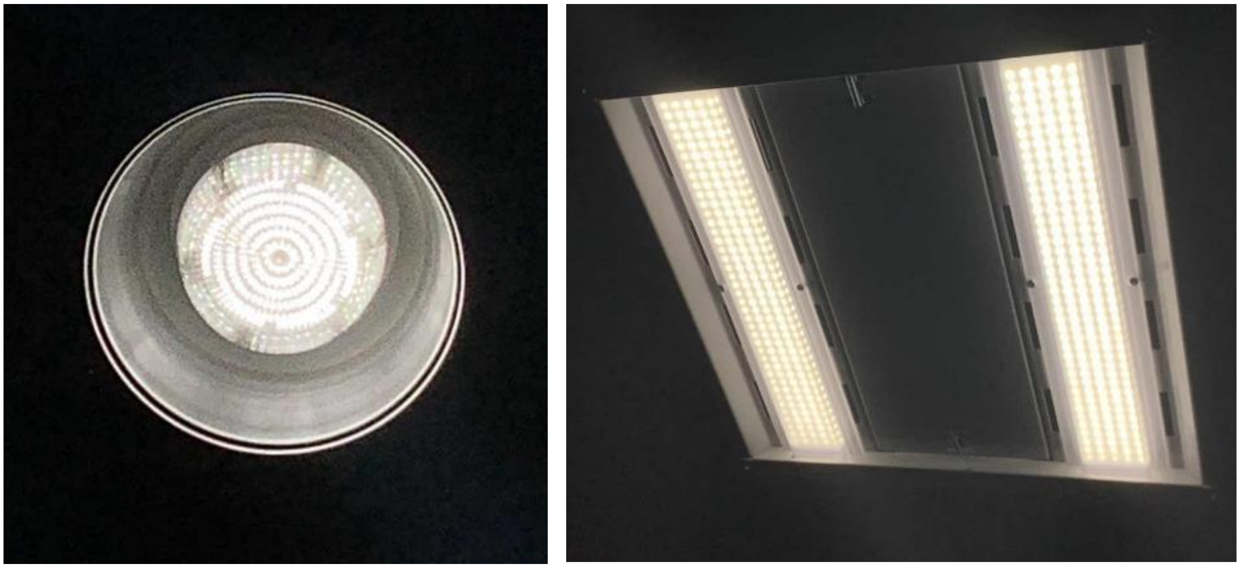
Roof

2.4 Lighting Systems

The primary interior lighting system uses mainly LED fixtures. Nearly all the lighting within the facility has been replaced over time with LED corn bulb lamps, LED high bay fixtures, LED lay-in 2-foot x 2-foot panels, and 14.5-Watt T8 equivalent LED lamps. There are also some 32-Watt linear fluorescent T8 lamps used in the waste injector mechanical room, some 40-Watt linear fluorescent T12 lamps used in the paint booth garage, and 250-Watt high-pressure sodium (HPS) lamps used in the vacuum unit mechanical room. Exit signs use LED sources.

Interior light fixtures are primarily controlled by manual wall switches, with occupancy sensors used in the toolbox garage and the west garage janitorial room. All light fixtures are in good condition. Interior lighting levels were generally sufficient. Exterior fixtures use LED and HPS lamps. Exterior fixtures are photocell controlled.

T8 Equivalent LED Lamps



High Bay LED Lamps

Exterior LED Fixture

Exterior HPS Fixtures

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

The maintenance side locker rooms and the telephone electrical room are conditioned by unitary electric HVAC equipment. This includes two mini-split heat pump (HP) units, and two mini-split air conditioning (AC) units. The units have cooling capacities ranging from 0.98 tons to 3.00 tons, with efficiency ratings between 10.2 EER and 18.0 EER. The mini split HP units have heating capacities ranging from 25.4 MBh to 36.0 MBh with efficiency ratings between 8.5 HSPF and 9.0 HSPF. The units are in fair to good condition, with the older units being recommended for replacement in Section 4.

Mini-Split AC Unit

HP Unit

Unitary Heating Equipment

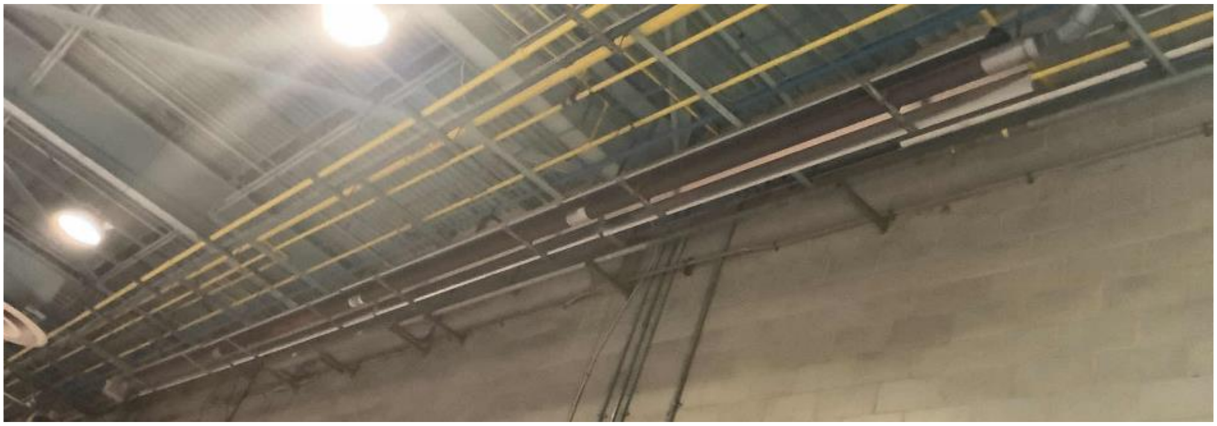
The garage areas of the building are heated using 15 gas-fired furnaces, nine gas-fired unit heaters, and two electric resistance heaters. The gas-fired units vary in capacity between 20 MBh to 2860 MBh, and the electric units each have a heating capacity of 2.5 kW. The gas-fired furnaces are equipped with constant speed supply fans with motors between 0.5 hp and 30.0 hp. Equipment is thermostatically controlled using manual dial thermostats. The units are in fair to good condition, with the older units being recommended for replacement in Section 4.

Unit Heaters

Forced Air Furnace

Infrared Heating

Areas of the main garage are heated by 12 infrared heaters, each with a heating capacity of 135 MBh and a nominal efficiency of 90%. The units are thermostatically controlled using manual dial thermostats. The units are operating beyond their useful life and in fair condition. Equipment has been recommended for replacement in Section 4.



Infrared Heater

Packaged Rooftop Units (RTUs)

The office areas of the building are conditioned using seven Trane packaged rooftop units (RTUs) with electric cooling and gas-fired heating. The units are equipped with constant speed supply fans with motors between 0.3 hp and 3.0 hp. The units' range in cooling capacity from 2.0 tons to 12.5 tons with efficiencies between 9 EER and 14 EER. Heating capacities range from 48.6 MBh to 202.5 MBh with nominal efficiencies between 80% to 82%. Equipment is thermostatically controlled using manual dial thermostats. The units are in fair to good condition, with the older units being recommended for replacement in Section 4.

Packaged Rooftop Unit

2.6 Heating Hot Water Systems

The driver's side office area heating system consists of one Crown Boiler Company gas-fired condensing hot water boiler with an output capacity of 135 MBh. The burner is fully modulating with a nominal efficiency of 93.1%. The maintenance side office area heating system consists of one Munchkin gas-fired condensing hot water boiler with an output capacity of 128 MBh. The burner is fully modulating with a nominal efficiency of 92.0%. The boilers are configured in a manual control scheme. Installed between 2003 to 2009, the boilers are in fair condition. There is a service contract in place.

The boilers are configured in a constant flow primary distribution with two fractional hp constant speed hot water pumps distributing water to different areas of the facility. The boilers provide hot water to radiators throughout the building.

Hot Water Boilers

2.7 Domestic Hot Water

Hot water for the driver's side is produced by one, 200 MBh gas-fired storage water heater with an 80-gallon capacity. Hot water for the maintenance side is produced by one, 200 MBh gas-fired storage water heater with a 98-gallon capacity. Additionally, there are some 1.44 kW electric storage water heaters with a 7-gallon capacity within the garage areas. The units are in good condition.

There is one fractional hp circulation pump on the maintenance side that distributes water to end uses. The circulation pump operates continuously. The domestic hot water pipes are partially insulated, and the insulation is in good condition. Section 4 includes a discussion about replacing the gas-fired storage water heaters with heat pump water heaters.

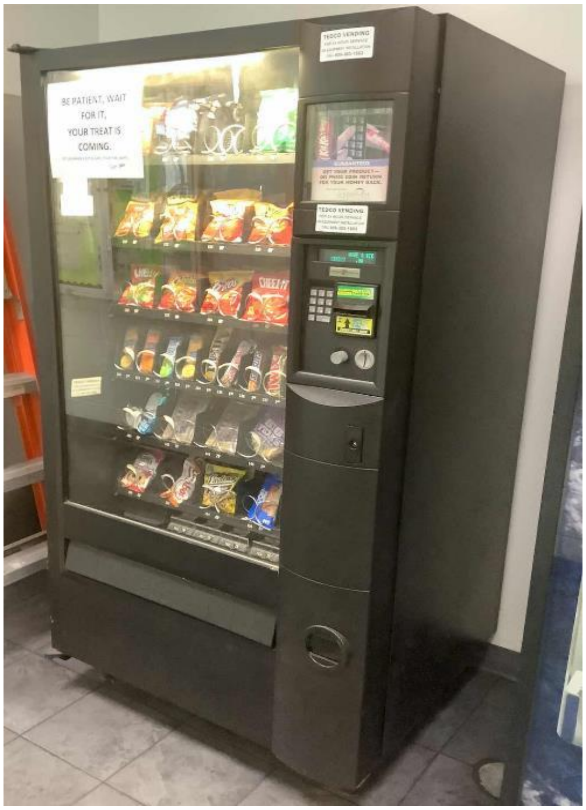
Water Heaters

2.8 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 32 computer workstations throughout the facility. Plug loads throughout the building include general office equipment. There are typical office loads such as copiers, printers, microwaves, televisions, and mini fridges. The garage areas include various shop tools and bus lifts for maintenance.

There are eight residential-style refrigerators throughout the buildings that are used to store food and drinks. These vary in condition and efficiency. There are two refrigerated beverage vending machines and two non-refrigerated vending machines. Vending machines are not equipped with occupancy-based controls.



