Local Government Energy Audit Report

Vehicle Base Facility - Caven Point

August 2, 2019

Prepared for:

NJ Transit

20 Caven Point

Jersey City, NJ 07304

Prepared by:

TRC Energy Services

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Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. 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 Energy Services (TRC) reviewed the energy conservation measures and estimates of energy savings were reviewed 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 installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available 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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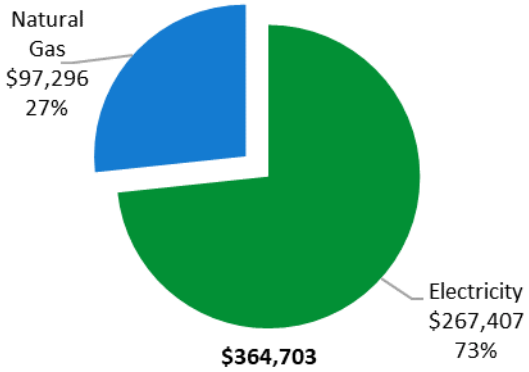
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Vehicle Base Facility - Caven Point. 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 Energy Services (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 help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $364,703 Electricity: 2,638,148 kWh Natural Gas: 113,511 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.

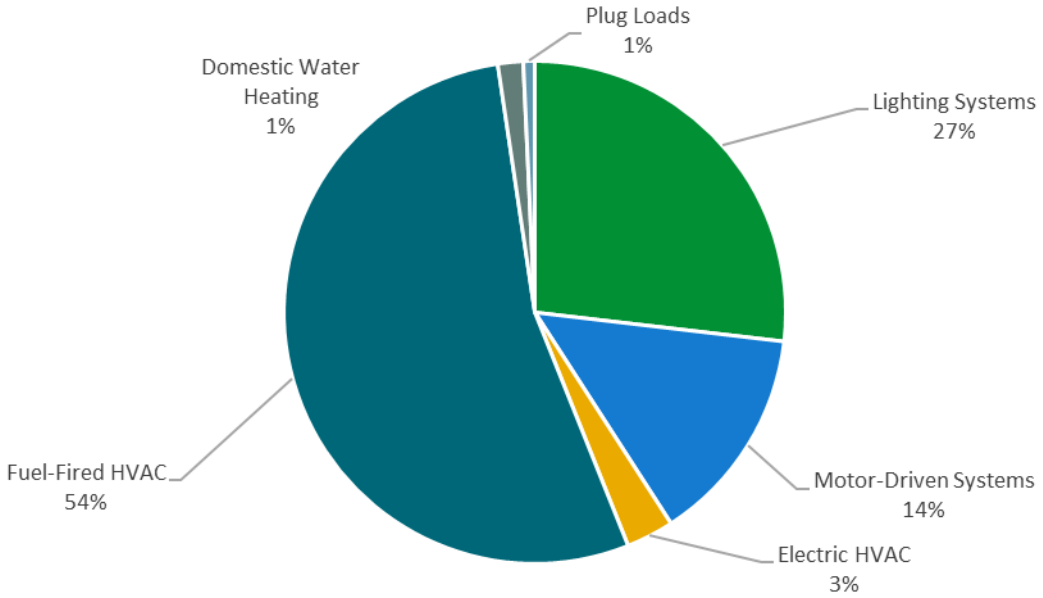


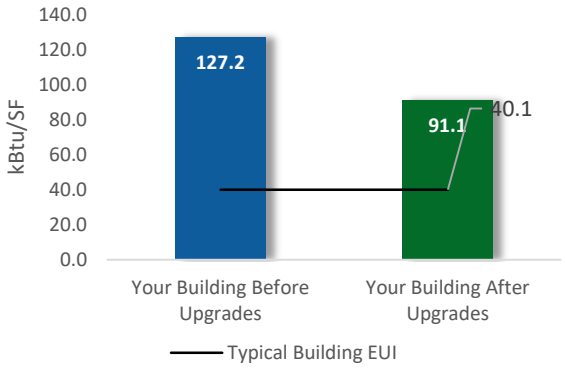
Figure 1 - Energy Use by System

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.

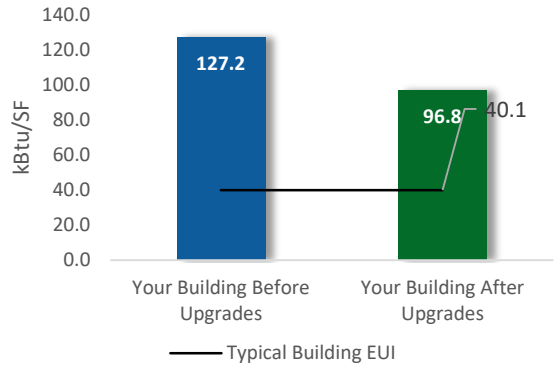
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$1,019,244
Potential Rebates & Incentives[1]	$100,185
Annual Cost Savings	$159,505
Annual Energy Savings	Electricity: 1,526,121 kWh Natural Gas: 5,617 Therms
Greenhouse Gas Emission Savings	801 Tons
Simple Payback	5.8 Years
Site Energy Savings (all utilities)	28%



Scenario 2: Cost Effective Package[2]

Installation Cost	$541,345
Potential Rebates & Incentives	$95,252
Annual Cost Savings	$149,704
Annual Energy Savings	Electricity: 1,497,266 kWh
Greenhouse Gas Emission Savings	740 Tons
Simple Payback	3.0 Years
Site Energy Savings (all utilities)	24%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives 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	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**1,167,286**	**163.4**	**-226**	**$116,380**	**$1,745,698**	**$354,449**	**$58,022**	**$296,427**	**2.5**	**1,148,974**
ECM 1	Install LED Fixtures	826,088	117.5	-153	$82,418	$1,236,275	$297,548	$43,870	$253,678	3.1	813,898
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	104,135	10.1	-22	$10,365	$155,478	$11,481	$1,940	$9,541	0.9	102,266
ECM 3	Retrofit Fixtures with LED Lamps	237,063	35.8	-50	$23,596	$353,945	$45,419	$12,212	$33,207	1.4	232,810
Lighting Control Measures		**85,357**	**12.3**	**-14**	**$8,529**	**$68,233**	**$24,496**	**$4,070**	**$20,426**	**2.4**	**84,276**
ECM 4	Install Occupancy Sensor Lighting Controls	50,312	8.0	-11	$5,008	$40,063	$20,446	$2,820	$17,626	3.5	49,409
ECM 5	Install Daylight Dimming Controls	25,187	3.4	-2	$2,540	$20,321	$1,250	$1,250	$0	0.0	25,187
ECM 6	Install High/Low Lighting Controls	9,857	1.0	-2	$981	$7,849	$2,800	$0	$2,800	2.9	9,681
Motor Upgrades		**9,975**	**5.2**	**0**	**$1,011**	**$15,166**	**$84,875**	**$0**	**$84,875**	**83.9**	**10,045**
	Premium Efficiency Motors	9,975	5.2	0	$1,011	$15,166	$84,875	$0	$84,875	83.9	10,045
Variable Frequency Drive (VFD) Measures		**236,564**	**129.4**	**0**	**$23,978**	**$359,677**	**$161,251**	**$33,160**	**$128,091**	**5.3**	**238,218**
ECM 7	Install VFDs on Constant Volume (CV) Fans	199,942	120.8	0	$20,266	$303,997	$130,084	$33,160	$96,924	4.8	201,340
ECM 8	Install VFDs on Heating Water Pumps	36,622	8.6	0	$3,712	$55,681	$31,167	$0	$31,167	8.4	36,878
Electric Unitary HVAC Measures		**18,880**	**27.4**	**0**	**$1,914**	**$28,706**	**$147,625**	**$4,535**	**$143,090**	**74.8**	**19,012**
	Install High Efficiency Air Conditioning Units	18,880	27.4	0	$1,914	$28,706	$147,625	$4,535	$143,090	74.8	19,012
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**764**	**$6,547**	**$130,942**	**$233,897**	**$0**	**$233,897**	**35.7**	**89,434**
	Install High Efficiency Hot Water Boilers	0	0.0	764	$6,547	$130,942	$233,897	$0	$233,897	35.7	89,434
Domestic Water Heating Upgrade		**0**	**0.0**	**38**	**$329**	**$4,929**	**$11,500**	**$398**	**$11,102**	**33.8**	**4,488**
	Install High Efficiency Gas-Fired Water Heater	0	0.0	38	$329	$4,929	$11,500	$398	$11,102	33.8	4,488
Food Service & Refrigeration Measures		**8,059**	**0.9**	**0**	**$817**	**$4,084**	**$1,150**	**$0**	**$1,150**	**1.4**	**8,116**
ECM 9	Vending Machine Control	8,059	0.9	0	$817	$4,084	$1,150	$0	$1,150	1.4	8,116
TOTALS		**1,526,121**	**338.6**	**562**	**$159,505**	**$2,357,436**	**$1,019,244**	**$100,185**	**$919,058**	**5.8**	**1,602,564**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

Figure 2 – Evaluated Energy Improvements

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

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.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	x		X
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x		X
ECM 3	Retrofit Fixtures with LED Lamps	x		X
ECM 4	Install Occupancy Sensor Lighting Controls	x		X
ECM 5	Install Daylight Dimming Controls			X
ECM 6	Install High/Low Lighting Controls			X
ECM 7	Install VFDs on Constant Volume (CV) HVAC	x		X
ECM 8	Install VFDs on Hot Water Pumps	x		X
ECM 9	Vending Machine Control	x		x

Figure 3 – Funding Options

New Jersey's Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

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 SmartStart 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 is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures. Direct Install contractors will assess and verify individual measure eligibility and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance 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. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings.

