Local Government Energy Audit Report

East Side Plant

August 2, 2019

Prepared for:

Jersey City MUA

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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 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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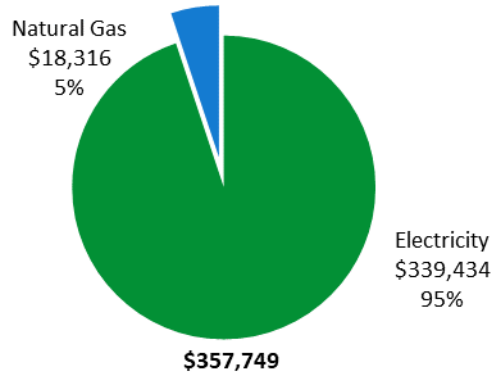
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for East Side Plant. This report provides you with information about the plant'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 to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $357,749 Electricity: 3,083,867 kWh Natural Gas: 26,980 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.

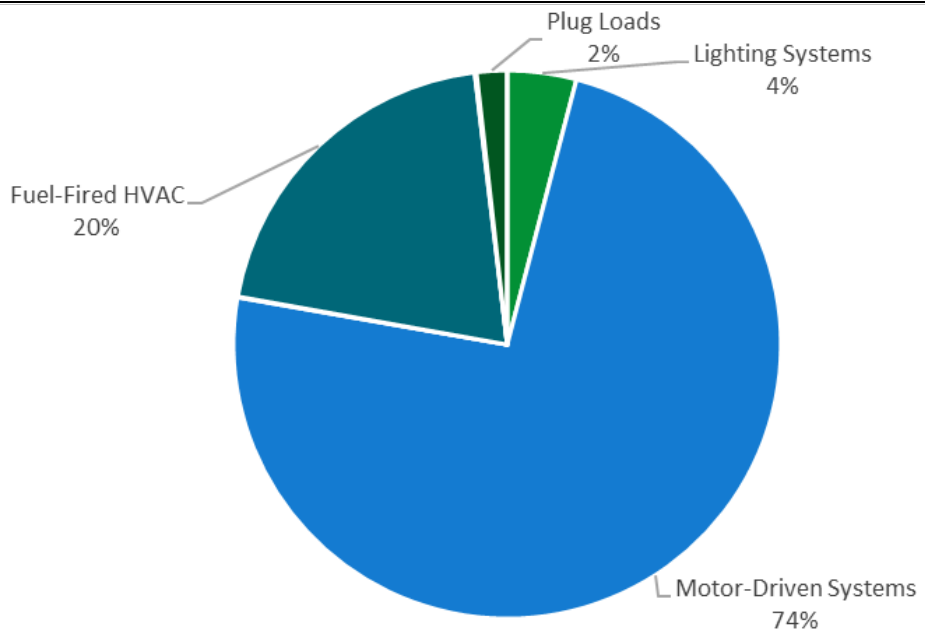


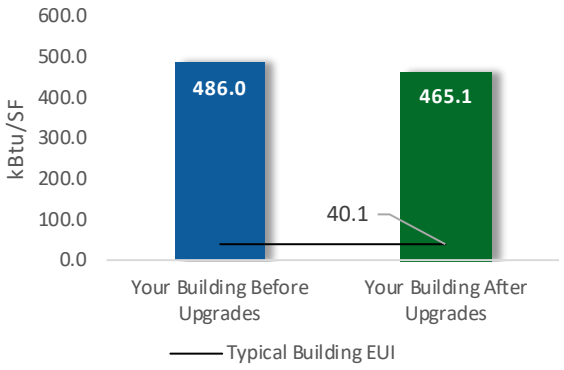
Figure 1 - Energy Use by System

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.

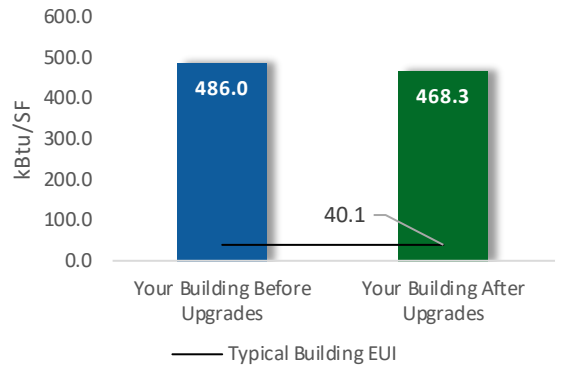
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$153,305
Potential Rebates & Incentives[1]	$18,755
Annual Cost Savings	$14,916
Annual Energy Savings	Electricity: 127,186 kWh Natural Gas: 1,351 Therms
Greenhouse Gas Emission Savings	72 Tons
Simple Payback	9.0 Years
Site Energy Savings (all utilities)	4%