Vending Machine

Residential-style Refrigerator

2.9 Water-Using Systems

There are six restrooms and locker rooms with toilets, urinals, showers, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher.

Typical Restroom Sinks

2.10 Process Equipment

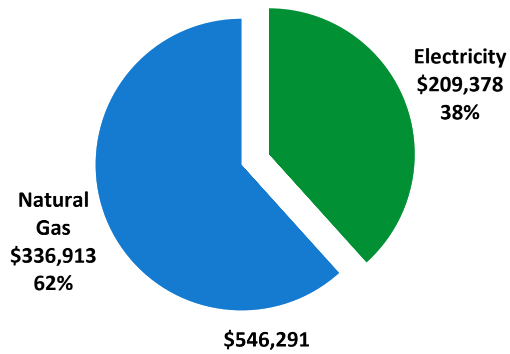
There is a two-lane bus washing system on the driver's side garage utilized between 4:00 PM and 6:00 AM. The system has two, 40 hp hydraulic oil pumps, two, 15 hp freshwater tank pumps, one holding tank pump with an estimated 15 hp motor, three additional bus wash motors between 7.5 hp and 10 hp, and six brush pumps equipped with fractional hp motors. The system equipment is in fair condition.

Bus Washing Equipment

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	1,692,300 kWh	$209,378
Natural Gas	301,531 Therms	$336,913
Total		**$546,291**



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

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

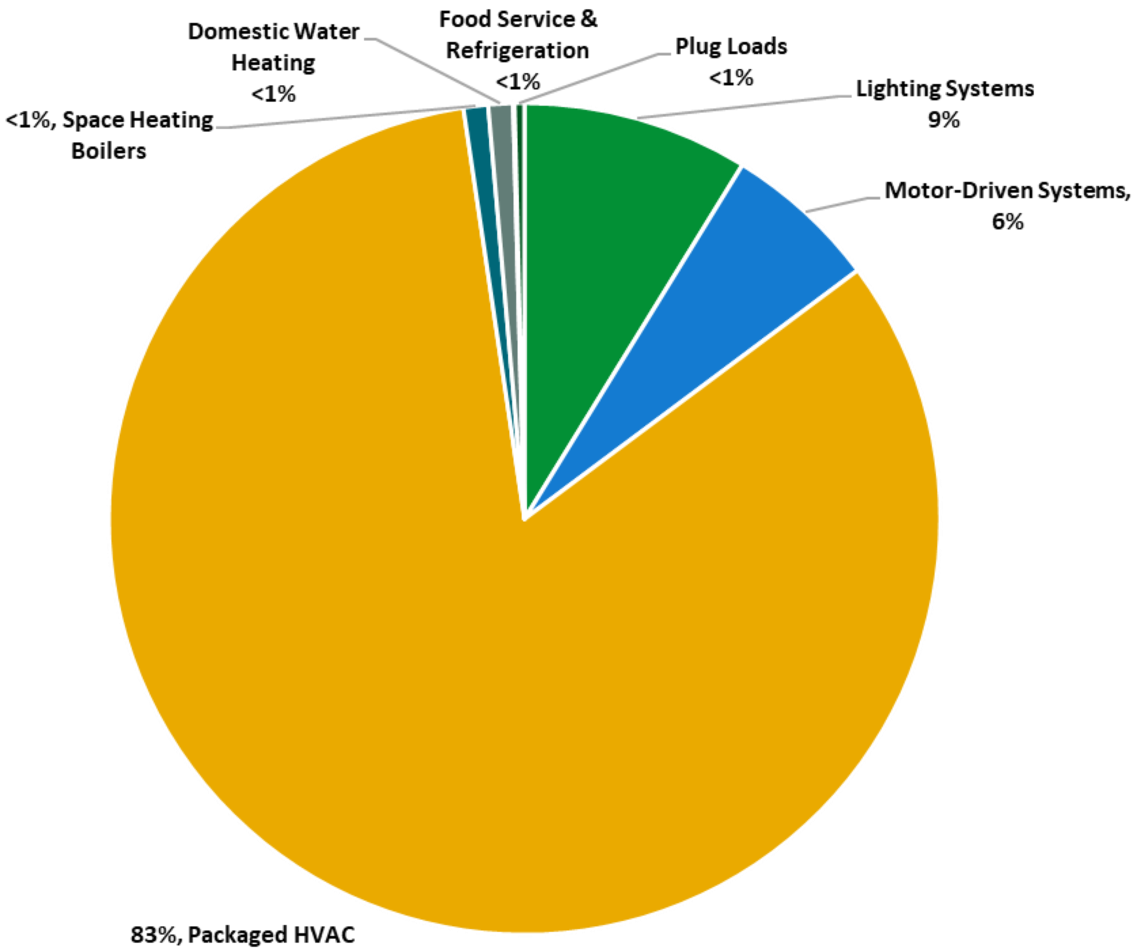
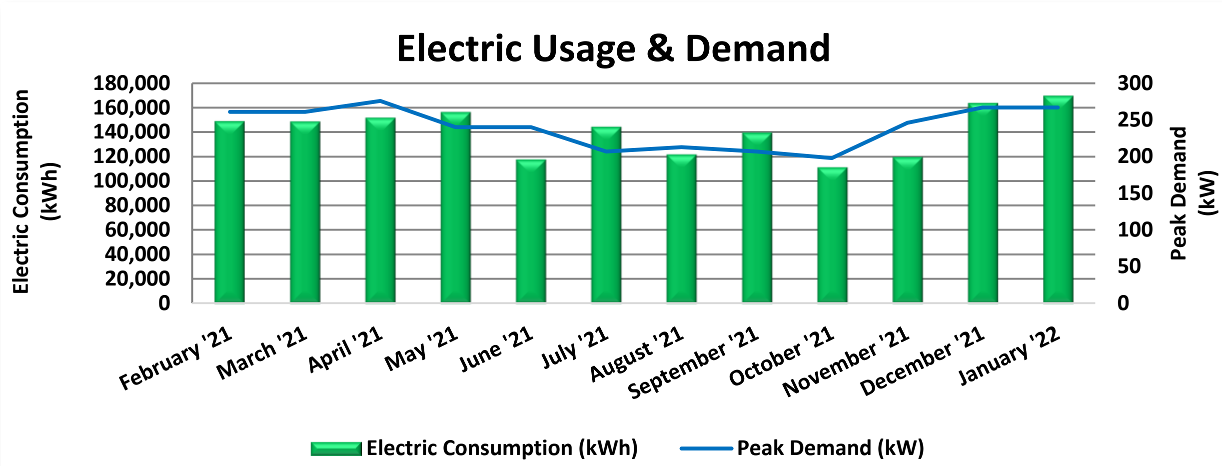


Figure 4 - Energy Balance

3.1 Electricity

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



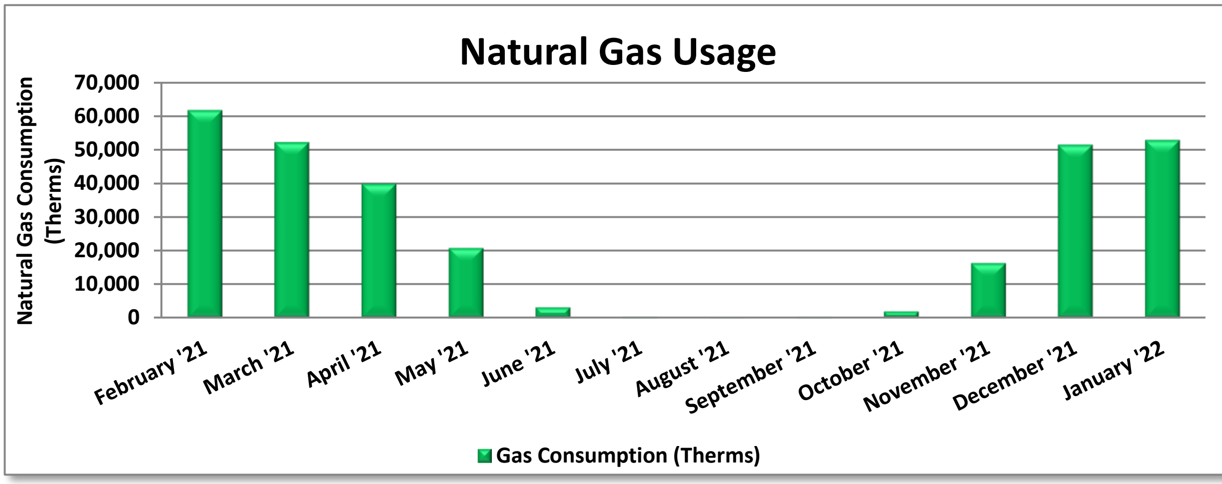
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
2/15/21	28	148,800	261	$2,743	$17,244
3/16/21	29	148,500	261	$2,841	$17,426
4/16/21	31	151,500	276	$3,225	$18,135
5/19/21	33	156,300	240	$3,116	$18,537
6/16/21	28	117,600	240	$2,644	$14,587
7/20/21	34	144,300	207	$3,211	$18,413
8/18/21	29	121,800	213	$2,739	$15,553
9/21/21	34	139,500	207	$2,663	$17,371
10/20/21	29	111,300	198	$2,174	$13,736
11/13/21	24	119,700	246	$2,240	$14,351
12/14/21	31	163,500	267	$3,140	$19,623
1/18/22	35	169,500	267	$3,729	$24,402
Totals	**365**	**1,692,300**	**276**	**$34,463**	**$209,378**

Notes:

- Peak demand of 276 kW occurred in April '21.
- Average demand over the past 12 months was 240 kW.
- The average electric cost over the past 12 months was $0.124/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service Gas Large Volume Firm Transportation (GSGLVFT), with natural gas supply provided by UGI Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
2/15/21	28	61,803	$61,282
3/16/21	29	52,267	$52,631
4/16/21	31	39,962	$41,134
5/19/21	33	20,786	$23,103
6/16/21	28	3,230	$5,923
7/19/21	33	299	$3,628
8/18/21	30	103	$3,135
9/21/21	34	258	$3,690
10/20/21	29	1,986	$4,878
11/13/21	24	16,319	$18,454
12/14/21	31	51,567	$53,422
1/18/22	35	52,952	$65,632
Totals	**365**	**301,531**	**$336,913**
Annual	**365**	**301,531**	**$336,913**

Notes:

- The average gas cost for the past 12 months is $1.117/therm, which is the blended rate used throughout the analysis.
- Summer gas consumption can be attributed to domestic hot water usage.