More Options from Around the State

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 & Power (CHP)

The CHP program provides incentives for combined heat and power (aka 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.

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 their 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.

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Vehicle Base Facility - Caven Point. 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. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing 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 February 15, 2019, TRC performed an energy audit at Vehicle Base Facility - Caven Point located in Jersey City, New Jersey. TRC met with Steven Jenks to review the facility operations and help focus our investigation on specific energy-using systems.

Vehicle Base Facility – Caven Point is a two-story, 160,000 square footage facility built in the year 1996. The spaces in the building include offices, restrooms, barns, tool rooms, pit area, shop and paint areas, training areas, locker rooms, storage, and mechanical spaces.

2.2 Building Occupancy

The facility is occupied all day year round. Typical day occupancy is 120 staff.

Building Name	Weekday/Weekend	Operating Schedule
Vehicle base facility - Caven Point	Weekday	12:00 AM - 12:00 AM
	Weekend	12:00 AM - 12:00 AM

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block with a metal cladding facade. Part of the building has a pitched roof with metal cladding while the other part has a flat roof and covered with black EPDM membrane. The roofs are in good condition.

Most of the windows are double glazed with low-e glass and have aluminum frames with a thermal break. The front doors are double entry with glass with an aluminum frame and in good condition. In addition, there are steel roll-up doors for entry and exit of the trains to the workshop. Each door has an air curtain installed and operated only when trains come in or out. The roll-up doors appeared to be in good condition.

Garage

Building Exterior

Flat Roof

Façade with Windows

2.4 Lighting Systems

The primary interior lighting system for the office area is 32-Watt linear fluorescent T8 lamps. Fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long troffers with ceiling mount fixtures. The shop areas are lit by 250-Watt and 400-Watt metal halide that are on continuously.

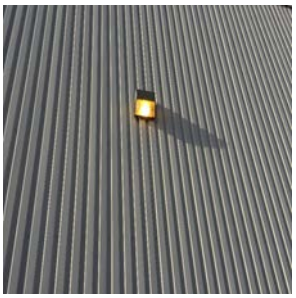
Additionally, there are some 23-Watt or 26-Watt compact fluorescent lamps (CFL) and 10-Watt LED fixtures serving some of the smaller spaces. Typically, T8 fluorescent lamps use electronic ballasts. Most fixtures are in good condition.

All exit signs are LED units. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually and the remainder by occupancy sensors.

The exterior light fixtures include 150-Watt, 250-Watt, or 400-Watt wall mounted or pole mounted high pressure sodium lamp fixtures that have manual controls.

Linear T8 Fixtures

Metal Halide Fixture



Exterior Wall Mount HPS Fixtures

Exterior Pole Mount Fixtures

2.5 Air Handling Systems

Packaged Units and Air Conditioners

Space cooling to the office areas of the building is provided using several constant volume and two variable volume packaged units and split AC units.

Located on the roof, AC1 and AC2 are 10-ton constant air volume Lennox units with an EER value of 9.3 each. Office and administrative spaces are cooled using 27-ton and 70-ton variable air volume McQuay units with an EER value of 9.3.

The shop area of the building is conditioned by heat recovery units all of which are old and in need of replacement. These units do not provide space cooling but only heating and ventilation.

Other miscellaneous areas and office spaces are cooled using smaller units with capacities ranging from 2.5-tons to 5-tons. All of these units are beyond the useful life of the equipment and have been evaluated for replacement.

The computer room has three CRAC units (Liebert) each 18-ton with EER value of 11. These units are new and well maintained.

Packaged AC Unit

CRAC Unit

Packaged AC Unit

Packaged AC Unit

2.6 Heating Hot Water Systems

Two gas-fired, non-condensing hot water boilers (HB Smith) with an output capacity of 6825 MBh and a heating efficiency of 81% provide the primary space heating in the perimeter of the building. The boilers are configured in a constant flow primary distribution with six 15 hp constant speed hot water pumps operating with a lead-lag control scheme. The boilers provide hot water to heat recovery units throughout the building. The boilers have exceeded their useful life period and have been evaluated for replacement.

There are also two direct gas-fired furnaces on the roof with an output capacity of 5775 MBh and an efficiency of 95%. The warm air unit heaters (electric - various sizes) provide heating in the shop areas.

Hot water is supplied at 180°F when the outside air temperature is low, and the setpoint is adjusted linearly to 140°F when the outside air is above 50°F. The hot water return temperature is typically 160°F. The system is locked out at an outside temperature of 55°F.

Boilers

Hot water pumps

2.7 Domestic Hot Water

Hot water is produced with a 150 gallon, 199 MBh gas-fired storage water heater (AO Smith) with an 80% efficiency. This water heater is old and has been evaluated for replacement.

2.8 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 0.74% of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are 97 computer work stations throughout the facility. Plug loads throughout the building include general café and office equipment.

There are several residential-style refrigerators throughout the building. These vary in condition and efficiency.

There are five refrigerated beverage vending machines. Vending machines are not equipped with occupancy-based controls.

Additionally, there are numerous mechanical tools used throughout the facility that are powered by four Ingersoll-Rand air compressors (two 50 hp and two 15 hp). The compressors cycle based on plant demand and observed to be in good operating condition.

15hp Air Compressor

50hp Air Compressor

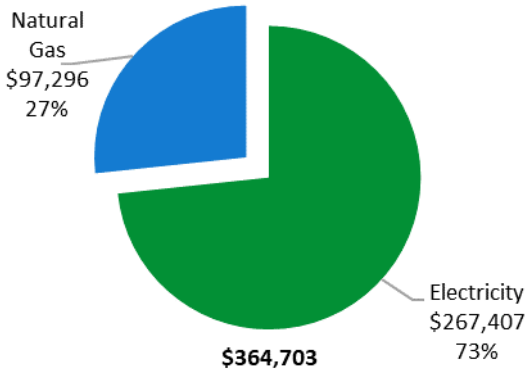
2.9 Water-Using Systems

Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 1.6 gallons per flush (gpf) and urinals are rated at 1.0 gpf

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	2,638,148 kWh	$267,407
Natural Gas	113,511 Therms	$97,296
Total		**$364,703**



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.