Scenario 2: Cost Effective Package[2]

Installation Cost	$113,106
Potential Rebates & Incentives	$16,217
Annual Cost Savings	$14,324
Annual Energy Savings	Electricity: 127,040 kWh Natural Gas: 502 Therms
Greenhouse Gas Emission Savings	67 Tons
Simple Payback	6.8 Years
Site Energy Savings (all utilities)	4%



On-site Generation Potential

Photovoltaic	Medium
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		**121,500**	**28.4**	**-21**	**$13,227**	**$198,411**	**$92,768**	**$13,997**	**$78,771**	**6.0**	**119,835**
ECM 1	Install LED Fixtures	91,960	22.4	-15	$10,019	$150,280	$85,514	$12,900	$72,614	7.2	90,824
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	28,641	5.8	-6	$3,111	$46,665	$7,133	$1,090	$6,043	1.9	28,127
ECM 3	Retrofit Fixtures with LED Lamps	899	0.3	0	$98	$1,466	$121	$7	$114	1.2	883
Lighting Control Measures		**5,686**	**1.1**	**-1**	**$618**	**$4,941**	**$12,880**	**$2,000**	**$10,880**	**17.6**	**5,584**
ECM 4	Install Occupancy Sensor Lighting Controls	5,540	1.0	-1	$602	$4,814	$12,380	$1,820	$10,560	17.5	5,440
ECM 5	Install Daylight Dimming Controls	146	0.0	0	$16	$127	$500	$180	$320	20.2	143
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**148**	**$1,003**	**$20,063**	**$47,628**	**$2,758**	**$44,870**	**44.7**	**17,302**
ECM 6	Install High Efficiency Steam Boilers	0	0.0	85	$576	$11,528	$39,698	$2,358	$37,340	64.8	9,942
ECM 7	Install High Efficiency Furnaces	0	0.0	63	$427	$8,535	$7,930	$400	$7,530	17.6	7,360
Domestic Water Heating Upgrade		**0**	**0.0**	**10**	**$68**	**$682**	**$29**	**$0**	**$29**	**0.4**	**1,176**
ECM 8	Install Low-Flow DHW Devices	0	0.0	10	$68	$682	$29	$0	$29	0.4	1,176
TOTALS (COST EFFECTIVE MEASURES)		**127,040**	**29.4**	**50**	**$14,324**	**$212,442**	**$113,106**	**$16,217**	**$96,889**	**6.8**	**133,812**
TOTALS (ALL MEASURES)		**127,186**	**29.5**	**135**	**$14,916**	**$224,097**	**$153,305**	**$18,755**	**$134,550**	**9.0**	**143,897**

* - 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

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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		
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X		
ECM 3	Retrofit Fixtures with LED Lamps	X		
ECM 4	Install Occupancy Sensor Lighting Controls	X		
ECM 5	Install Daylight Dimming Controls	X		
ECM 6	Install High Efficiency Steam Boilers	X		
ECM 7	Install High Efficiency Furnaces			
ECM 8	Install Low-Flow Domestic Hot Water Devices			

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 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 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 East Side Plant. 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 January 30, 2019, TRC performed an energy audit at East Side Plant located in Jersey City, New Jersey. TRC met with Elmer Andal to review the plant operations and help focus our investigation on specific energy-using systems.

East Side Plant is a multi-story, 27,200 square foot facility built in 1956. The Operations Building and Grit Building spaces include: offices, a locker room, restrooms, the main floor, lower levels, storage space, and mechanical space.

Recent improvements include: over the last five years the facility has installed high-efficiency motors for pumping. The site is interested in a new lighting but has been unable to fund the project.

Facility concerns include: high electric bills.

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

2.2 Building Occupancy

The plant is occupied year-round, Monday through Friday, and one Saturday per month. Typical weekday occupancy is 102 employees.

Building Name	Weekday/Weekend	Operating Schedule
Operation Building	Weekday	7:00 AM to 3:00 PM
	Weekend	7:00 AM to 3:00 PM
Grit Building	Weekday	12:00 AM to 12:00 PM
	Weekend	12:00 AM to 12:00 PM

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

The walls at the Operations Building and Grit Building are concrete block over structural steel with a brick facade. The roofs of both buildings are flat and covered with black membrane and are in good condition.