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.

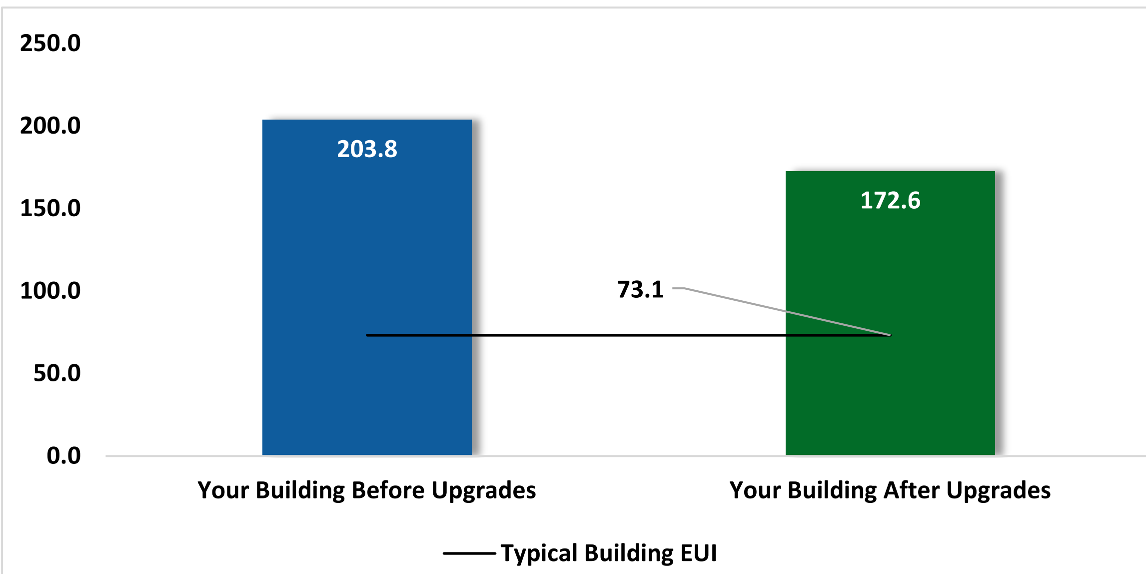


Figure 5 - Energy Use Intensity Comparison[3]

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			**29,168**	**1.6**	**-1**	**$3,592**	**$12,487**	**$1,990**	**$10,497**	**2.9**	**29,197**
ECM 1	Install LED Fixtures	Yes	24,112	0.9	0	$2,980	$11,430	$1,800	$9,630	3.2	24,242
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	4,948	0.6	-1	$599	$947	$160	$787	1.3	4,849
ECM 3	Retrofit Fixtures with LED Lamps	Yes	108	0.1	0	$13	$110	$30	$80	6.1	106
Lighting Control Measures			**252,158**	**21.3**	**-58**	**$30,550**	**$39,062**	**$6,170**	**$32,892**	**1.1**	**247,131**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	248,405	21.0	-57	$30,095	$37,262	$4,700	$32,562	1.1	243,452
ECM 5	Install High/Low Lighting Controls	Yes	3,754	0.3	-1	$455	$1,800	$1,470	$330	0.7	3,679
Motor Upgrades			**424**	**0.1**	**0**	**$52**	**$3,207**	**$0**	**$3,207**	**61.1**	**427**
ECM 6	Premium Efficiency Motors	No	424	0.1	0	$52	$3,207	$0	$3,207	61.1	427
Variable Frequency Drive (VFD) Measures			**253,681**	**102.5**	**0**	**$31,386**	**$273,093**	**$28,925**	**$244,168**	**7.8**	**255,455**
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	253,681	102.5	0	$31,386	$273,093	$28,925	$244,168	7.8	255,455
Unitary HVAC Measures			**18,281**	**7.9**	**8**	**$2,353**	**$60,789**	**$2,199**	**$58,590**	**24.9**	**19,366**
ECM 8	Install High Efficiency Air Conditioning Units	No	16,478	6.9	8	$2,130	$54,607	$2,199	$52,408	24.6	17,550
ECM 9	Install High Efficiency Heat Pumps	No	1,803	1.0	0	$223	$6,182	$0	$6,182	27.7	1,815
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**181**	**$2,021**	**$84,978**	**$5,100**	**$79,878**	**39.5**	**21,182**
ECM 10	Install High Efficiency Furnaces	Yes	0	0.0	103	$1,150	$13,289	$1,500	$11,789	10.2	12,056
ECM 11	Install High Efficiency Unit Heaters	No	0	0.0	20	$222	$13,352	$0	$13,352	60.1	2,328
ECM 12	Install Infrared Heaters	No	0	0.0	58	$649	$58,337	$3,600	$54,737	84.4	6,799
HVAC System Improvements			**0**	**0.0**	**15**	**$167**	**$362**	**$56**	**$306**	**1.8**	**1,752**
ECM 13	Install Pipe Insulation	Yes	0	0.0	15	$167	$362	$56	$306	1.8	1,752
Domestic Water Heating Upgrade			**0**	**0.0**	**9**	**$106**	**$72**	**$36**	**$36**	**0.3**	**1,111**
ECM 14	Install Low-Flow DHW Devices	Yes	0	0.0	9	$106	$72	$36	$36	0.3	1,111
Food Service & Refrigeration Measures			**3,103**	**0.4**	**0**	**$384**	**$920**	**$100**	**$820**	**2.1**	**3,124**
ECM 15	Vending Machine Control	Yes	3,103	0.4	0	$384	$920	$100	$820	2.1	3,124
Custom Measures			**40,946**	**0.0**	**3,299**	**$41,925**	**$60,100**	**$0**	**$60,100**	**1.4**	**427,471**
ECM 16	Installation of an Energy Management System	Yes	71,146	0.0	2,977	$42,063	$52,890	$0	$52,890	1.3	420,180
ECM 17	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-30,200	0.0	322	-$138	$7,210	$0	$7,210	-52.2	7,291
TOTALS			**597,762**	**133.7**	**3,453**	**$112,538**	**$535,069**	**$44,576**	**$490,493**	**4.4**	**1,006,217**

* - 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).

*** - Negative payback explained is section 4.10

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		**29,168**	**1.6**	**-1**	**$3,592**	**$12,487**	**$1,990**	**$10,497**	**2.9**	**29,197**
ECM 1	Install LED Fixtures	24,112	0.9	0	$2,980	$11,430	$1,800	$9,630	3.2	24,242
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	4,948	0.6	-1	$599	$947	$160	$787	1.3	4,849
ECM 3	Retrofit Fixtures with LED Lamps	108	0.1	0	$13	$110	$30	$80	6.1	106
Lighting Control Measures		**252,158**	**21.3**	**-58**	**$30,550**	**$39,062**	**$6,170**	**$32,892**	**1.1**	**247,131**
ECM 4	Install Occupancy Sensor Lighting Controls	248,405	21.0	-57	$30,095	$37,262	$4,700	$32,562	1.1	243,452
ECM 5	Install High/Low Lighting Controls	3,754	0.3	-1	$455	$1,800	$1,470	$330	0.7	3,679
Variable Frequency Drive (VFD) Measures		**253,681**	**102.5**	**0**	**$31,386**	**$273,093**	**$28,925**	**$244,168**	**7.8**	**255,455**
ECM 7	Install VFDs on Constant Volume (CV) Fans	253,681	102.5	0	$31,386	$273,093	$28,925	$244,168	7.8	255,455
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**103**	**$1,150**	**$13,289**	**$1,500**	**$11,789**	**10.2**	**12,056**
ECM 10	Install High Efficiency Furnaces	0	0.0	103	$1,150	$13,289	$1,500	$11,789	10.2	12,056
HVAC System Improvements		**0**	**0.0**	**15**	**$167**	**$362**	**$56**	**$306**	**1.8**	**1,752**
ECM 13	Install Pipe Insulation	0	0.0	15	$167	$362	$56	$306	1.8	1,752
Domestic Water Heating Upgrade		**0**	**0.0**	**9**	**$106**	**$72**	**$36**	**$36**	**0.3**	**1,111**
ECM 14	Install Low-Flow DHW Devices	0	0.0	9	$106	$72	$36	$36	0.3	1,111
Food Service & Refrigeration Measures		**3,103**	**0.4**	**0**	**$384**	**$920**	**$100**	**$820**	**2.1**	**3,124**
ECM 15	Vending Machine Control	3,103	0.4	0	$384	$920	$100	$820	2.1	3,124
Custom Measures		**71,146**	**0.0**	**2,977**	**$42,063**	**$52,890**	**$0**	**$52,890**	**1.3**	**420,180**
ECM 16	Installation of an Energy Management System	71,146	0.0	2,977	$42,063	$52,890	$0	$52,890	1.3	420,180
TOTALS		**609,256**	**125.7**	**3,045**	**$109,399**	**$392,174**	**$38,777**	**$353,397**	**3.2**	**970,007**

* - 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		**29,168**	**1.6**	**-1**	**$3,592**	**$12,487**	**$1,990**	**$10,497**	**2.9**	**29,197**
ECM 1	Install LED Fixtures	24,112	0.9	0	$2,980	$11,430	$1,800	$9,630	3.2	24,242
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	4,948	0.6	-1	$599	$947	$160	$787	1.3	4,849
ECM 3	Retrofit Fixtures with LED Lamps	108	0.1	0	$13	$110	$30	$80	6.1	106

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

ECM 1: Install LED Fixtures

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

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

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

Affected Building Areas: mechanical room and exterior HID fixtures

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected Building Areas: paint booth garage fluorescent fixtures with T12 tubes

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent 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: mechanical room fluorescent fixtures with T8 tubes

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		**252,158**	**21.3**	**-58**	**$30,550**	**$39,062**	**$6,170**	**$32,892**	**1.1**	**247,131**
ECM 4	Install Occupancy Sensor Lighting Controls	248,405	21.0	-57	$30,095	$37,262	$4,700	$32,562	1.1	243,452
ECM 5	Install High/Low Lighting Controls	3,754	0.3	-1	$455	$1,800	$1,470	$330	0.7	3,679

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

ECM 4: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: classrooms, offices, conference rooms, garages, shop areas, locker rooms, dining areas, lounges, restrooms, and storage rooms