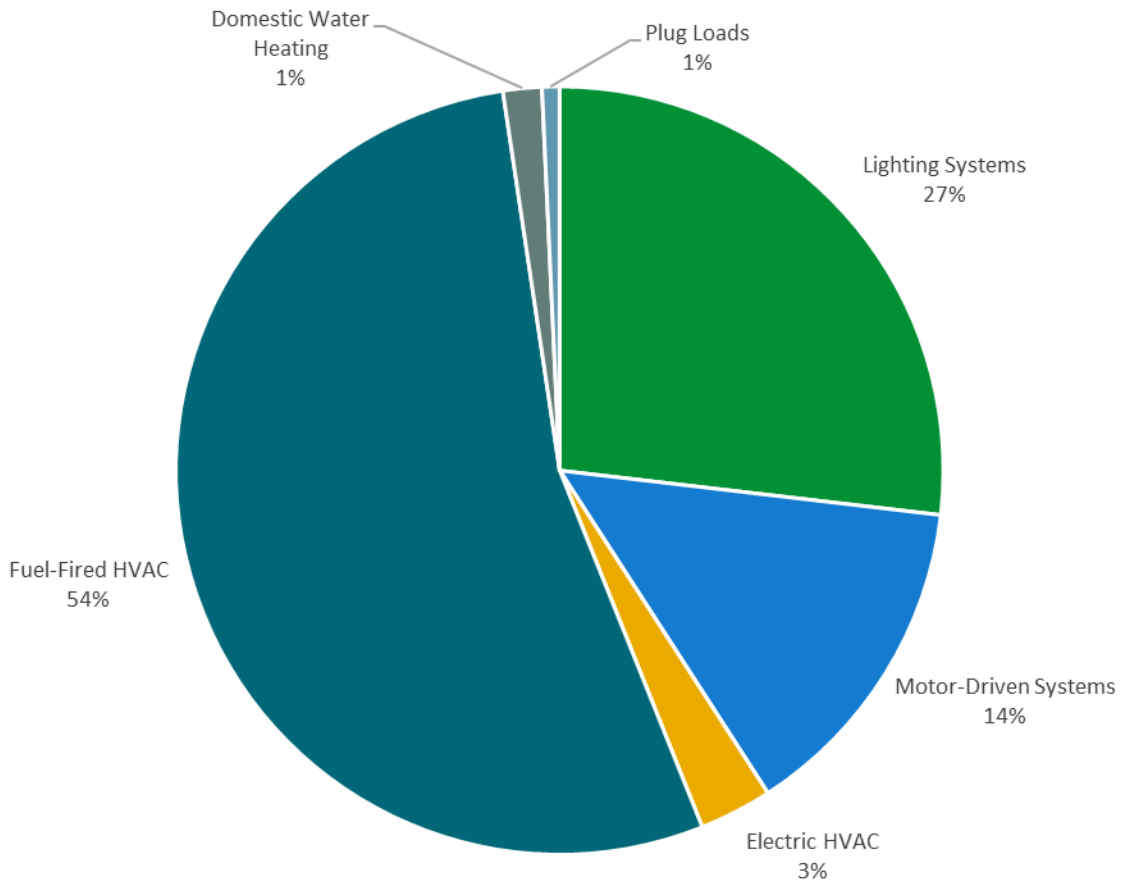
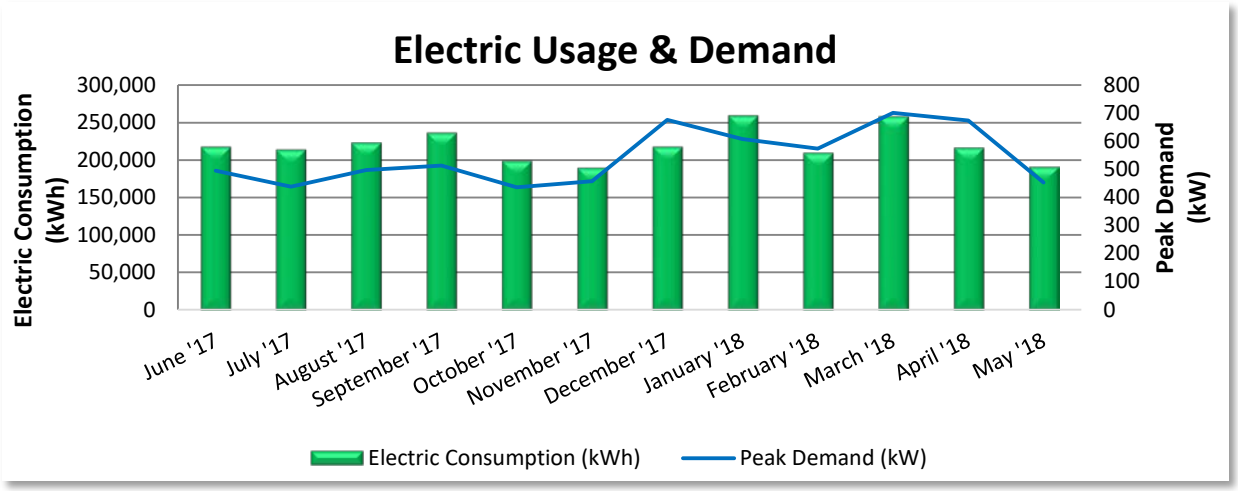


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class LPLP, with electric production provided by Constellation Energy, a third-party supplier.



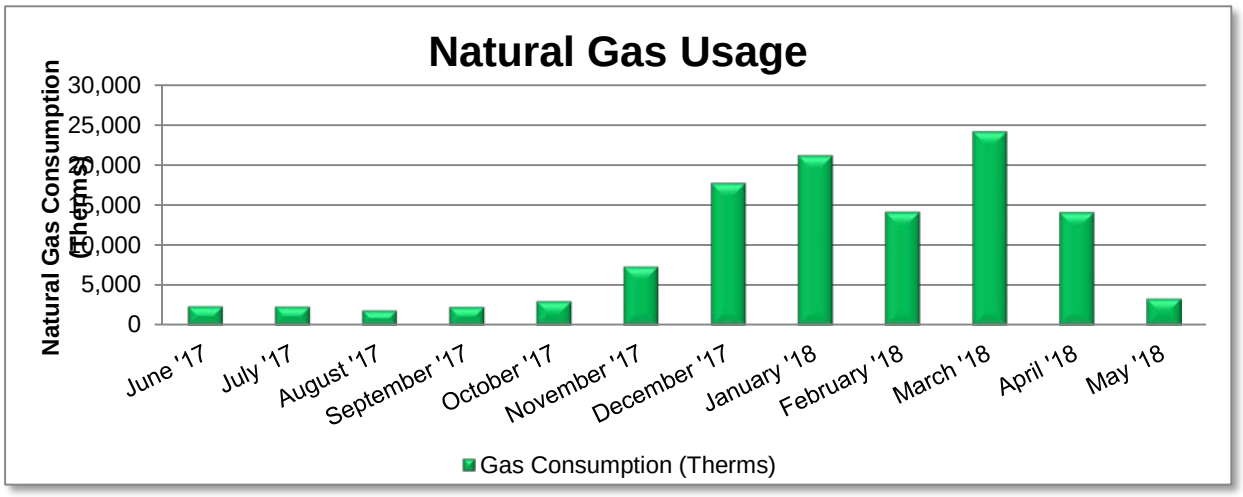
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
6/23/17	30	218,274	495		$24,852
7/25/17	32	214,232	439		$24,027
8/23/17	29	223,663	498		$25,597
9/22/17	30	237,137	514		$27,034
10/23/17	31	199,411	436		$18,702
11/21/17	29	189,979	458		$17,676
12/22/17	31	218,274	677		$20,540
1/24/18	33	260,042	608		$24,374
2/23/18	30	210,189	574		$20,148
3/26/18	31	258,695	702		$24,888
4/25/18	30	216,926	674		$21,149
5/24/18	29	191,326	453		$18,420
Totals	**365**	**2,638,148**	**702**	**$0**	**$267,407**
Annual	**365**	**2,638,148**	**702**	**$0**	**$267,407**

Notes:

- Peak demand of 702 kW occurred in January 2018.
- The average electric cost over the past 12 months was $0.101/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class LVG, with natural gas supply provided by Direct Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
7/1/17	30	2,399	$2,262
8/1/17	31	2,394	$2,096
9/1/17	31	1,897	$2,260
10/1/17	30	2,324	$1,678
11/1/17	31	3,051	$1,917
12/1/17	30	7,371	$6,705
1/1/18	31	17,811	$14,870
2/1/18	31	21,244	$17,048
3/1/18	28	14,193	$12,335
4/3/18	33	24,232	$20,216
5/1/18	28	14,163	$14,589
6/4/18	34	3,364	$2,121
Totals	**368**	**114,444**	**$98,096**
Annual	**365**	**113,511**	**$97,296**

Notes:

- The average gas cost for the past 12 months is $0.857/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, 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.

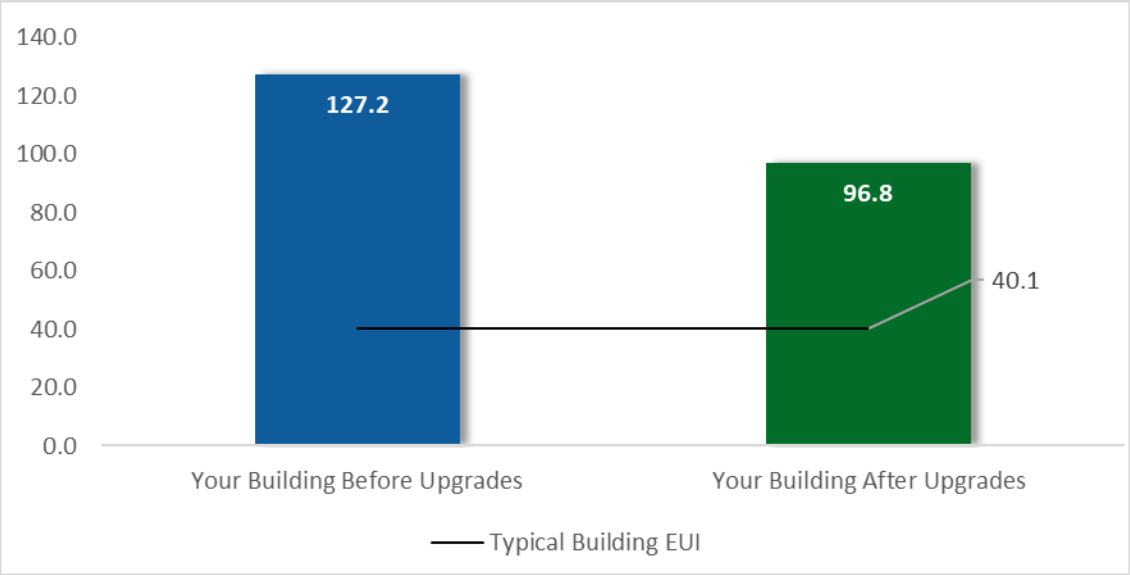


Figure 6 - Energy Use Intensity Comparison

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. A number of factors can cause a building to vary from the "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.