Each flat roof is supported with steel trusses and a metal deck and is finished with an insulated layer and a covering of Modified Bitumen.

Most of the windows are single-glazed with storm windows and have aluminum frames without a thermal break. The glass-to-frame seals are in fair condition. The operable window weather seals are also in fair condition, showing some evidence of wear. Exterior doors have aluminum frames and are in fair condition with worn door seals. Degraded window and door seals increase drafts and outside air infiltration.

Operations Building

Grit Building

2.4 Lighting Systems

The primary interior lighting system uses 40-Watt linear fluorescent T12 lamps. There are also a few eight-foot 110-Watt T12 high-output fixtures. Additionally, there are some compact fluorescent lamps (CFL) and incandescent lamps. T12 fluorescent lamps typically use magnetic ballasts.

Fixture types include 2- or 4-lamp, 4- or 8-foot long, surface-mounted fixtures. Most fixtures are in good condition. All exit signs are LED units.

Interior lighting levels were generally sufficient; however, the boiler room of the Operation Building was underlit.

Fluorescent Lighting

Lower Level LEDs

Lighting fixtures throughout the plant are controlled by wall switches.

Exterior fixtures include wall packs with high intensity discharge (HID) lamps and pole-mounted fixtures, which use a combination of LED and metal halide sources.

Exterior light fixtures are controlled by a time clock or photocell, depending on the fixture.

2.5 Air Handling Systems

Unit Heaters

Unit heaters operate much like a furnace and have supply fan motors, drawing air from the surrounding space. There is a single unit heater in the Grit Building that serves the whole building. The unit heater is a model P-35LO manufactured by Hasting. The heater is original to the building and appears to be in fair operating condition.

Air Conditioners

The office area uses a window air conditioning (AC) unit to supply cooling. The capacity of the unit is 2-tons and has an efficiency of 9.5 SEER. The unit is in fair condition but is not ENERGY STAR® labeled.

Grit Building Unit Heater

Grit Building Unit Heater

2.6 Steam Heating System

One H.B. Smith 1,965 MBh steam boiler serves the Operations Building heating load. The burner is fully-modulating with a nominal efficiency of 78%. The boiler is configured in an automated control scheme and operates based on outdoor temperature. Installed in 2005, the boiler is in good condition. There is a service contract in place.

A 2-pipe steam distribution system serves the building radiators. There are two 1/2 hp boiler feed pumps in the mechanical room. Steam supply and condensate return piping is insulated.

Operations Building Steam Boiler

Operations Building Steam Boiler

2.7 Domestic Hot Water

Hot water for the Operations Building is produced with a 50-gallon, 40 MBh gas-fired storage water heater with an 80% efficiency. Hot water for the Grit Building is produced by a 10-gallon 3.5 kW electric water heater serving a single sink on the main floor.

At the time of the site visit, the domestic water heaters were set at 120°F. The domestic hot water pipes are insulated, and the insulation is in fair condition.

Operations Building DHW

Operations Building Domestic Hot Water

2.8 Plug Load & Vending Machines

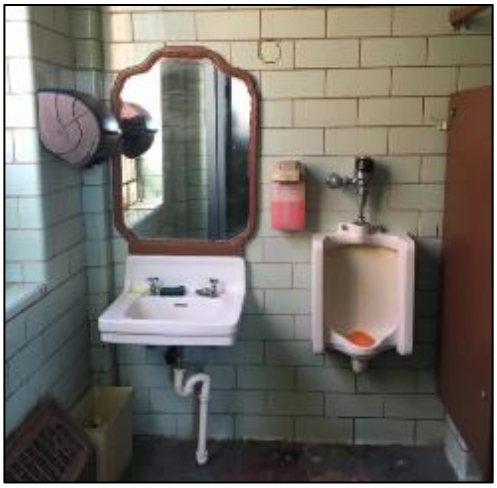
The utility bill analysis indicates that plug loads consume less than 1% percent of total building energy use. This is typical for a pumping station building where the majority of the energy is consumed by the process equipment.

Office equipment

Refrigerators

2.9 Water-Using Systems

There are two restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.0 gallons per minute (gpm) or lower. Toilets are rated at 1.6 gallons per flush (gpf), and urinals are rated at 1.0 gpf. There is also one locker room with showers and showerheads are rated at 2.0 gpm. Showers are used occasionally.