ECM 5: 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 lobbies

4.3 Motors

#	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)
Motor Upgrades		**424**	**0.1**	**0**	**$52**	**$3,207**	**$0**	**$3,207**	**61.1**	**427**
ECM 6	Premium Efficiency Motors	424	0.1	0	$52	$3,207	$0	$3,207	61.1	427

ECM 6: Premium Efficiency Motors

We evaluated replacing standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Affected Motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Roof	Exhaust System	2	Exhaust Fan	0.5	Exhaust Fan
Roof	Exhaust System	4	Exhaust Fan	0.3	Exhaust Fan
Roof	Exhaust System	1	Exhaust Fan	0.3	Exhaust Fan

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 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		**253,681**	**102.5**	**0**	**$31,386**	**$273,093**	**$28,925**	**$244,168**	**7.8**	**255,455**
ECM 7	Install VFDs on Constant Volume (CV) Fans	253,681	102.5	0	$31,386	$273,093	$28,925	$244,168	7.8	255,455

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 7: 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: supply fans for HV-1 through HV-15 and AC-1 through AC-5, building exhaust fans

4.5 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		**18,281**	**7.9**	**8**	**$2,353**	**$60,789**	**$2,199**	**$58,590**	**24.9**	**19,366**
ECM 8	Install High Efficiency Air Conditioning Units	16,478	6.9	8	$2,130	$54,607	$2,199	$52,408	24.6	17,550
ECM 9	Install High Efficiency Heat Pumps	1,803	1.0	0	$223	$6,182	$0	$6,182	27.7	1,815

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 package units and mini-split units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 8: 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: AC-1 through AC-3, mini-split AC units serving the female maintenance locker room and telephone electrical room

ECM 9: 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: mini-split HP unit serving the telephone electrical room

4.6 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**	**181**	**$2,021**	**$84,978**	**$5,100**	**$79,878**	**39.5**	**21,182**
ECM 10	Install High Efficiency Furnaces	0	0.0	103	$1,150	$13,289	$1,500	$11,789	10.2	12,056
ECM 11	Install High Efficiency Unit Heaters	0	0.0	20	$222	$13,352	$0	$13,352	60.1	2,328
ECM 12	Install Infrared Heaters	0	0.0	58	$649	$58,337	$3,600	$54,737	84.4	6,799

ECM 10: Install High Efficiency Furnaces

Replace 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.

Condensing gas furnaces in larger sizes, up to 3,000 MBh input, are beginning to appear in the marketplace. If you develop this measure, we recommend that your design team research available options for replacing the larger furnaces at this facility as well.

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

Affected Units: HV-13, 14, and 15

ECM 11: Install High Efficiency Unit Heaters

We evaluated replacing existing standard gas-fired unit heaters with high efficiency gas-fired condensing unit heaters. Improved combustion technology and heat exchanger design optimize the heat recovery from the combustion gases, which can significantly improve unit heater efficiency. Savings result from improved system efficiency.

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

A heating upgrade option that might work in some circumstances would be to replace forced air heating equipment with low-intensity infrared heating units with an enclosed flame, rather than an open flame on a ceramic or metal surface. The most optimal installed system would include modulating high-efficiency infrared heaters, designed for the space and with appropriate controls to vary the capacity based on the space heating needs.

Forced air furnaces heat all of the air in the space served, which is inefficient for large volume spaces with relatively few occupants, areas with high ceilings, or areas with high outside air infiltration. Infrared heaters heat objects and surfaces directly, including the occupants of the space, rather than heating large volumes of air. Infrared heaters also heat the floor, which then re-radiates the heat. As a result, infrared heaters are more effective and efficient at maintaining occupant comfort at significantly lower cost for certain space types.

ECM 12: Install Infrared Heaters

We evaluated replacing aging gas-fired infrared heating equipment with low-intensity infrared heating units with an enclosed flame.

Forced air furnaces heat all of the air in the space served, which is inefficient for large volume spaces with relatively few occupants, areas with high ceilings, or areas with high outside air infiltration. Infrared heaters heat objects and surfaces directly, including the occupants of the space, rather than heating large volumes of air. Infrared heaters also heat the floor, which then re-radiates the heat. As a result, infrared heaters are more effective and efficient at maintaining occupant comfort at significantly lower cost for certain space types. While you are currently using infrared technology for heating some of garage areas, the equipment is aging and ready for replacement.

For the purposes of this report, the proposed efficiency of the new infrared heaters is assumed to be about 3% more efficient that the existing heating equipment. We recommend that you work with a mechanical contractor who specializes in the installation of infrared heaters for exact system sizing and costs.

Affected Building Areas: drivers' side and maintenance side garages.

4.7 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**0**	**0.0**	**15**	**$167**	**$362**	**$56**	**$306**	**1.8**	**1,752**
ECM 13	Install Pipe Insulation	0	0.0	15	$167	$362	$56	$306	1.8	1,752

ECM 13: Install Pipe Insulation

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

Affected Systems: hot water piping around both boilers, and domestic hot water piping in the drivers' side mechanical room

4.8 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**	**9**	**$106**	**$72**	**$36**	**$36**	**0.3**	**1,111**
ECM 14	Install Low-Flow DHW Devices	0	0.0	9	$106	$72	$36	$36	0.3	1,111

ECM 14: Install Low-Flow DHW Devices

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

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

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. Additional cost savings may result from reduced water usage.

4.9 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		**3,103**	**0.4**	**0**	**$384**	**$920**	**$100**	**$820**	**2.1**	**3,124**
ECM 15	Vending Machine Control	3,103	0.4	0	$384	$920	$100	$820	2.1	3,124

ECM 15: 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.

4.10 Custom 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)
Custom Measures		**40,946**	**0.0**	**3,299**	**$41,925**	**$60,100**	**$0**	**$60,100**	**1.4**	**427,471**
ECM 16	Installation of an Energy Management System	71,146	0.0	2,977	$42,063	$52,890	$0	$52,890	1.3	420,180
ECM 17	Replace Gas Fired Water Heater with Heat Pump Water Heater	-30,200	0.0	322	-$138	$7,210	$0	$7,210	-52.2	7,291

ECM 16: Installation of an Energy Management System

Most larger facilities have some type of building automation system (BAS), which provides for centralized, remote control and monitoring of HVAC equipment, and sometimes lighting or other building systems. A BAS utilizes a system of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems that adjust HVAC 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. Pneumatic 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.

Often smaller facilities are not equipped with central controls. For many small sites, it has been less costly to install distributed local controls, such as programmable thermostats and timeclocks, rather than centralized DDC. Local controls do a reasonably good job of scheduling equipment and maintaining operating conditions by relying on controls integral to HVAC units, such as logic for compressor staging, to manage the equipment operating algorithms.

Even for smaller sites, inefficiencies arise when temperature sensors and thermostat schedules are not maintained, when there are separate systems for heating and cooling, and especially when equipment is added, or the facility is reconfigured or repurposed.

Based on our survey, it appears that the installation of a BAS at your site could increase the efficiency of your building HVAC system operation.

A controls upgrade would enable automated equipment start and stop times, temperature setpoints, 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. 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.

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in installing a BAS. Based on industry standards and previous project experience, the potential energy savings may be up to 20% of existing HVAC energy use. We estimate the cost for installing a BAS is approximately $3.00 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to implement the system. For the purposes of this report, we have conservatively estimated savings to be 10.0% of the HVAC energy consumption baseline.

ECM 17: Replace Gas Fired Water Heater with Heat Pump Water Heater

A gas fired water heater uses a burner to heat water. Air source heat pump water heaters (HPWH) use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. Water heater efficiency is rated by the uniform energy factor (UEF). For a relative comparison of water heater UEFs, the criteria for certifying a water heater in the ENERGY STAR program are provided below. These values indicate that HPWH heaters are significantly more efficient than gas fired water heaters.

There are two types of HPWH: those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The measure considers an integrated HPWH.

ENERGY STAR Uniform Energy Factor (UEF) Criteria for Certified Water Heaters *

Water Heater Type	Minimum UEF	Other
Integrated HPWH	3.3	
Integrated HPWH	2.2	120 Volt, 15 Amp circuit
Split System HPWH	2.2	
Gas Fired Storage	0.64	≤ 55-gal, Medium Draw Pattern
Gas Fired Storage	0.68	≤ 55-gal, High Draw Pattern
Gas Fired Storage	0.78	> 55-gal, Medium Draw Pattern
Gas Fired Storage	0.80	> 55-gal, High Draw Pattern
Gas Fired Storage	0.80	Residential Duty
Gas Fired Instantaneous	0.87	

** Note: Uniform Energy Factor (UEF): The newest measure of water heater overall efficiency. The higher the UEF value is, the more efficient the water heater. UEF is determined by the Department of Energy's test method outlined in 10 CFR Part 430, Subpart B, Appendix E.*[4]

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation[5]. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room. The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

Most HPWH operate effectively down to an air temperature of 40 °F. Below that temperature, an electric resistance booster heater is typically required to achieve full heating capacity. It is critical that the HPWH

[4] https://www.energy.gov/sites/prod/files/2014/06/f17/rwh_tp_final_rule.pdf

[5] https://basc.pnnl.gov/code-compliance/heat-pump-water-heaters-code-compliance-brief#:~:text=HPWH%20must%20have%20unrestricted%20airflow,depending%20on%20size%20of%20system

controls are set up so that the electric resistance heat only engages when the air temperature is too cold for the HPWH to extract heat from it. HPWHs have a slow recovery. During periods of high demand, the electric resistance heating element, if enabled, may be energized to maintain set point, thus reducing the overall efficiency of the unit. It is recommended that a careful analysis of the hot water demand be conducted to determine if the application makes economic sense, and the HPWH heating capacity and storage are properly sized.

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank in order to maintain stratification within the storage tank. Water should be drawn from the bottom of the tank to be heated. If there is a DHW recirculation pump, it should only be operated during high hot water demand periods.

Switching from a gas fired water heater to a HPWH has the potential to reduce the sites overall greenhouse gas emissions. If the electricity for the HPWH is provided by an on-site photovoltaic (PV) system, then there are essentially no greenhouse gas (GHG) emissions. A 2016 study conducted at Cornell[6] calculated the kg of methane (CH_4) and carbon dioxide (CO_2) produced per GJ of water heated. The study compared HPWH to gas and electric fired, storage and tankless water heaters. The study also considered electricity produced from natural gas and coal fired electric plants. In all cases the study found that HPWHs produced less methane than all of the other water heaters. The study also found that HPWH produced less carbon dioxide than electric resistance water heaters but more carbon dioxide than tankless gas water heaters and about the same amount of carbon dioxide as storage gas water heaters. The summary tables provide the reduction in CO2 equivalent emissions based on the typical New Jersey electric utility.