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 we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[3].

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1

4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. 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 are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

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	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**1,167,286**	**163.4**	**-226**	**$116,380**	**$1,745,698**	**$354,449**	**$58,022**	**$296,427**	**2.5**	**1,148,974**
ECM 1	Install LED Fixtures	826,088	117.5	-153	$82,418	$1,236,275	$297,548	$43,870	$253,678	3.1	813,898
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	104,135	10.1	-22	$10,365	$155,478	$11,481	$1,940	$9,541	0.9	102,266
ECM 3	Retrofit Fixtures with LED Lamps	237,063	35.8	-50	$23,596	$353,945	$45,419	$12,212	$33,207	1.4	232,810
Lighting Control Measures		**85,357**	**12.3**	**-14**	**$8,529**	**$68,233**	**$24,496**	**$4,070**	**$20,426**	**2.4**	**84,276**
ECM 4	Install Occupancy Sensor Lighting Controls	50,312	8.0	-11	$5,008	$40,063	$20,446	$2,820	$17,626	3.5	49,409
ECM 5	Install Daylight Dimming Controls	25,187	3.4	-2	$2,540	$20,321	$1,250	$1,250	$0	0.0	25,187
ECM 6	Install High/Low Lighting Controls	9,857	1.0	-2	$981	$7,849	$2,800	$0	$2,800	2.9	9,681
Motor Upgrades		**9,975**	**5.2**	**0**	**$1,011**	**$15,166**	**$84,875**	**$0**	**$84,875**	**83.9**	**10,045**
	Premium Efficiency Motors	9,975	5.2	0	$1,011	$15,166	$84,875	$0	$84,875	83.9	10,045
Variable Frequency Drive (VFD) Measures		**236,564**	**129.4**	**0**	**$23,978**	**$359,677**	**$161,251**	**$33,160**	**$128,091**	**5.3**	**238,218**
ECM 7	Install VFDs on Constant Volume (CV) Fans	199,942	120.8	0	$20,266	$303,997	$130,084	$33,160	$96,924	4.8	201,340
ECM 8	Install VFDs on Heating Water Pumps	36,622	8.6	0	$3,712	$55,681	$31,167	$0	$31,167	8.4	36,878
Electric Unitary HVAC Measures		**18,880**	**27.4**	**0**	**$1,914**	**$28,706**	**$147,625**	**$4,535**	**$143,090**	**74.8**	**19,012**
	Install High Efficiency Air Conditioning Units	18,880	27.4	0	$1,914	$28,706	$147,625	$4,535	$143,090	74.8	19,012
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**764**	**$6,547**	**$130,942**	**$233,897**	**$0**	**$233,897**	**35.7**	**89,434**
	Install High Efficiency Hot Water Boilers	0	0.0	764	$6,547	$130,942	$233,897	$0	$233,897	35.7	89,434
Domestic Water Heating Upgrade		**0**	**0.0**	**38**	**$329**	**$4,929**	**$11,500**	**$398**	**$11,102**	**33.8**	**4,488**
	Install High Efficiency Gas-Fired Water Heater	0	0.0	38	$329	$4,929	$11,500	$398	$11,102	33.8	4,488
Food Service & Refrigeration Measures		**8,059**	**0.9**	**0**	**$817**	**$4,084**	**$1,150**	**$0**	**$1,150**	**1.4**	**8,116**
ECM 9	Vending Machine Control	8,059	0.9	0	$817	$4,084	$1,150	$0	$1,150	1.4	8,116
TOTALS		**1,526,121**	**338.6**	**562**	**$159,505**	**$2,357,436**	**$1,019,244**	**$100,185**	**$919,058**	**5.8**	**1,602,564**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**1,167,286**	**163.4**	**-226**	**$116,380**	**$354,449**	**$58,022**	**$296,427**	**2.5**	**1,148,974**
ECM 1	Install LED Fixtures	826,088	117.5	-153	$82,418	$297,548	$43,870	$253,678	3.1	813,898
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	104,135	10.1	-22	$10,365	$11,481	$1,940	$9,541	0.9	102,266
ECM 3	Retrofit Fixtures with LED Lamps	237,063	35.8	-50	$23,596	$45,419	$12,212	$33,207	1.4	232,810
Lighting Control Measures		**85,357**	**12.3**	**-14**	**$8,529**	**$24,496**	**$4,070**	**$20,426**	**2.4**	**84,276**
ECM 4	Install Occupancy Sensor Lighting Controls	50,312	8.0	-11	$5,008	$20,446	$2,820	$17,626	3.5	49,409
ECM 5	Install Daylight Dimming Controls	25,187	3.4	-2	$2,540	$1,250	$1,250	$0	0.0	25,187
ECM 6	Install High/Low Lighting Controls	9,857	1.0	-2	$981	$2,800	$0	$2,800	2.9	9,681
Variable Frequency Drive (VFD) Measures		**236,564**	**129.4**	**0**	**$23,978**	**$161,251**	**$33,160**	**$128,091**	**5.3**	**238,218**
ECM 7	Install VFDs on Constant Volume (CV) Fans	199,942	120.8	0	$20,266	$130,084	$33,160	$96,924	4.8	201,340
ECM 8	Install VFDs on Heating Water Pumps	36,622	8.6	0	$3,712	$31,167	$0	$31,167	8.4	36,878
Food Service & Refrigeration Measures		**8,059**	**0.9**	**0**	**$817**	**$1,150**	**$0**	**$1,150**	**1.4**	**8,116**
ECM 9	Vending Machine Control	8,059	0.9	0	$817	$1,150	$0	$1,150	1.4	8,116
TOTALS		**1,497,266**	**306.0**	**-240**	**$149,704**	**$541,345**	**$95,252**	**$446,093**	**3.0**	**1,479,584**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

Figure 8 – 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 ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**1,167,286**	**163.4**	**-226**	**$116,380**	**$354,449**	**$58,022**	**$296,427**	**2.5**	**1,148,974**
ECM 1	Install LED Fixtures	826,088	117.5	-153	$82,418	$297,548	$43,870	$253,678	3.1	813,898
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	104,135	10.1	-22	$10,365	$11,481	$1,940	$9,541	0.9	102,266
ECM 3	Retrofit Fixtures with LED Lamps	237,063	35.8	-50	$23,596	$45,419	$12,212	$33,207	1.4	232,810

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 are proposed, we suggest converting all of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

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

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

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: shop area, wash area, paint booth area, and stock room.

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.

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent or incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

Affected building areas: all areas with fluorescent fixtures with T8 tubes, incandescent lamps and CFLs.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**85,357**	**12.3**	**-14**	**$8,529**	**$24,496**	**$4,070**	**$20,426**	**2.4**	**84,276**
ECM 4	Install Occupancy Sensor Lighting Controls	50,312	8.0	-11	$5,008	$20,446	$2,820	$17,626	3.5	49,409
ECM 5	Install Daylight Dimming Controls	25,187	3.4	-2	$2,540	$1,250	$1,250	$0	0.0	25,187
ECM 6	Install High/Low Lighting Controls	9,857	1.0	-2	$981	$2,800	$0	$2,800	2.9	9,681

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 lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

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

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

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

Affected building areas: offices, restrooms, and storage spaces.

ECM 5: Install Daylight Dimming Controls

Install daylight dimming controls that use photosensors to reduce electric lighting in areas when ample daylight lighting is present. Use photosensor controls for fixtures serving areas that are lit by sunlight. As sunlight levels increase in the room, artificial lighting decreases or turns off.

This measure reduces energy use in spaces where ambient daylight provides sufficient lighting levels. Optimum light levels and the method of dimming should be determined during lighting design.

Affected building areas: exterior fixtures and barn areas.

ECM 6: 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 requirements. 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.

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

Affected building areas: hallways.