Operation Building Restroom

Operation Building Restroom

2.10 Process Equipment

East Side Plant is a pumping facility assisting with the sewage needs of Jersey City. The Operations Building of the plant has four 300 Hp motors for pumping sewage. Each pump has a rating of 11,900 gpm. The average flow of the plant is 18 to 20 million gallons per day (MGD). Motors on all pumps are high-efficiency with variable frequency drives (VFDs). The four VFDs are model SPX9000 manufactured by Eaton.

Additional process loads include motors for equipment associated with water treatment, including for grit collection material transfer. There motors generally range from 2.0 to 10.0 hp and are not equipped with VFDs. We do not recommend investing in VFD control for these loads due to the associated motor sizes and limited usage patterns.

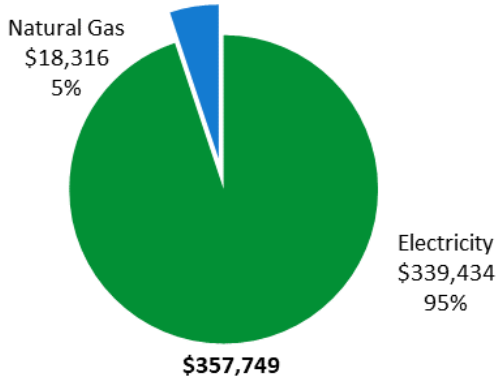
Motors & Pumps

Variable Frequency Drives

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	3,083,867 kWh	$339,434
Natural Gas	26,980 Therms	$18,316
Total		**$357,749**



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.

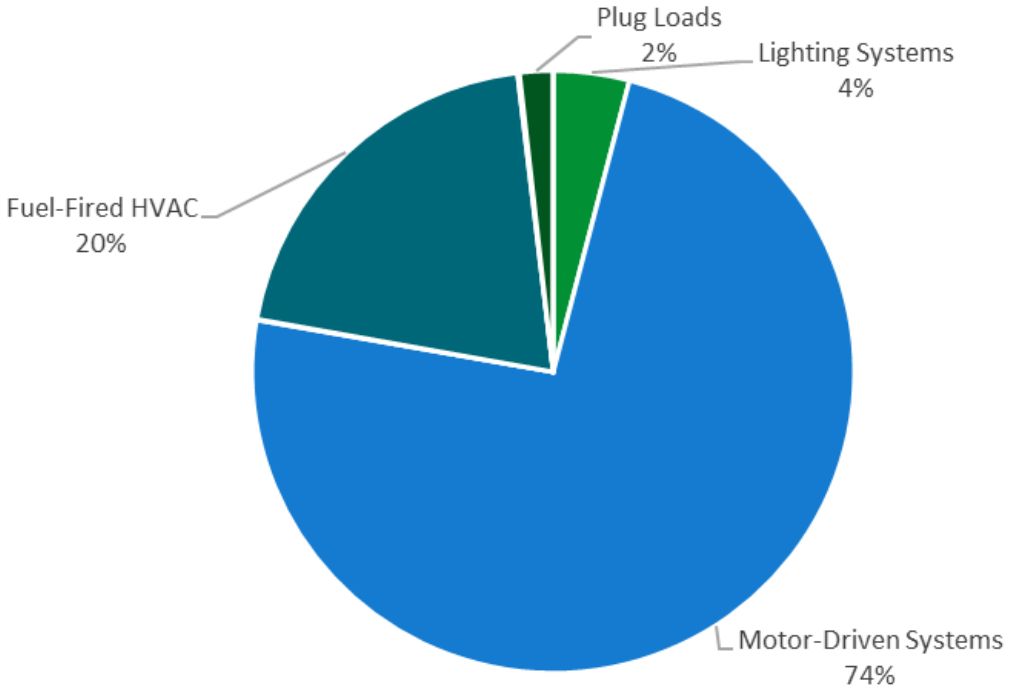
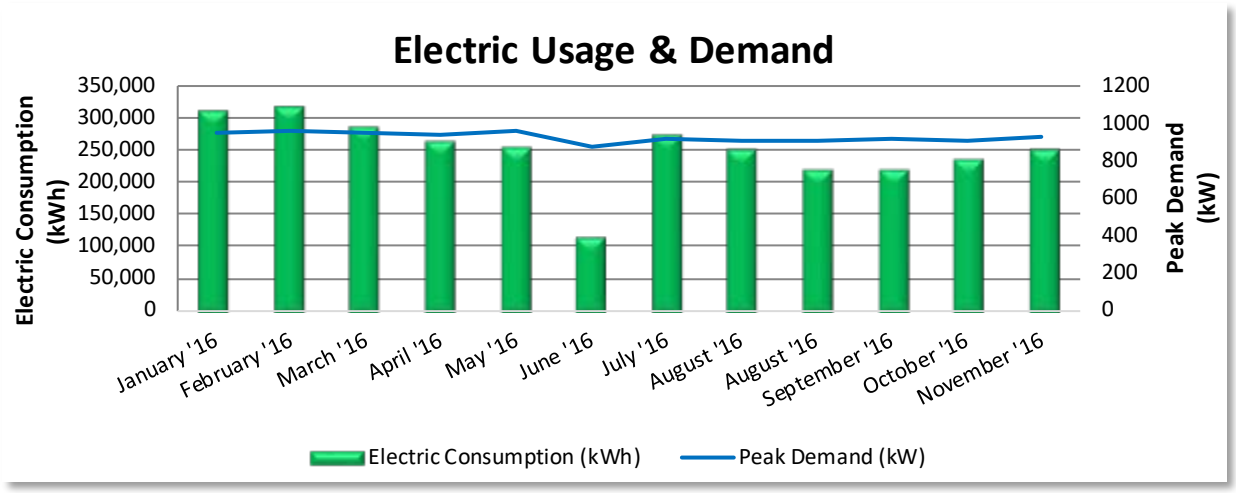