This measure has a negative simple payback due to the relative cost of electricity to natural gas. At this site the cost per Btu for natural gas is significantly lower than for electricity. Therefore, even though this measure will result in a net energy savings in terms of Btu at this site it will increase the overall cost for providing domestic hot water.

Affected Systems: both gas-fired DHW systems

[6] Greenhouse gas emissions from domestic hot water: Heat pumps compared to most commonly used systems. Bongghi Hong, Robert W. Howarth. Department of Ecology and Evolutionary Biology, Cornell University. Energy Science and Engineering 2016.

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[7]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. Materials used may include caulk, polyurethane foam, and other weather-stripping materials. There is an energy savings opportunity by reducing the uncontrolled air exchange between the outside and inside of the building. Blower door assisted comprehensive building air sealing will reduce the amount of air exchange, which will in turn reduce the load on the buildings heating and cooling equipment, providing energy savings and increased occupant comfort.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

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

Lighting Maintenance

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

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

Lighting Controls

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

Motor Maintenance

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

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.

Boiler Maintenance

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

Furnace Maintenance

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

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.

Compressed Air System Maintenance

Compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan for compressed air systems should include:

- Inspection, cleaning, and replacement of inlet filter cartridges.
- Cleaning of drain traps.
- Daily inspection of lubricant levels to reduce unwanted friction.
- Inspection of belt condition and tension.
- Check for leaks and adjust loose connections.
- Overall system cleaning.
- Reduce pressure setting to minimum needed for air operated equipment.
- Turn off compressor if not routinely needed.
- Use low pressure blower air rather than high pressure compressed air.

Contact a qualified technician for help with setting up periodic maintenance schedule.

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[8] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[9] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

Procurement Strategies

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

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

[9] 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.

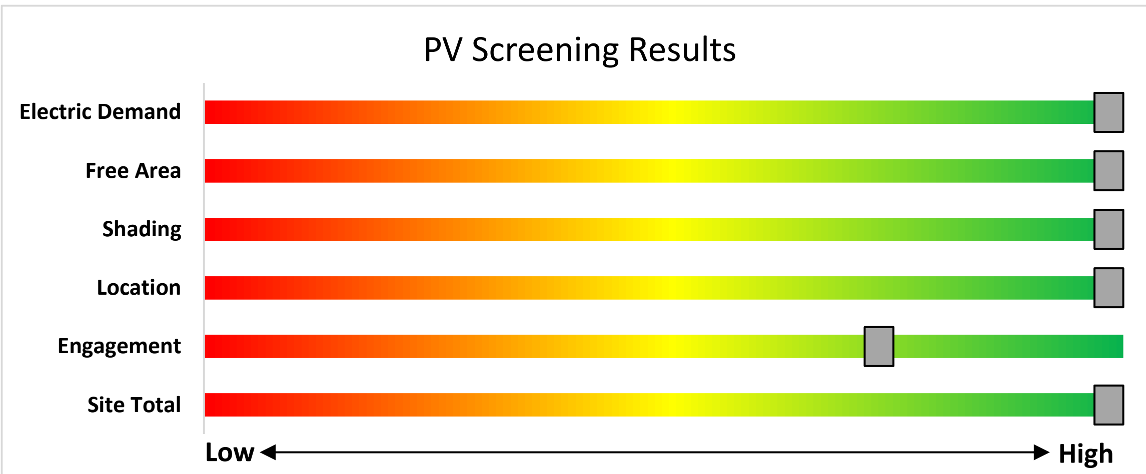
6.1 Solar Photovoltaic

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	240	kW DC STC
Electric Generation	285,929	kWh/yr
Displaced Cost	$35,380	/yr
Installed Cost	$624,000	

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.

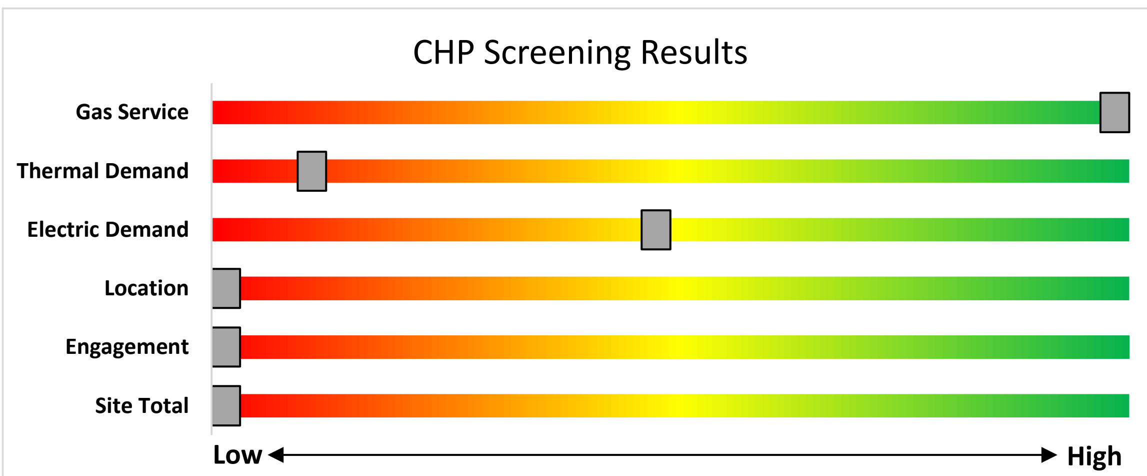


Figure 9 - Combined Heat and Power Screening

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)

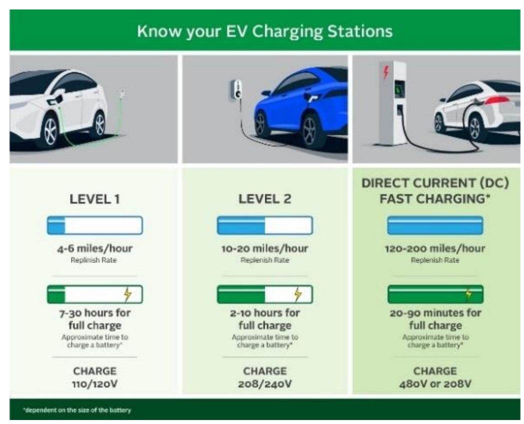
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

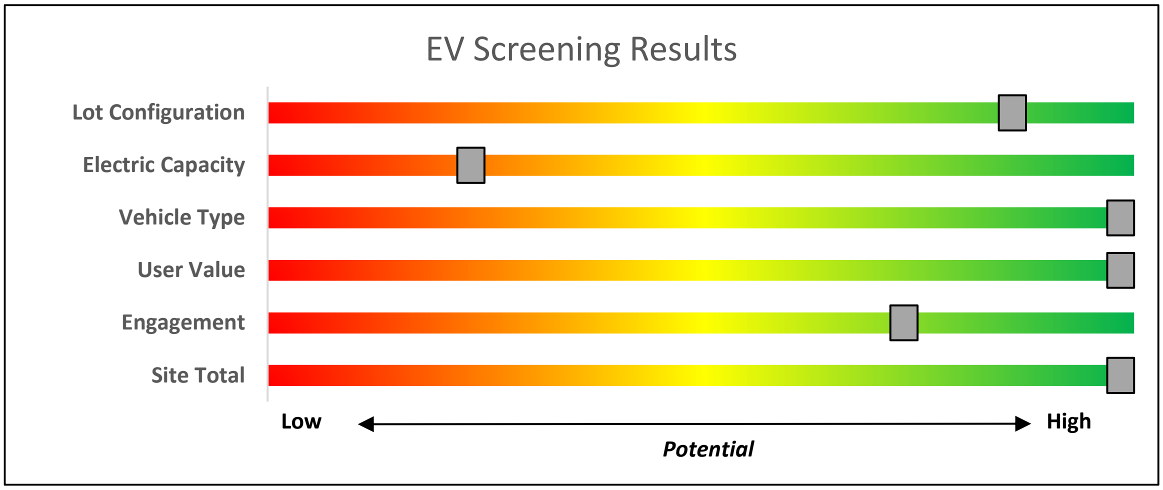


Figure 10 – EV Charger Screening

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.

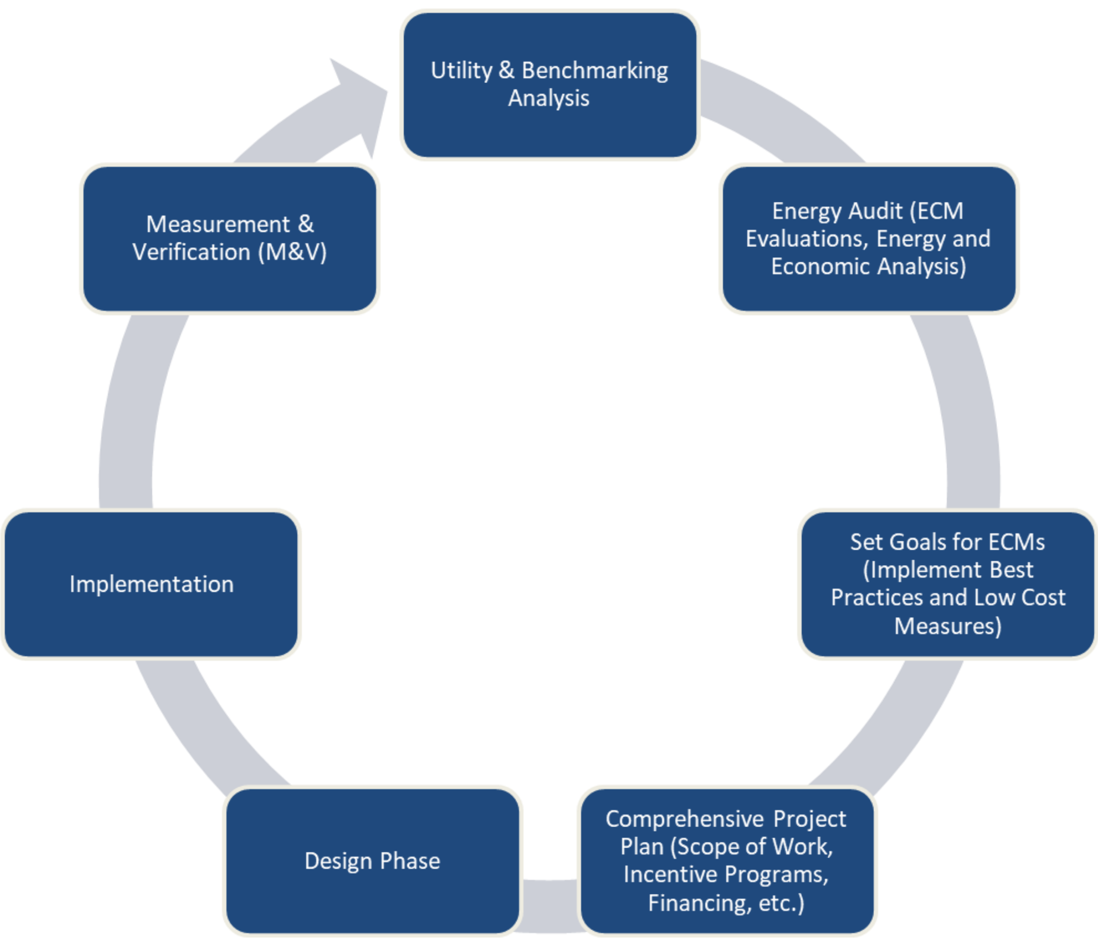


Figure 11 – Project Development Cycle

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[10].