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**9,975**	**5.2**	**0**	**$1,011**	**$84,875**	**$0**	**$84,875**	**83.9**	**10,045**
	Premium Efficiency Motors	9,975	5.2	0	$1,011	$84,875	$0	$84,875	83.9	10,045

Premium Efficiency Motors

Replace 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
Roof	AC-1	1	Supply Fan	5.0
Roof	AC-2	1	Supply Fan	5.0
Roof	AC-1	1	Return Fan	3.0
Roof	AC-2	1	Return Fan	3.0

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor
Roof	HRU 2	1	Supply Fan	40.0
Roof	HRU 2	1	Exhaust Fan	25.0
Roof	HRU 9	1	Supply Fan	5.0
Roof	HRU 9	1	Exhaust Fan	7.5
Roof	HRU 1	1	Supply Fan	30.0
Roof	HRU 1	1	Exhaust Fan	25.0

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor
Shop	Compressor	2	Air Compressor	50.0
Unknown	Compressor	2	Air Compressor	15.0
Roof	HRU 8	1	Supply Fan	5.0
Roof	HRU 8	1	Exhaust Fan	7.5
Roof	HRU 7	1	Supply Fan	20.0
Roof	HRU 7	1	Exhaust Fan	15.0
Roof	HRU-10	1	Supply Fan	3.0
Roof	HRU-10	1	Exhaust Fan	5.0
Roof	HRU-11	1	Supply Fan	3.0
Roof	HRU-11	1	Exhaust Fan	5.0
Roof	HRU-3	1	Supply Fan	40.0
Roof	HRU-3	1	Exhaust Fan	40.0
Roof	HRU-4	1	Supply Fan	25.0
Roof	HRU-4	1	Exhaust Fan	20.0
Roof	HRU-5	1	Supply Fan	40.0
Roof	HRU-5	1	Exhaust Fan	40.0
Roof	HRU-6	1	Supply Fan	25.0
Roof	HRU-6	1	Exhaust Fan	40.0

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 ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**236,564**	**129.4**	**0**	**$23,978**	**$161,251**	**$33,160**	**$128,091**	**5.3**	**238,218**
ECM 7	Install VFDs on Constant Volume (CV) Fans	199,942	120.8	0	$20,266	$130,084	$33,160	$96,924	4.8	201,340
ECM 8	Install VFDs on Heating Water Pumps	36,622	8.6	0	$3,712	$31,167	$0	$31,167	8.4	36,878

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 motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

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.

VAV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g. 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

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.

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

Affected air handlers: AC1, AC2 and all HRUs.

ECM 8: Install VFDs on Heating Water Pumps

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

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

Affected pumps: six 15 hp Heating hot water pumps.

4.5 Electric Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**18,880**	**27.4**	**0**	**$1,914**	**$147,625**	**$4,535**	**$143,090**	**74.8**	**19,012**
	Install High Efficiency Air Conditioning Units	18,880	27.4	0	$1,914	$147,625	$4,535	$143,090	74.8	19,012

We have evaluated the replacement of all the unitary HVAC units. These have a long payback period and may not be justifiable based simply on energy considerations. However, most of the units at this facility 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 equipment are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Install High Efficiency Air Conditioning Units

Replace standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. 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 load, and the estimated annual operating hours.

4.6 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**764**	**$6,547**	**$233,897**	**$0**	**$233,897**	**35.7**	**89,434**
	Install High Efficiency Hot Water Boilers	0	0.0	764	$6,547	$233,897	$0	$233,897	35.7	89,434

Install High Efficiency Hot Water Boilers

Replace older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load at this facility. In many cases installing multiple modular boilers rather than one or two large boilers will result in higher overall plant efficiency while providing additional system redundancy.

We have evaluated replacing the boilers. This measure has a long payback and may not be justifiable based simply on energy considerations. However, the boilers have reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**38**	**$329**	**$11,500**	**$398**	**$11,102**	**33.8**	**4,488**
	Install High Efficiency Gas-Fired Water Heater	0	0.0	38	$329	$11,500	$398	$11,102	33.8	4,488

Install High Efficiency Gas-Fired Water Heater

Replace the existing tank water heater with a high efficiency tank water heater. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

4.8 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**8,059**	**0.9**	**0**	**$817**	**$1,150**	**$0**	**$1,150**	**1.4**	**8,116**
ECM 9	Vending Machine Control	8,059	0.9	0	$817	$1,150	$0	$1,150	1.4	8,116

ECM 9: Vending Machine Control

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

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. 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 can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[4]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Lighting 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.

Destratification Fans

For areas with high ceilings, destratification fans f air balance the air temperature from floor to ceiling. They help reduce the recovery time needed to warm the space after nightly temperature setbacks and will increase occupants' the comfort level.

Areas with high ceilings require the heating system to heat a larger volume of space than that which is occupied. As the warm air rises, the warmest space is at the ceiling level, rather than floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, which requires additional energy consumption by the heating equipment to compensate for this accelerated heat transfer.

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.

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Boiler Maintenance

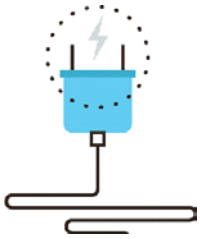
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is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

Water Heater Maintenance

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

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

Plug Load Controls



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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense™ at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

Procurement Strategies

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

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

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

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

6 On-site Generation

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

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.

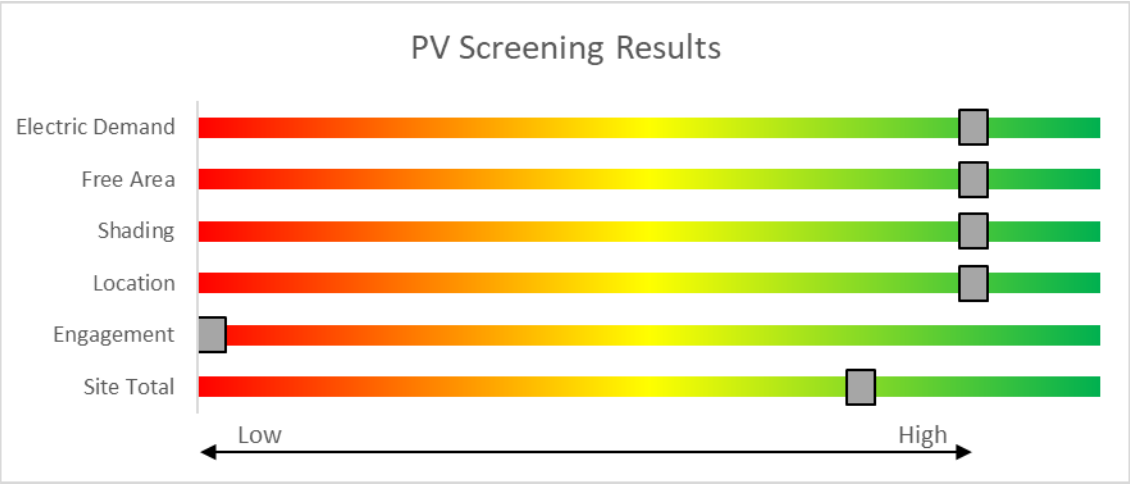


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

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:

- **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.

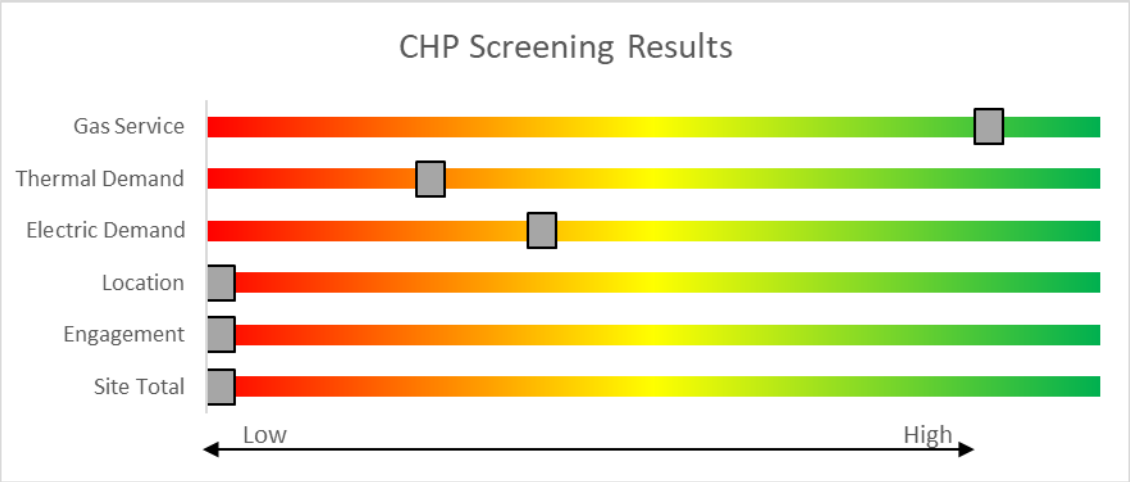


Figure 10 - Combined Heat and Power Screening

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 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available from New Jersey's Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.
Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.			

7.1 SmartStart

SmartStart 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.

SmartStart routinely adds, removes, or modifies incentives from year-to-year for various energy-efficient equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are capped at 50% of the total installed incremental project cost, or a project cost buy down to a one-year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings. P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program 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

Incentives are based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

Contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

7.3 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 in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the 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 (ESP) 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 description 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.