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class LPLS.



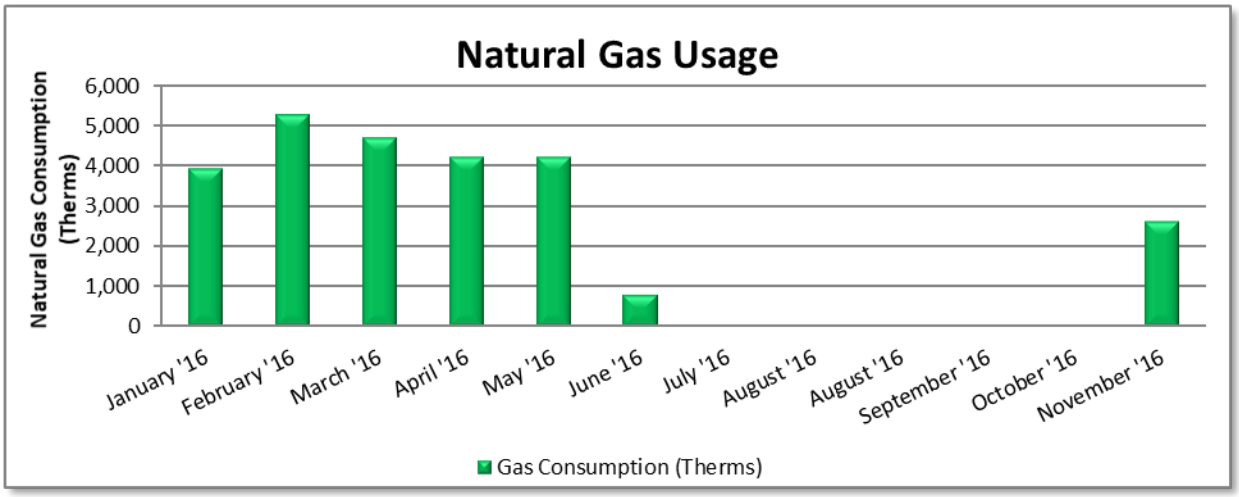
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
1/19/16	33	309,619	955	$3,461	$23,280
2/17/16	28	315,193	962	$3,486	$24,806
3/17/16	28	282,404	954	$3,479	$19,990
4/18/16	31	262,967	936	$3,430	$21,306
5/17/16	28	252,294	961	$3,520	$21,129
6/16/16	29	114,062	879	$3,256	$33,716
7/18/16	31	270,785	915	$3,354	$36,626
8/16/16	28	247,878	904	$3,312	$34,285
9/15/16	29	219,425	910	$3,360	$31,918
10/15/16	29	219,425	917	$3,416	$31,918
11/14/16	29	232,121	910	$3,360	$24,029
12/14/16	29	247,858	929	$3,461	$24,341
Totals	**352**	**2,974,031**	**962**	**$40,896**	**$327,344**
Annual	**365**	**3,083,867**	**962**	**$42,406**	**$339,434**

Notes:

- Peak demand of 962 kW occurred in February '16.
- The average electric cost over the past 12 months was $0.110/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 GSH (HTG).