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[11].

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

[11] 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 - Training Room	15	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	15	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	672	0	$81	$270	$35	2.9
Classroom - Training Room Drivers	15	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	15	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	672	0	$81	$270	$35	2.9
Conference - Maintenance	7	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	7	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	314	0	$38	$270	$35	6.2
Corridor - Bus Operators	10	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	8,736	5	None	Yes	10	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	6,028	0.1	894	0	$108	$450	$350	0.9
Corridor - Drivers	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor - Drivers	15	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	8,736	5	None	Yes	15	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	6,028	0.1	1,341	0	$162	$675	$525	0.9
Dining Area - Drivers	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 - Drivers	31	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	31	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.2	1,389	0	$168	$810	$105	4.2
Dining Room - Maintenance	20	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	20	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	896	0	$109	$540	$70	4.3
Electrical Room - Main	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095	4	None	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	756	0.1	158	0	$19	$540	$70	24.6
Electrical Room - Telephones	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	1,095	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	756	0.0	45	0	$5	$270	$35	43.3
Garage - Dynamometer	8	LED - Fixtures: High-Bay	Wall Switch	S	150	5,242	4	None	Yes	8	LED - Fixtures: High-Bay	Occupancy Sensor	150	3,617	0.2	1,950	0	$236	$270	$35	1.0
Garage - Industrial Waste	12	LED - Fixtures: High-Bay	Wall Switch	S	240	5,242	4	None	Yes	12	LED - Fixtures: High-Bay	Occupancy Sensor	240	3,617	0.6	4,680	-1	$567	$270	$35	0.4
Garage - Industrial Waste	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	5,242	4	None	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,617	0.1	424	0	$51	$270	$35	4.6
Garage - Paint Booth	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	5,242	4	None	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,617	0.1	754	0	$91	$540	$70	5.1
Garage - Paint Booth	40	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	5,242	4	None	Yes	40	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,617	0.5	3,770	-1	$457	$810	$105	1.5
Garage - Paint Booth	8	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	5,242	2, 4	Relamp & Reballast	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,617	0.7	5,702	-1	$691	$1,217	$195	1.5
Garage - Parts Storage	63	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	5,242	4	None	Yes	63	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,617	0.4	2,969	-1	$360	$1,350	$175	3.3
Garage - Steam Cleaner	8	LED - Fixtures: High-Bay	Wall Switch	S	150	5,242	4	None	Yes	8	LED - Fixtures: High-Bay	Occupancy Sensor	150	3,617	0.2	1,950	0	$236	$270	$35	1.0
Garage - Steam Cleaner	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	5,242	4	None	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,617	0.1	471	0	$57	$270	$35	4.1
Garage - Tool Boxes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,669		None	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,669	0.0	0	0	$0	$0	$0	0.0
Janitorial - Bus Operators	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	1,095		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,095	0.0	0	0	$0	$0	$0	0.0
Janitorial - Maintenance	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	40	1,095	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	756	0.0	27	0	$3	$116	$20	29.2
Janitorial - West Garage	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	S	33	931		None	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	931	0.0	0	0	$0	$0	$0	0.0
Lobby - Maintenance	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

	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
Lobby - Maintenance	17	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	8,736	5	None	Yes	17	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	6,028	0.1	1,519	0	$184	$675	$595	0.4
Locker Room - Drivers	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	269	0	$33	$270	$35	7.2
Locker Room - Female Maintenance	8	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	40	4,380	4	None	Yes	8	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	3,022	0.1	434	0	$53	$270	$35	4.5
Locker Room - Foreman	8	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	358	0	$43	$270	$35	5.4
Locker Room - Male Maintenance	13	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	40	4,380	4	None	Yes	13	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	3,022	0.1	706	0	$86	$270	$35	2.7
Locker Room - Uniforms Maintenance	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	0.0	0	0	$0	$0	$0	0.0
Lounge - Drivers	12	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	12	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	538	0	$65	$270	$35	3.6
Main Garage - Drivers Side	16	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	16	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Garage - Drivers Side	146	LED - Fixtures: High-Bay	Wall Switch	S	240	8,736	4	None	Yes	146	LED - Fixtures: High-Bay	Occupancy Sensor	240	6,028	7.2	94,894	-22	$11,497	$4,050	$525	0.3
Main Garage - Drivers Side	522	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736	4	None	Yes	522	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	3.1	40,996	-9	$4,967	$13,500	$1,750	2.4
Main Garage - Maintenance Side	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Garage - Maintenance Side	121	LED - Fixtures: High-Bay	Wall Switch	S	240	8,736	4	None	Yes	121	LED - Fixtures: High-Bay	Occupancy Sensor	240	6,028	5.9	78,645	-18	$9,528	$3,240	$420	0.3
Main Garage - Maintenance Side	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736	4	None	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	0.1	942	0	$114	$270	$35	2.1
Mechanical - Battery Room	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	756	0.0	39	0	$5	$116	$20	20.1
Mechanical - Bus Washers	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	0	0	$0	$0	$0	0.0
Mechanical - Compressors	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095		None	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	0	0	$0	$0	$0	0.0
Mechanical - Drivers Side	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	0	0	$0	$0	$0	0.0
Mechanical - Fire Pump	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095		None	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	0	0	$0	$0	$0	0.0
Mechanical - Maintenance	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	0	0	$0	$0	$0	0.0
Mechanical - Pump Room	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095		None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	0	0	$0	$0	$0	0.0
Mechanical - Vacuum Units	6	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	1,095	1, 4	Fixture Replacement	Yes	6	LED - Fixtures: High-Bay	Occupancy Sensor	75	756	1.0	1,598	0	$194	$3,301	$335	15.3
Mechanical - Waste Injector	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,095	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.1	108	0	$13	$110	$30	6.1
Office - Assistant Supervisor	7	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	7	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	314	0	$38	$270	$35	6.2
Office - Building Maintenance	9	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	9	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	403	0	$49	$270	$35	4.8
Office - Bus Operator Supervisor	7	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	7	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	314	0	$38	$270	$35	6.2

	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 - Bus Operators	20	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	20	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	896	0	$109	$540	$70	4.3
Office - Doctor	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	90	0	$11	$116	$20	8.8
Office - Maintenance #1	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	269	0	$33	$270	$35	7.2
Office - Maintenance #2	8	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	358	0	$43	$270	$35	5.4
Office - Maintenance Open	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 - Maintenance Open	20	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	20	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	896	0	$109	$540	$70	4.3
Office - Nurse	13	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	13	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	582	0	$71	$270	$35	3.3
Office - Regional Supervisor	13	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	13	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.1	582	0	$71	$270	$35	3.3
Office - Training Drivers	5	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	5	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	224	0	$27	$270	$35	8.7
Office - Training Room	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	179	0	$22	$270	$35	10.8
Office - Veeder Root Room	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	269	0	$33	$270	$35	7.2
Restroom - Female Bus Operators	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	0.0	0	0	$0	$0	$0	0.0
Restroom - Female Drivers	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	179	0	$22	$270	$35	10.8
Restroom - Female Drivers Shower	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	0.0	0	0	$0	$0	$0	0.0
Restroom - Male Bus Operators	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	0.0	0	0	$0	$0	$0	0.0
Restroom - Male Drivers	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	179	0	$22	$270	$35	10.8
Restroom - Male Drivers Shower	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,380	0.0	0	0	$0	$0	$0	0.0
Restroom - West Garage	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	4,380	4	None	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,022	0.0	90	0	$11	$116	$20	8.8
Shop - Metal/Welding	16	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	5,242	4	None	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,617	0.1	1,131	0	$137	$540	$70	3.4
Shop - Small Electronics	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	5,242	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,617	0.0	188	0	$23	$270	$35	10.3
Shop - Tools	16	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	5,242	4	None	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,617	0.1	1,131	0	$137	$540	$70	3.4
Storage - Hand Tools	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	756	0.0	20	0	$2	$116	$0	48.6
Storage - Lost and Found	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	1,095	4	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	756	0.0	67	0	$8	$270	$0	33.2
Storage - Maintenance Office	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	1,095	4	None	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	756	0.0	22	0	$3	$116	$0	42.7
Storage - Training Room	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	1,095	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	756	0.0	45	0	$5	$270	$0	49.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Storage - Transportation	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	1,095	4	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	756	0.0	67	0	$8	$270	$0	33.2
Storage - Vault	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,095	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	756	0.0	39	0	$5	$116	$0	24.3
Exterior Lighting	15	High-Pressure Sodium: (1) 400W Lamp	Photocell		465	4,380	1	Fixture Replacement	No	15	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	120	4,380	0.0	22,667	0	$2,804	$8,399	$1,500	2.5
Exterior Lighting	34	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		400	4,380		None	No	34	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	400	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Lighting	38	LED - Fixtures: Wall Pack	Photocell		50	4,380		None	No	38	LED - Fixtures: Wall Pack	Photocell	50	4,380	0.0	0	0	$0	$0	$0	0.0