7.4 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install 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 SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey SRECs. SRECs are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SRECs to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

8 Energy Purchasing and Procurement Strategies

8.1 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. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

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

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

8.2 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 that fluctuate monthly. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third-party supplier for natural gas commodity.

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[9].

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,368	3	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,368	0.7	3,736	-1	$372	$876	$240	1.7
Boiler room	1	Exit Signs: LED - 2 W Lamp	None		6	4,368		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	4,368	0.0	0	0	$0	$0	$0	0.0
Battery Storage	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	4,368	3, 4	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,014	0.3	1,486	0	$148	$390	$75	2.1
Battery Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,368	3, 4	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,014	0.1	349	0	$35	$73	$20	1.5
Test room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,920	3, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,325	0.4	958	0	$95	$672	$145	5.5
Machine shop	48	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,920	3, 4	Relamp	Yes	48	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,325	1.8	4,179	-1	$416	$3,103	$655	5.9
Outside machine shop	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	25	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	0.7	7,506	-2	$747	$913	$250	0.9
Men's restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	900	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	621	0.1	82	0	$8	$189	$20	20.8
Women's restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	900	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	621	0.1	82	0	$8	$189	$20	20.8
Shop Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,920	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,325	0.1	261	0	$26	$226	$50	6.8
Tool Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,512	0.1	660	0	$66	$262	$60	3.1
Computer room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	3, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,512	0.4	1,816	0	$181	$672	$145	2.9
Stairwell	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	0.2	2,402	-1	$239	$292	$80	0.9
Electrical room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	920	3, 4	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	635	0.9	1,001	0	$100	$1,416	$310	11.1
Shop area 1	96	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	6,000	1	Fixture Replacement	No	96	LED - Fixtures: High-Bay	Wall Switch	137	6,000	27.2	199,439	-42	$19,851	$74,389	$14,400	3.0
Crane 10 ton	4	High-Pressure Sodium: (1) 400W Lamp	Wall Switch	S	465	8,424	1, 4	Fixture Replacement	Yes	4	LED - Fixtures: Close to Ceiling Mount	Occupancy Sensor	140	5,813	1.3	13,419	-3	$1,336	$1,458	$75	1.0
Pit Area	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	40	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	1.2	12,009	-3	$1,195	$1,461	$400	0.9
Pit Area	104	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	104	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	3.0	31,224	-7	$3,108	$3,798	$1,040	0.9
Pit 1	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	36	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	1.1	10,808	-2	$1,076	$1,315	$360	0.9
Pit 2	68	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	68	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	2.0	20,416	-4	$2,032	$2,483	$680	0.9
Pit 3	80	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	80	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	2.3	24,019	-5	$2,391	$2,921	$800	0.9
Pit area	84	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	84	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	2.5	25,219	-5	$2,510	$3,067	$840	0.9
Wash area *	18	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	6,000	1, 4	Fixture Replacement	Yes	18	LED - Fixtures: High-Bay	Occupancy Sensor	137	4,140	5.8	42,363	-9	$4,217	$17,908	$3,330	3.5
Wash area *	2	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	6,000	1, 4	Fixture Replacement	Yes	2	LED - Fixtures: High-Bay	Occupancy Sensor	89	4,140	0.4	3,032	-1	$302	$1,990	$370	5.4
Electrical room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	900	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	900	0.1	64	0	$6	$73	$20	8.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Shop Area 2	16	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	7,500	1, 4	Fixture Replacement	Yes	16	LED - Fixtures: High-Bay	Occupancy Sensor	137	5,175	5.1	47,070	-10	$4,685	$12,668	$2,435	2.2
Shop Area 2	32	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	7,500	1, 4	Fixture Replacement	Yes	32	LED - Fixtures: High-Bay	Occupancy Sensor	137	5,175	10.3	94,140	-20	$9,370	$25,606	$4,905	2.2
Shop Area 2	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Paint booth	97	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	8,424	2, 4	Relamp & Reballast	Yes	97	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	5,813	11.7	120,002	-26	$11,945	$11,751	$1,975	0.8
Paint booth area	35	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	7,500	1	Fixture Replacement	No	35	LED - Fixtures: High-Bay	Wall Switch	137	7,500	9.9	90,890	-19	$9,047	$27,121	$5,250	2.4
Storage *	12	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	900	1, 4	Fixture Replacement	Yes	12	LED - Fixtures: High-Bay	Occupancy Sensor	137	621	3.9	4,236	-1	$422	$11,939	$2,220	23.0
Stock room	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,920	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,325	0.4	1,045	0	$104	$708	$155	5.3
Stock room *	17	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	1,920	1, 4	Fixture Replacement	Yes	17	LED - Fixtures: High-Bay	Occupancy Sensor	137	1,325	5.5	12,803	-3	$1,274	$16,913	$3,145	10.8
Waste oil	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.3	1,224	0	$122	$445	$110	2.7
Elevator	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,920	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,920	0.1	342	0	$34	$183	$50	3.9
Freight room	2	Compact Fluorescent: Screw-in 1 lamp	Wall Switch	S	23	1,920	3	Relamp	No	2	LED Screw-In Lamps: Screw-in 1 lamp	Wall Switch	16	1,920	0.0	29	0	$3	$34	$2	11.4
Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.4	1,045	0	$104	$708	$155	5.3
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	720	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	720	0.0	26	0	$3	$37	$10	10.4
Security	2	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	S	10	8,424		None	No	2	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	10	8,424	0.0	0	0	$0	$0	$0	0.0
Lobby	4	Compact Fluorescent: Pin based - 2 lamps	Wall Switch	S	26	8,424	3	Relamp	No	4	LED - Fixtures: Downlight Recessed	Wall Switch	18	8,424	0.0	284	0	$28	$200	$0	7.1
Stairwell	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,424	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,424	0.1	1,201	0	$120	$146	$40	0.9
2nd floor: Hall	8	Compact Fluorescent: Pin based - 2 lamps	Wall Switch	S	26	8,424	3, 6	Relamp	Yes	8	LED - Fixtures: Downlight Recessed	High/Low Control	18	5,813	0.1	978	0	$97	$600	$0	6.2
2nd floor: Hall	23	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,424	3, 6	Relamp	Yes	23	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	5,813	1.3	13,180	-3	$1,312	$2,060	$345	1.3
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	720	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	497	0.1	65	0	$6	$189	$20	26.0
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	720	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	497	0.1	65	0	$6	$189	$20	26.0
Break room	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	4,000	3	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,000	0.6	2,780	-1	$277	$712	$195	1.9
Janitor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	5,813	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	5,813	0.0	207	0	$21	$37	$10	1.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Locker room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	5,813	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	5,813	0.2	1,243	0	$124	$219	$60	1.3
Locker rooom	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	5,813	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	5,813	0.2	1,243	0	$124	$219	$60	1.3
Vehicle maintenance office	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	5,813	3	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	5,813	0.8	5,593	-1	$557	$986	$270	1.3
Private office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	5,813	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	5,813	0.1	621	0	$62	$110	$30	1.3
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	920	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	920	0.0	33	0	$3	$37	$10	8.1
Lab	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,640	3, 4	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,512	0.6	2,724	-1	$271	$872	$200	2.5
Office	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	5,813	3, 4	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,011	0.9	6,326	-1	$630	$1,146	$275	1.4
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,640	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,512	0.2	990	0	$99	$489	$95	4.0
Receiving	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,512	0.4	1,981	0	$197	$708	$155	2.8
3rd floor: Training room	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,640	3	Relamp	No	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,640	0.7	3,308	-1	$329	$931	$255	2.1
3rd floor: Stairs	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.2	778	0	$77	$219	$60	2.1
Locker/Office	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,640	3, 4	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,512	0.8	3,714	-1	$370	$1,092	$260	2.2
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	920	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	920	0.1	66	0	$7	$73	$20	8.1
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	720	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	497	0.1	65	0	$6	$189	$20	26.0
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	720	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	497	0.1	65	0	$6	$189	$20	26.0
Janitor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	900	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	900	0.0	32	0	$3	$37	$10	8.3
Storage	4	Compact Fluorescent: Pin based - 2 lamps	Wall Switch	S	26	920	3, 4	Relamp	Yes	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	18	635	0.0	53	0	$5	$316	$0	59.4
File storage	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,640	3, 4	Relamp	Yes	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,512	1.2	5,200	-1	$518	$1,590	$315	2.5
Engineering	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	900	3	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	900	0.4	481	0	$48	$548	$150	8.3
Stan James	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,640	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,512	0.1	495	0	$49	$226	$50	3.6
Pat Harrison	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,640	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,512	0.1	495	0	$49	$226	$50	3.6
Offices	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	0.2	411	0	$41	$219	$60	3.9
Fares	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	0.4	1,026	0	$102	$548	$150	3.9
MOW office	23	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	23	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	1.0	2,361	-1	$235	$1,260	$345	3.9
Break room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,640	3, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,512	0.4	1,816	0	$181	$672	$145	2.9