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
1/19/16	33	3,965	$4,294
2/17/16	28	5,294	$3,785
3/17/16	28	4,712	$3,355
4/18/16	31	4,242	$2,849
5/17/16	28	4,249	$615
6/16/16	29	814	$29
7/18/16	31	8	$29
8/16/16	28	7	$28
9/15/16	29	6	$83
10/15/16	29	72	$35
11/14/16	29	12	$33
12/14/16	29	2,636	$2,527
Totals	**352**	**26,019**	**$17,663**
Annual	**365**	**26,980**	**$18,316**

Notes:

- The average gas cost for the past 12 months is $0.679/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.

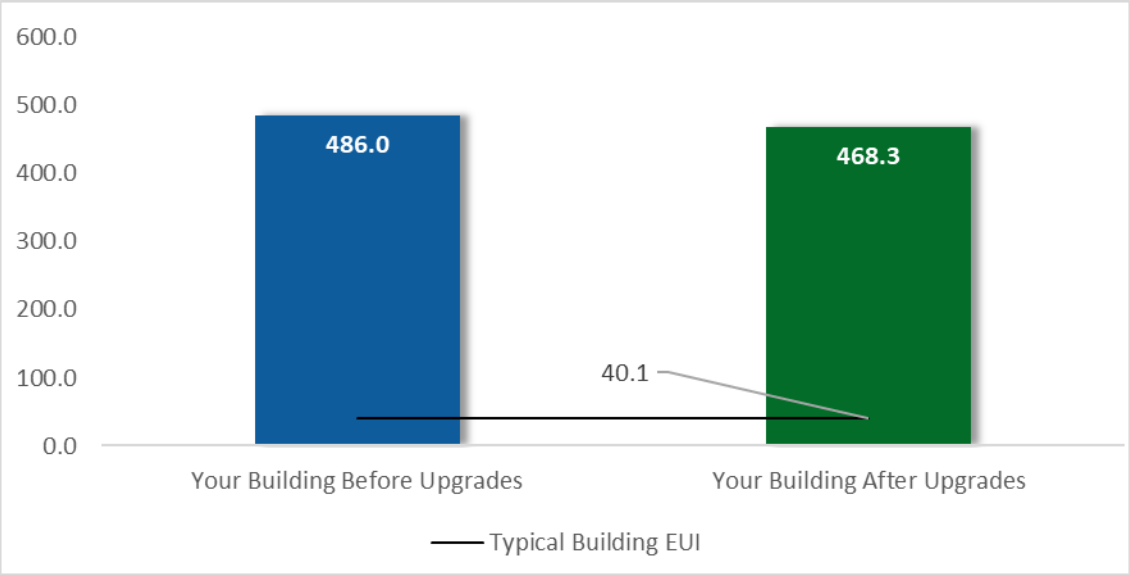


Figure 6 - Energy Use Intensity Comparison

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 as 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 ENEGY STAR® and Portfolio Manager®.

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 *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the New Jersey Board of Public Utilities. 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 ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**121,500**	**28.4**	**-21**	**$13,227**	**$92,768**	**$13,997**	**$78,771**	**6.0**	**119,835**
ECM 1	Install LED Fixtures	91,960	22.4	-15	$10,019	$85,514	$12,900	$72,614	7.2	90,824
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	28,641	5.8	-6	$3,111	$7,133	$1,090	$6,043	1.9	28,127
ECM 3	Retrofit Fixtures with LED Lamps	899	0.3	0	$98	$121	$7	$114	1.2	883
Lighting Control Measures		**5,686**	**1.1**	**-1**	**$618**	**$12,880**	**$2,000**	**$10,880**	**17.6**	**5,584**
ECM 4	Install Occupancy Sensor Lighting Controls	5,540	1.0	-1	$602	$12,380	$1,820	$10,560	17.5	5,440
ECM 5	Install Daylight Dimming Controls	146	0.0	0	$16	$500	$180	$320	20.2	143
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**148**	**$1,003**	**$47,628**	**$2,758**	**$44,870**	**44.7**	**17,302**
ECM 6	Install High Efficiency Steam Boilers	0	0.0	85	$576	$39,698	$2,358	$37,340	64.8	9,942
ECM 7	Install High Efficiency Furnaces	0	0.0	63	$427	$7,930	$400	$7,530	17.6	7,360
Domestic Water Heating Upgrade		**0**	**0.0**	**10**	**$68**	**$29**	**$0**	**$29**	**0.4**	**1,176**
ECM 8	Install Low-Flow DHW Devices	0	0.0	10	$68	$29	$0	$29	0.4	1,176
TOTALS		**127,186**	**29.5**	**135**	**$14,916**	**$153,305**	**$18,755**	**$134,550**	**9.0**	**143,897**