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	HV-1 - Bus Storage Area	1	Supply Fan	15.0	91.0%	No			B	2,300	7	No	93.0%	Yes	1	4.4	11,016	0	$1,363	$9,177	$1,200	5.9
Roof	HV-2 - Bus Storage Area	1	Supply Fan	15.0	91.0%	No			B	2,300	7	No	93.0%	Yes	1	4.4	11,016	0	$1,363	$9,177	$1,200	5.9
Roof	HV-3 - Bus Storage Area	1	Supply Fan	15.0	91.0%	No			B	2,300	7	No	93.0%	Yes	1	4.4	11,016	0	$1,363	$9,177	$1,200	5.9
Roof	HV-4 - Bus Storage Area	1	Supply Fan	30.0	94.1%	No			W	2,300	7	No	94.1%	Yes	1	8.6	20,513	0	$2,538	$14,881	$1,500	5.3
Roof	HV-5 - Bus Storage Area	1	Supply Fan	30.0	92.4%	No			B	2,300	7	No	94.1%	Yes	1	8.8	21,570	0	$2,669	$14,881	$1,500	5.0
Roof	HV-6 - Bus Storage Area	1	Supply Fan	30.0	92.4%	No			B	2,300	7	No	94.1%	Yes	1	8.8	21,570	0	$2,669	$14,881	$1,500	5.0
Roof	HV-7 - Bus Storage Area	1	Supply Fan	30.0	92.4%	No			B	2,300	7	No	94.1%	Yes	1	8.8	21,570	0	$2,669	$14,881	$1,500	5.0
Roof	HV-8 - Maintenance Area	1	Supply Fan	15.0	91.0%	No			B	2,300	7	No	93.0%	Yes	1	4.4	11,016	0	$1,363	$9,177	$1,200	5.9
Roof	HV-9 - Maintenance Area	1	Supply Fan	25.0	93.6%	No			W	2,300	7	No	93.6%	Yes	1	7.2	17,185	0	$2,126	$13,171	$1,400	5.5
Roof	HV-10 - Maintenance Area	1	Supply Fan	15.0	91.0%	No			B	2,300	7	No	93.0%	Yes	1	4.4	11,016	0	$1,363	$9,177	$1,200	5.9
Roof	HV-11 - Maintenance Area	1	Supply Fan	15.0	93.0%	No			W	2,300	7	No	93.0%	Yes	1	4.3	10,378	0	$1,284	$9,177	$1,200	6.2
Roof	HV-12 - Maintenance Area	1	Supply Fan	7.5	88.5%	No			B	2,300	7	No	91.0%	Yes	1	2.2	5,722	0	$708	$5,945	$1,000	7.0
Roof	HV-13 - Maintenance Area	1	Supply Fan	0.5	75.0%	No			B	2,300	7	No	78.2%	Yes	1	0.2	461	0	$57	$3,136	$50	54.2
Roof	HV-14 - Maintenance Area	1	Supply Fan	1.0	82.5%	No			B	2,300	7	No	85.5%	Yes	1	0.3	829	0	$103	$3,508	$75	33.5
Roof	HV-15 - Maintenance Area	1	Supply Fan	2.0	84.0%	No			B	2,300	7	No	86.5%	Yes	1	0.6	1,612	0	$199	$4,182	$100	20.5
Roof	AC-1 - Bus Operator Side Offices	1	Supply Fan	2.0	84.0%	No			B	2,300	7	No	86.5%	Yes	1	0.6	1,612	0	$199	$4,182	$100	20.5
Roof	AC-2 - Bus Locker Rooms	1	Supply Fan	3.0	86.5%	No			B	2,300	7	No	89.5%	Yes	1	0.9	2,366	0	$293	$4,555	$200	14.9
Roof	AC-3 - Bus Operator Side Offices	1	Supply Fan	2.0	84.0%	No			B	2,300	7	No	86.5%	Yes	1	0.6	1,612	0	$199	$4,182	$100	20.5
Roof	AC-4 - Maintenance Side Offices	1	Supply Fan	1.0	85.5%	No			W	2,300	7	No	85.5%	Yes	1	0.3	753	0	$93	$3,508	$75	36.9
Roof	AC-5 - Maintenance Break Room	1	Supply Fan	1.0	85.5%	No			W	2,300	7	No	85.5%	Yes	1	0.3	753	0	$93	$3,508	$75	36.9

		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
Roof	AC-6 - Training Office	1	Supply Fan	1.0	85.5%	No			W	2,300	7	No	85.5%	Yes	1	0.3	753	0	$93	$3,508	$75	36.9
Roof	AC-7 - Back Offices	1	Supply Fan	0.3	73.4%	No			W	2,300		No	73.4%	No		0.0	0	0	$0	$0	$0	0.0
Various	Unit Heaters	9	Supply Fan	0.1	60.0%	No			W	2,300		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Compressors	Air Compressor	1	Air Compressor	30.0	94.1%	Yes			W	600		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Compressors	Air Compressor	2	Air Compressor	20.0	93.0%	Yes			W	600		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Compressors	Air Compressor	1	Air Compressor	1.5	86.5%	No			W	600		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Drivers Side	Heating System - Drivers Side	1	Heating Hot Water Pump	0.1	60.0%	No	Taco		W	2,300		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Maintenance	Heating System - Maintenance Side	1	Heating Hot Water Pump	0.1	60.0%	No	Taco		W	2,300		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Maintenance	Domestic Hot Water - Maintenance Side	1	DHW Circulation Pump	0.1	60.0%	No	Taco		W	8,760		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust System	1	Exhaust Fan	10.0	89.5%	No			B	2,300	7	No	91.7%	Yes	1	3.1	7,500	0	$928	$6,697	$1,100	6.0
Roof	Exhaust System	1	Exhaust Fan	7.5	88.5%	No			B	2,300	7	No	91.0%	Yes	1	2.3	5,722	0	$708	$5,945	$1,000	7.0
Roof	Exhaust System	10	Exhaust Fan	5.0	87.5%	No			B	2,300	7	No	89.5%	Yes	10	15.3	38,246	0	$4,732	$50,277	$9,000	8.7
Roof	Exhaust System	5	Exhaust Fan	3.0	86.5%	No			B	2,300	7	No	89.5%	Yes	5	4.7	11,831	0	$1,464	$22,774	$1,000	14.9
Roof	Exhaust System	5	Exhaust Fan	1.5	84.0%	No			B	2,300	7	No	86.5%	Yes	5	2.3	6,044	0	$748	$19,434	$375	25.5
Roof	Exhaust System	2	Exhaust Fan	0.5	75.0%	No			B	2,300	6	Yes	78.2%	No		0.0	70	0	$9	$938	$0	108.0
Roof	Exhaust System	4	Exhaust Fan	0.3	65.0%	No			B	2,300	6	Yes	73.4%	No		0.1	302	0	$37	$1,821	$0	48.7
Roof	Exhaust System	1	Exhaust Fan	0.3	62.5%	No			B	2,300	6	Yes	69.5%	No		0.0	52	0	$6	$448	$0	69.9
Roof	Exhaust System	1	Exhaust Fan	0.1	60.0%	No			B	2,300		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust System	5	Exhaust Fan	0.1	60.0%	No			B	2,300		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Various	Garage Doors	17	Other	0.5	75.0%	No			W	600		No	75.0%	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 - Industrial Waste	Sump Pump	1	Process Pump	1.0	82.5%	No			W	600		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Sump Pump	2	Process Pump	1.0	82.5%	No			W	600		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Garage - Industrial Waste	Wheel Clamp	1	Other	3.0	86.5%	No			W	600		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Vacuum Units	Dust Collector	1	Other	25.0	91.7%	No			W	600		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Shop - Tools	Dust Collector	1	Other	5.0	87.5%	No			W	600		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Waste Injector	Sewerage Pumps	2	Process Pump	3.0	86.5%	No			W	600		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior	Gas Pump	1	Process Pump	0.3	65.0%	No			W	600		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Various	Bus Lift Motors	9	Other	15.0	91.0%	No			W	400		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Bus Washer Motors	1	Other	7.5	88.5%	No			W	600		No	88.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Bus Washer Motors	2	Other	10.0	89.5%	No			B	600		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Hydraulic Oil Pumps	2	Other	40.0	91.7%	No			B	600		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Fresh Water Tank	2	Other	15.0	89.5%	No			B	600		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Holding Tank	1	Other	15.0	89.5%	No			B	600		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Bus Washers	Brush Pumps	6	Other	0.1	60.0%	No			W	600		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Electrical Room - Main	Electrical Room - Main	2	Electric Resistance Heat		8.53		1 COP	Dayton	2HDA1	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-1 - Bus Storage Area	1	Forced Air Furnace		1,112.83		0.8 Et	Industrial Air Systems	QD220C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-2 - Bus Storage Area	1	Forced Air Furnace		1,119.74		0.8 Et	Industrial Air Systems	QD220C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-3 - Bus Storage Area	1	Forced Air Furnace		1,112.83		0.8 Et	Industrial Air Systems	QD220C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-4 - Bus Storage Area	1	Forced Air Furnace		2,860.00		0.8 Et	Reznor		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-5 - Bus Storage Area	1	Forced Air Furnace		2,721.60		0.8 Et	Industrial Air Systems	QD230C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-6 - Bus Storage Area	1	Forced Air Furnace		2,721.60		0.8 Et	Industrial Air Systems	QD230C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-7 - Bus Storage Area	1	Forced Air Furnace		2,721.60		0.8 Et	Industrial Air Systems	QD230C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-8 - Maintenance Area	1	Forced Air Furnace		1,296.00		0.8 Et	Industrial Air Systems	QD222C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-9 - Maintenance Area	1	Forced Air Furnace		1,296.00		0.8 Et	Air Wise Sales	MN-28	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-10 - Maintenance Area	1	Forced Air Furnace		1,296.00		0.8 Et	Industrial Air Systems	QD222C	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-11 - Maintenance Area	1	Forced Air Furnace		960.00		0.8 Et	Mestek	PV12	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-12 - Maintenance Area	1	Forced Air Furnace		1,000.00		0.8 Et	Industrial Air Systems	GMIAC100HW	B		No							0.0	0	0	$0	$0	$0	0.0
Roof	HV-13 - Maintenance Area	1	Forced Air Furnace		80.00		0.8 Et	Trane	GRCA10GD	B	10	Yes	1	Forced Air Furnace		80.00		0.97 AFUE	0.0	0	18	$196	$3,007	$500	12.8
Roof	HV-14 - Maintenance Area	1	Forced Air Furnace		158.00		0.8 Et	Trane	GRCA20GD	B	10	Yes	1	Forced Air Furnace		158.00		0.97 AFUE	0.0	0	35	$387	$4,485	$500	10.3
Roof	HV-15 - Maintenance Area	1	Forced Air Furnace		232.00		0.8 Et	Industrial Air Systems	QD115C	B	10	Yes	1	Forced Air Furnace		232.00		0.97 AFUE	0.0	0	51	$568	$5,797	$500	9.3
Main Garage - Drivers Side	Main Garage - Drivers Side	6	Infrared Heater		135.00		0.9 Et	Solaronics	STG-150-40C	B	12	Yes	6	Infrared Heater		135.00		0.93 Et	0.0	0	29	$324	$29,168	$1,800	84.4
Main Garage - Maintenance Side	Main Garage - Maintenance Side	6	Infrared Heater		135.00		0.9 Et	Solaronics	STG-150-40C	B	12	Yes	6	Infrared Heater		135.00		0.93 Et	0.0	0	29	$324	$29,168	$1,800	84.4
Garage - Dynamometer	Garage - Dynamometer	2	Unit Heater		80.00		0.8 Et	Dayton	3E228D	B	11	Yes	2	Unit Heater		80.00		0.83 Et	0.0	0	7	$81	$4,413	$0	54.6
Garage - Parts Storage	Garage - Parts Storage	2	Unit Heater		80.00		0.8 Et	Dayton	3E228D	B	11	Yes	2	Unit Heater		80.00		0.83 Et	0.0	0	7	$81	$4,413	$0	54.6