	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Electrical	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	920	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	920	0.0	35	0	$3	$37	$10	7.7
Locker room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	5,813	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	5,813	0.2	1,243	0	$124	$219	$60	1.3
Locker room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	5,813	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	5,813	0.2	1,243	0	$124	$219	$60	1.3
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,920	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,920	0.1	274	0	$27	$146	$40	3.9
HR	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.2	522	0	$52	$335	$80	4.9
Closet	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	520	0.4	278	0	$28	$548	$150	14.4
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	520	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	520	0.0	19	0	$2	$37	$10	14.4
CC	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Daylight Dimming	S	93	1,920	3	Relamp	No	20	LED - Linear Tubes: (3) 4' Lamps	Daylight Dimming	44	1,920	0.9	2,053	0	$204	$1,095	$300	3.9
Conf room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.2	522	0	$52	$335	$80	4.9
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	0.2	411	0	$41	$219	$60	3.9
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	0.2	411	0	$41	$219	$60	3.9
Admin/Op	30	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	30	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	1.3	3,079	-1	$307	$1,643	$450	3.9
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.1	261	0	$26	$226	$50	6.8
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,920	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,325	0.2	522	0	$52	$335	$80	4.9
Conference room B	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,920	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,920	0.2	411	0	$41	$219	$60	3.9
Hallway	54	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,424	3, 6	Relamp	Yes	54	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	5,813	3.0	30,944	-7	$3,080	$4,758	$810	1.3
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	900	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	621	0.1	82	0	$8	$189	$20	20.8
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	900	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	621	0.1	82	0	$8	$189	$20	20.8
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	900	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	621	0.1	82	0	$8	$189	$20	20.8
Barn	111	High-Pressure Sodium: (1) 400W Lamp	Daylight Dimming	S	465	5,054	1	Fixture Replacement	No	111	LED - Fixtures: Close to Ceiling Mount	Daylight Dimming	140	5,054	32.0	197,227	-42	$19,631	$32,976	$1,110	1.6
Barn	22	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	8,424	1, 5	Fixture Replacement	Yes	22	LED - Fixtures: Close to Ceiling Mount	Daylight Dimming	89	5,054	4.7	48,417	-10	$4,819	$6,786	$470	1.3
Exterior	15	High-Pressure Sodium: (1) 150W Lamp	None		188	4,380	1, 5	Fixture Replacement	Yes	15	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	56	2,628	1.5	10,128	0	$1,027	$14,739	$1,750	12.7

	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Exterior	16	High-Pressure Sodium: (1) 400W Lamp	None		465	4,380	1, 5	Fixture Replacement	Yes	16	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	140	2,628	4.0	26,722	0	$2,709	$15,705	$1,850	5.1
Exterior - 1 lamp poles	26	High-Pressure Sodium: (1) 400W Lamp	None		465	4,380	1, 5	Fixture Replacement	Yes	26	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	140	2,628	6.5	43,422	0	$4,401	$25,365	$2,850	5.1
Exterior - 2 lamp poles	26	High-Pressure Sodium: (1) 400W Lamp	None		465	4,380	1, 5	Fixture Replacement	Yes	26	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	140	2,628	6.5	43,422	0	$4,401	$25,365	$2,850	5.1

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	AC-1	1	Supply Fan	5.0	89.5%	No		1,344	NR, 7	Yes	89.5%	Yes	1	1.4	2,100	0	$213	$4,197	$400	17.8
Roof	AC-2	1	Supply Fan	5.0	89.5%	No		1,344	NR, 7	Yes	89.5%	Yes	1	1.4	2,100	0	$213	$4,197	$400	17.8
Roof	Occ. Office AC-3	1	Supply Fan	15.0	92.4%	Yes		1,344		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Administration AC-4	1	Supply Fan	30.0	93.6%	Yes		1,344		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Misc Areas AC-5	1	Supply Fan	1.0	85.5%	No		1,344		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Office area - AC-6	1	Supply Fan	1.5	85.5%	No		1,344		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	UPS - Comm	1	Supply Fan	0.3	60.0%	No		1,344		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AC-1	1	Return Fan	3.0	89.5%	No		1,344	NR, 7	Yes	89.5%	Yes	1	0.9	1,260	0	$128	$3,812	$240	28.0
Roof	AC-2	1	Return Fan	3.0	89.5%	No		1,344	NR, 7	Yes	89.5%	Yes	1	0.9	1,260	0	$128	$3,812	$240	28.0
Roof	Occ. Office AC-3	1	Return Fan	5.0	89.5%	Yes		1,344		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Administration AC-4	1	Return Fan	20.0	93.0%	Yes		1,344		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-1	1	Supply Fan	10.0	91.7%	No		1,078		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-2	1	Supply Fan	10.0	91.7%	No		1,078		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-3	1	Supply Fan	15.0	92.4%	No		1,078		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-4	1	Supply Fan	15.0	92.4%	No		1,078		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-5	1	Supply Fan	3.0	89.5%	No		1,078		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-6	1	Supply Fan	5.0	89.5%	No		1,078		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-7	1	Supply Fan	1.5	85.5%	No		1,078		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	CU-3	1	Return Fan	10.0	91.7%	No		1,078		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Computer room	2	Supply Fan	0.8	60.0%	No		1,344		No	60.0%	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?	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
HV 1	Paint booth service area	1	Supply Fan	5.0	89.5%	No		1,344		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
HV 2	Paint prep	1	Supply Fan	15.0	92.4%	No		1,344		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
HV 3	Car washer	1	Supply Fan	10.0	91.7%	No		1,344		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0	92.4%	No		1,344	NR, 8	Yes	92.4%	Yes	1	1.4	6,104	0	$619	$7,086	$0	11.5
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0	92.4%	No		1,344	NR, 8	Yes	92.4%	Yes	1	1.4	6,104	0	$619	$7,086	$0	11.5
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0	92.4%	No		1,344	NR, 8	Yes	92.4%	Yes	1	1.4	6,104	0	$619	$7,086	$0	11.5
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0	92.4%	No		1,344	NR, 8	Yes	92.4%	Yes	1	1.4	6,104	0	$619	$7,086	$0	11.5
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0	92.4%	No		1,344	NR, 8	Yes	92.4%	Yes	1	1.4	6,104	0	$619	$7,086	$0	11.5
Mechanical room	Boilers	1	Heating Hot Water Pump	15.0	92.4%	No		1,344	NR, 8	Yes	92.4%	Yes	1	1.4	6,104	0	$619	$7,086	$0	11.5
Roof	EF-1	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-2	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-3	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-4	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-5	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-6	1	Exhaust Fan	0.2	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-7	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-8	1	Exhaust Fan	0.5	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-9	1	Exhaust Fan	0.5	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-10	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-11	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	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?	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	EF-12	1	Exhaust Fan	0.8	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-13	1	Exhaust Fan	0.5	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-14	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-15	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-16	1	Exhaust Fan	10.0	91.7%	No		1,800		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-17	1	Exhaust Fan	1.5	85.5%	No		1,800		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-18	1	Exhaust Fan	1.5	85.5%	No		1,800		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-19	1	Exhaust Fan	0.3	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-20	1	Exhaust Fan	1.5	85.5%	No		1,800		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-27	1	Exhaust Fan	5.0	89.5%	No		1,800		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-29	1	Exhaust Fan	0.5	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-30	1	Exhaust Fan	0.5	60.0%	No		1,800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU 2	1	Supply Fan	40.0	84.0%	No		1,344	NR, 7	Yes	94.1%	Yes	1	13.3	21,363	0	$2,165	$13,573	$3,200	4.8
Roof	HRU 2	1	Exhaust Fan	25.0	84.0%	No		1,344	NR, 7	Yes	93.6%	Yes	1	8.6	13,256	0	$1,344	$11,471	$2,000	7.0
Roof	HRU 9	1	Supply Fan	5.0	89.5%	No		1,344	NR	Yes	89.5%	No		0.0	0	0	$0	$921	$0	0.0
Roof	HRU 9	1	Exhaust Fan	7.5	91.7%	No		1,344	NR	Yes	91.7%	No		0.0	0	0	$0	$1,154	$0	0.0
Roof	HRU 1	1	Supply Fan	30.0	92.4%	No		1,344	NR	Yes	93.6%	No		0.2	313	0	$32	$3,439	$0	108.4
Roof	HRU 1	1	Exhaust Fan	25.0	92.4%	No		1,344	NR	Yes	93.6%	No		0.1	261	0	$26	$3,468	$0	131.2
Roof	Unknown	2	Supply Fan	50.0	94.5%	No		1,344		No	94.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler room	Boiler	2	Combustion Air Fan	3.0	89.5%	No		900		No	89.5%	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?	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Wood shop	tool	1	Other	1.0	85.5%	No		520		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Shop	Compressor	2	Air Compressor	50.0	94.5%	No	B	1,344	NR	Yes	94.5%	No		0.0	0	0	$0	$9,214	$0	0.0
Unknown	Compressor	2	Air Compressor	15.0	92.4%	No	B	1,344	NR	Yes	92.4%	No		0.0	0	0	$0	$3,783	$0	0.0
Roof	HRU 8	1	Supply Fan	5.0	89.5%	No		2,184	NR, 7	Yes	89.5%	Yes	1	1.4	3,413	0	$346	$4,197	$400	11.0
Roof	HRU 8	1	Exhaust Fan	7.5	91.7%	No		2,184	NR, 7	Yes	91.7%	Yes	1	2.2	4,997	0	$507	$4,761	$600	8.2
Roof	HRU 7	1	Supply Fan	20.0	91.0%	No	B	1,600	NR, 7	Yes	93.0%	Yes	1	5.9	10,218	0	$1,036	$8,850	$1,600	7.0
Roof	HRU 7	1	Exhaust Fan	15.0	91.0%	No	B	1,600	NR, 7	Yes	92.4%	Yes	1	4.5	7,579	0	$768	$7,086	$1,200	7.7
Roof	HRU-10	1	Supply Fan	3.0	87.5%	No	B	1,600	NR, 7	Yes	89.5%	Yes	1	0.9	1,596	0	$162	$3,812	$240	22.1
Roof	HRU-10	1	Exhaust Fan	5.0	87.5%	No	B	1,600	NR, 7	Yes	89.5%	Yes	1	1.5	2,661	0	$270	$4,197	$400	14.1
Roof	HRU-11	1	Supply Fan	3.0	87.5%	No	B	1,600	NR, 7	Yes	89.5%	Yes	1	0.9	1,596	0	$162	$3,812	$240	22.1
Roof	HRU-11	1	Exhaust Fan	5.0	87.5%	No		1,600	NR, 7	Yes	89.5%	Yes	1	1.5	2,661	0	$270	$4,197	$400	14.1
Roof	HRU-3	1	Supply Fan	40.0	93.0%	No		1,600	NR, 7	Yes	94.1%	Yes	1	11.6	19,657	0	$1,992	$13,573	$3,200	5.2
Roof	HRU-3	1	Exhaust Fan	40.0	93.0%	No		1,600	NR, 7	Yes	94.1%	Yes	1	12.1	19,657	0	$1,992	$13,573	$3,200	5.2
Roof	HRU-4	1	Supply Fan	25.0	92.4%	No		1,600	NR, 7	Yes	93.6%	Yes	1	7.3	12,390	0	$1,256	$11,471	$2,000	7.5
Roof	HRU-4	1	Exhaust Fan	20.0	91.0%	No		1,600	NR, 7	Yes	93.0%	Yes	1	6.1	10,218	0	$1,036	$8,850	$1,600	7.0
Roof	HRU-5	1	Supply Fan	40.0	93.0%	No		1,600	NR, 7	Yes	94.1%	Yes	1	11.6	19,657	0	$1,992	$13,573	$3,200	5.2
Roof	HRU-5	1	Exhaust Fan	40.0	93.0%	No		1,600	NR, 7	Yes	94.1%	Yes	1	12.1	19,657	0	$1,992	$13,573	$3,200	5.2
Roof	HRU-6	1	Supply Fan	25.0	92.4%	No		1,600	NR, 7	Yes	93.6%	Yes	1	7.3	12,390	0	$1,256	$11,471	$2,000	7.5
Roof	HRU-6	1	Exhaust Fan	40.0	93.0%	No		1,600	NR, 7	Yes	94.1%	Yes	1	12.1	19,657	0	$1,992	$13,573	$3,200	5.2