* - 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		**121,500**	**28.4**	**-21**	**$13,227**	**$92,768**	**$13,997**	**$78,771**	**6.0**	**119,835**
ECM 1	Install LED Fixtures	91,960	22.4	-15	$10,019	$85,514	$12,900	$72,614	7.2	90,824
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	28,641	5.8	-6	$3,111	$7,133	$1,090	$6,043	1.9	28,127
ECM 3	Retrofit Fixtures with LED Lamps	899	0.3	0	$98	$121	$7	$114	1.2	883
Lighting Control Measures		**5,540**	**1.0**	**-1**	**$602**	**$12,380**	**$1,820**	**$10,560**	**17.5**	**5,440**
ECM 4	Install Occupancy Sensor Lighting Controls	5,540	1.0	-1	$602	$12,380	$1,820	$10,560	17.5	5,440
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**63**	**$427**	**$7,930**	**$400**	**$7,530**	**17.6**	**7,360**
ECM 7	Install High Efficiency Furnaces	0	0.0	63	$427	$7,930	$400	$7,530	17.6	7,360
Domestic Water Heating Upgrade		**0**	**0.0**	**10**	**$68**	**$29**	**$0**	**$29**	**0.4**	**1,176**
ECM 8	Install Low-Flow DHW Devices	0	0.0	10	$68	$29	$0	$29	0.4	1,176
TOTALS		**127,040**	**29.4**	**50**	**$14,324**	**$113,106**	**$16,217**	**$96,889**	**6.8**	**133,812**

* - 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		**121,500**	**28.4**	**-21**	**$13,227**	**$92,768**	**$13,997**	**$78,771**	**6.0**	**119,835**
ECM 1	Install LED Fixtures	91,960	22.4	-15	$10,019	$85,514	$12,900	$72,614	7.2	90,824
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	28,641	5.8	-6	$3,111	$7,133	$1,090	$6,043	1.9	28,127
ECM 3	Retrofit Fixtures with LED Lamps	899	0.3	0	$98	$121	$7	$114	1.2	883

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

ECM 1: Install LED Fixtures

Replace existing fixtures containing metal halide and high-pressure sodium 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 as LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: main floor, lower area, and exterior fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected building areas: all areas with fluorescent fixtures with T12 tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, compact 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 direct replacements 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.

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		**5,686**	**1.1**	**-1**	**$618**	**$12,880**	**$2,000**	**$10,880**	**17.6**	**5,584**
ECM 4	Install Occupancy Sensor Lighting Controls	5,540	1.0	-1	$602	$12,380	$1,820	$10,560	17.5	5,440
ECM 5	Install Daylight Dimming Controls	146	0.0	0	$16	$500	$180	$320	20.2	143

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, 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, break room, lunch room, restrooms, locker room, main floor, lower levels, and storage rooms.

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: main floor entry areas.

4.3 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**	**148**	**$1,003**	**$47,628**	**$2,758**	**$44,870**	**44.7**	**17,302**
ECM 6	Install High Efficiency Steam Boilers	0	0.0	85	$576	$39,698	$2,358	$37,340	64.8	9,942
ECM 7	Install High Efficiency Furnaces	0	0.0	63	$427	$7,930	$400	$7,530	17.6	7,360

ECM 6: Install High-Efficiency Steam Boilers

Replace older inefficient steam boilers with high-efficiency steam 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 the plant. 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.

Replacing the boilers has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the boilers are nearing 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.

ECM 7: Install High-Efficiency Furnaces

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

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

4.4 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**10**	**$68**	**$29**	**$0**	**$29**	**0.4**	**1,176**
ECM 8	Install Low-Flow DHW Devices	0	0.0	10	$68	$29	$0	$29	0.4	1,176

ECM 8: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm

Low-flow devices reduce the overall water flow from the fixture while still providing adequate pressure for washing.

Additional cost savings may result from reduced water usage.

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

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment.

Doors and Windows

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

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single pane windows and east or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

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.

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

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 5-10°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.

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.

Furnace Maintenance

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

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.

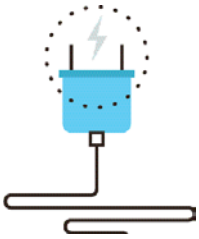
Compressed Air System Maintenance

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

- Inspection, cleaning, and replacement of inlet filter cartridges
- Cleaning of drain traps
- Daily inspection of lubricant levels to reduce unwanted friction
- Inspection of belt condition and tension
- Check for leaks and adjust loose connections
- Overall system cleaning

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

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[4]. 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 gpf and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

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

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

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the

[4] 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

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

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

foundation. Periodically check overnight meter readings when the plant 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.