		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
Mechanical - Bus Washers	Mechanical - Bus Washers	1	Unit Heater		20.00		0.8 Et	Reznor	FE-25	B	11	Yes	1	Unit Heater		20.00		0.83 Et	0.0	0	1	$10	$1,160	$0	114.9
Mechanical - Compressors	Mechanical - Compressors	1	Unit Heater		40.00		0.8 Et	Reznor		W		No							0.0	0	0	$0	$0	$0	0.0
Shop - Metal/Welding	Shop - Metal/Welding	1	Unit Heater		80.00		0.8 Et	Dayton	3E228D	B	11	Yes	1	Unit Heater		80.00		0.83 Et	0.0	0	4	$40	$2,207	$0	54.6
Shop - Small Electronics	Shop - Small Electronics	1	Unit Heater		40.00		0.8 Et	Reznor		W		No							0.0	0	0	$0	$0	$0	0.0
Shop - Tools	Shop - Tools	1	Unit Heater		20.00		0.8 Et	Reznor	FE-25	B	11	Yes	1	Unit Heater		20.00		0.83 Et	0.0	0	1	$10	$1,160	$0	114.9
Exterior HVAC	Locker Room - Male Maintenance	1	Ductless Mini-Split HP	1.83	25.40	18.00	8.5 HSPF	Daikin	RXN24KEVJU5	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior HVAC	Locker Room - Female Maintenance	1	Ductless Mini-Split AC	0.98		10.20		Sanyo	C1251	B	8	Yes	1	Ductless Mini-Split AC	0.98		18.00		0.3	602	0	$74	$2,524	$0	33.9
Roof	Electrical Room - Telephones	1	Ductless Mini-Split AC	1.50		10.40		Fujitsu	ASU18CL	B	8	Yes	1	Ductless Mini-Split AC	1.50		18.00		0.4	877	0	$108	$3,447	$0	31.8
Roof	Electrical Room - Telephones	1	Ductless Mini-Split HP	3.00	36.00	14.50	9 HSPF	Sea Breeze	242-1307-C	B	9	Yes	1	Ductless Mini-Split HP	3.00	36.00	18.00	3.8 COP	1.0	1,803	0	$223	$6,182	$0	27.7
Roof	AC-1 - Bus Operator Side Offices	1	Package Unit	7.50	166.00	9.00	0.809756097560976 Et	Trane	YCD090D4H0BD	B	8	Yes	1	Package Unit	7.50	166.00	14.00	0.82 Et	1.8	4,286	3	$559	$15,622	$593	26.9
Roof	AC-2 - Bus Locker Rooms	1	Package Unit	12.50	202.50	9.00	0.81 Et	Trane	YCD150C4H0AA	B	8	Yes	1	Package Unit	12.50	202.50	14.00	0.82 Et	3.0	7,143	3	$918	$19,265	$1,113	19.8
Roof	AC-3 - Bus Operator Side Offices	1	Package Unit	6.25	166.00	9.00	0.809756097560976 Et	Trane	YCD075C4H0BD	B	8	Yes	1	Package Unit	6.25	166.00	14.00	0.82 Et	1.5	3,571	3	$470	$13,748	$494	28.2
Roof	AC-4 - Maintenance Side Offices	1	Package Unit	5.00	92.00	14.00	0.8 Et	Trane	GBC060A4EMB0	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-5 - Maintenance Break Room	1	Package Unit	5.00	121.50	14.00	0.81 Et	Trane	YSC060G4RHB0	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-6 - Training Office	1	Package Unit	5.00	106.60	14.00	0.82 Et	Trane	YSC060G4RHA0	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-7 - Back Offices	1	Package Unit	2.00	48.60	14.00	0.81 Et	Trane	4YCC4024A1060	W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical - Drivers Side	Heating System - Drivers Side Offices	1	Condensing Hot Water Boiler	135	Crown Boiler Company	BWC150ENST1PSU	B		No						0.0	0	0	$0	$0	$0	0.0
Mechanical - Maintenance	Heating System - Maintenance Side Offices	1	Condensing Hot Water Boiler	129	Munchkin	140M	B		No						0.0	0	0	$0	$0	$0	0.0

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical - Drivers Side	Heating System - Drivers Side Offices	13	10	1.25	0.0	0	6	$64	$133	$20	1.8
Mechanical - Maintenance	Heating System - Maintenance Side Offices	13	10	1.25	0.0	0	6	$64	$133	$20	1.8
Mechanical - Drivers Side	Domestic Hot Water - Drivers Side Offices	13	8	1.00	0.0	0	4	$39	$95	$16	2.0

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
Main Garage	Domestic Hot Water - Garage	3	Storage Tank Water Heater (≤ 50 Gal)	Bosch	ES 8-1M WIR	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical - Drivers Side	Domestic Hot Water - Drivers Side Offices	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	D80T1993N	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical - Maintenance	Domestic Hot Water - Maintenance Side Offices	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	D100T1993N	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
Garage Egg Harbor Maintenance	14	10	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	9	$106	$72	$36	0.3

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
Garage - Dynamometer	1	Ice Making Head (<450 lbs/day), Batch	Ice-O-Matic		No		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
Garage Egg Harbor Maintenance	3	Coffee Machine	500	No		
Garage Egg Harbor Maintenance	32	Desktop	120	No		
Garage Egg Harbor Maintenance	1	Dishwasher (Undercounter)	1,000	No		
Garage Egg Harbor Maintenance	25	Fan (Large)	200	No		
Garage Egg Harbor Maintenance	13	Microwave	1,000	No		
Garage Egg Harbor Maintenance	3	Paper Shredder	146	No		
Garage Egg Harbor Maintenance	18	Printer (Medium/Small)	450	No		
Garage Egg Harbor Maintenance	2	Printer/Copier (Large)	600	No		
Garage Egg Harbor Maintenance	8	Refrigerator (Mini)	175	No		
Garage Egg Harbor Maintenance	8	Refrigerator (Residential)	340	No		
Garage Egg Harbor Maintenance	7	Television	224	No		
Garage Egg Harbor Maintenance	2	Toaster Oven	600	No		
Garage Egg Harbor Maintenance	3	Water Cooler	192	No		
Garage Egg Harbor Maintenance	1	Electric Stove	1,200	No		
Garage Egg Harbor Maintenance	1	Change Machine	300	No		
Garage Egg Harbor Maintenance	1	Pinball Table	300	No		
Garage Egg Harbor Maintenance	9	Power Tools	1,000	No		
Garage Egg Harbor Maintenance	2	Welding Machine	16,100	No		

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
Dining Area - Drivers	1	Glass Fronted Refrigerated	15	Yes	0.1	1,209	0	$150	$230	$50	1.2
Main Garage - Maintenance Side	1	Glass Fronted Refrigerated	15	Yes	0.1	1,209	0	$150	$230	$50	1.2
Dining Area - Drivers	1	Non-Refrigerated	15	Yes	0.0	343	0	$42	$230	$0	5.4
Main Garage - Maintenance Side	1	Non-Refrigerated	15	Yes	0.0	343	0	$42	$230	$0	5.4

Custom (High Level) Measure Analysis

Installation of an Energy Management System

Building Square Footage	17,630	**Fuel Utility Rate**	$11.173 MMBtu
Percent of Conditioned Area Impacted	100%	**Blended Electric Utility Rate**	$0.124 kWh

Existing Conditions						Proposed Conditions					Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	Remaining Useful Life	Total HVAC Motor Usage kWh	Total HVAC Electric Usage kWh	Total HVAC Fuel Usage MMBtu	Description	% Savings HVAC Motor Usage kWh	% Savings HVAC Electric Usage kWh	% Savings HVAC Fuel Usage MMBtu	Estimated Cost per Sqft	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Simple Payback w/ Incentives in Years
Limited/No HVAC Controls	HVAC Equipment & Systems	15	632,071	79,385	29,767	Installation of an Energy Management System	10%	10%	10%	$3.00	0.00	71,146	2,977	$42,063	$52,890	$0	$0	$0	$52,890	1.26	1.26

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

4271 - Egg Harbor Bus Maintenance Garage

Primary Property Type: Repair Services (Vehicle, Shoe, Locksmith, etc.)
Gross Floor Area (ft²): 176,300
Built: 1996

For Year Ending: December 31, 2021
Date Generated: May 29, 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
4271 - Egg Harbor Township Bus Maintenance Facility 1431 Doughty Road Egg Harbor, New Jersey 08234	NJ Transit 1 Penn Plaza Newark, NJ 07015 (973) 491-4140	Erin Hill One Penn Plaza East 8th Floor Newark, NJ 07015 (973) 491-4140 erhill@njtransit.com

Property ID: 24629173

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
209.2 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	31,073,700 (84%)
Electric - Grid (kBtu)	5,799,589 (16%)

Source EUI
277.2 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	73.1
National Median Source EUI (kBtu/ft²)	96.9
% Diff from National Median Source EUI	186%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	2,156

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.