Electric 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)	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/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	AC-1	1	Split-System AC	10.00		B	NR	Yes	1	Split-System AC	10.00		11.50		2.8	2,164	0	$219	$11,638	$730	49.7
Roof	AC-2	1	Split-System AC	10.00		B	NR	Yes	1	Split-System AC	10.00		11.50		2.8	2,164	0	$219	$11,638	$730	49.7
Roof	Occ. Office AC-3	1	Split-System AC	27.00		B	NR	Yes	1	Split-System AC	27.00		10.50		6.3	4,823	0	$489	$32,151	$2,133	61.4
Roof	Administration AC-4	1	Split-System AC	70.00		B	NR	Yes	1	Split-System AC	70.00		9.50		12.2	7,345	0	$744	$77,011	$0	103.4
Roof	Misc Areas AC-5	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		1.0	733	0	$74	$4,489	$276	56.7
Roof	Office area - AC-6	1	Split-System AC	5.71		B	NR	Yes	1	Split-System AC	5.71		11.50		1.3	991	0	$100	$6,645	$417	62.0
Roof	UPS - Comm	1	Split-System AC	2.71		B	NR	Yes	1	Split-System AC	2.71		14.00		0.9	662	0	$67	$4,055	$249	56.7
Roof	Computer room	2	Packaged AC	18.00		N		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-1	1	Electric Resistance Heat		42.90	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-2	1	Electric Resistance Heat		91.70	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-3	1	Electric Resistance Heat		91.70	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-4	1	Electric Resistance Heat		64.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-5	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-6	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-7	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-8	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-9	1	Electric Resistance Heat		64.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-10	1	Electric Resistance Heat		91.70	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-11	1	Electric Resistance Heat		38.50	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-12	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	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 (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Various spaces	UH-13	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-14	1	Electric Resistance Heat		64.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-15	1	Electric Resistance Heat		50.40	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-16	1	Electric Resistance Heat		23.50	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-17	1	Electric Resistance Heat		14.20	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-18	1	Electric Resistance Heat		13.70	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-19	1	Electric Resistance Heat		22.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-20	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-21	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-22	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-23	1	Electric Resistance Heat		23.50	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-24	1	Electric Resistance Heat		23.50	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-25	1	Electric Resistance Heat		25.59	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-26	1	Electric Resistance Heat		42.65	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-27	1	Electric Resistance Heat		42.65	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-28	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-21	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-22	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-23	1	Electric Resistance Heat		23.50	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-24	1	Electric Resistance Heat		23.50	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	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 (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Various spaces	UH-25	1	Electric Resistance Heat		25.59	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-26	1	Electric Resistance Heat		42.65	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-27	1	Electric Resistance Heat		42.65	W		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	UH-28	1	Electric Resistance Heat		19.10	W		No							0.0	0	0	$0	$0	$0	0.0

Fuel Heating 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)	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical room	Perimeter of the building	2	Non-Condensing Hot Water Boiler	######	B	NR	Yes	2	Non-Condensing Hot Water Boiler	######	85.00%	Ec	0.0	0	764	$6,547	$233,897	$0	35.7
Roof	AMU1	1	Furnace	######	B		No						0.0	0	0	$0	$0	$0	0.0
Roof	AMU 2	1	Furnace	######	B		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	Restrooms	1	Storage Tank Water Heater (> 50 Gal)	B	NR	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	90.00%	Et	0.0	0	38	$329	$11,500	$398	33.8

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
VBF - Caven Point	1	Ice Making Head (<450 lbs/day), Batch	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?
VBF Caven point	97	Desktop	145.0	Yes
VBF Caven point	8	Printer - small	60.0	Yes
VBF Caven point	9	Printer - medium	80.0	Yes
VBF Caven point	8	Printer - large	200.0	Yes
VBF Caven point	4	Coffee machine	400.0	Yes
VBF Caven point	13	Microwave	900.0	Yes
VBF Caven point	7	Fridge	220.0	Yes
VBF Caven point	5	Mini fridge	60.0	Yes
VBF Caven point	4	TV	120.0	Yes
VBF Caven point	1	Sander	1,500.0	Yes

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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
VBF - Caven point	5	Refrigerated	9	Yes	0.9	8,059	0	$817	$1,150	$0	1.4

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

Vehicle Base Facility - Caven Point (HBLR)

Primary Property Type: Repair Services (Vehicle, Shoe, Locksmith, etc.)
Gross Floor Area (ft²): 160,000
Built: 1996

For Year Ending: April 30, 2018
Date Generated: March 26, 2019

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
Vehicle Base Facility - Caven Point (HBLR) 20 Caven Point Jersey City, New Jersey 07304	NJ Transit 1 Penn Plaza Newark, NJ 07015 (____)____-_____	Steve Jenks 1 Penn Plaza Newark, NJ 07015 9734918589 pdubuc@chacompanies.com

Property ID: 6725705

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
131 kBtu/ft²

Source EUI
236.4 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	9,039,408 (43%)
Natural Gas (kBtu)	11,913,395 (57%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	53.7
National Median Source EUI (kBtu/ft²)	96.9
% Diff from National Median Source EUI	144%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,549

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

____ _____
,
(____)____-_____
_____

Professional Engineer Stamp
(if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate financial savings. 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	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
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.
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 energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system 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.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.