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 plant's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, which results in improved electric grid reliability through better use of transmission and distribution systems.

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

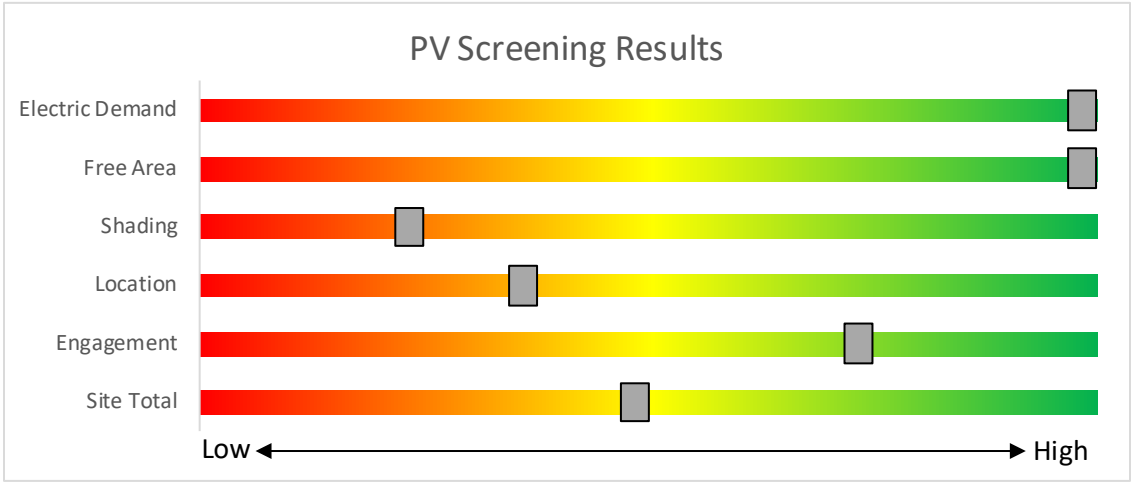
6.1 Solar Photovoltaic

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

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

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

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



Potential	Medium	
System Potential	221	kW DC STC
Electric Generation	166,290	kWh/yr
Displaced Cost	$18,300	/yr
Installed Cost	$919,400	

Figure 9 - Photovoltaic Screening

Solar Renewable Energy Credit (SREC) Registration Program

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 New Jersey**: www.njcleanenergy.com/whysolar
- **New Jersey Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the New Jersey 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 plant 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.

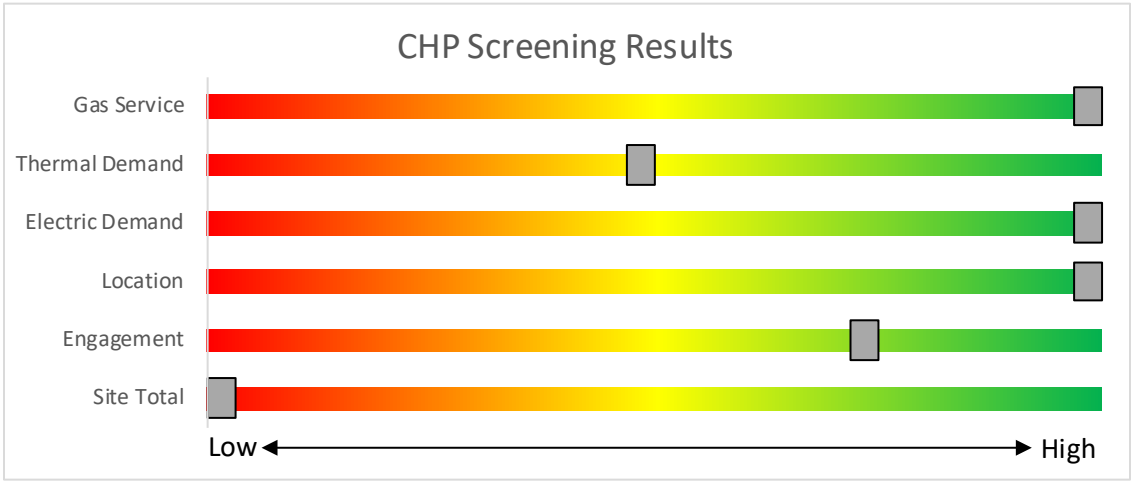
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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



Potential	None	
System Type	None	
System Potential	20	kW
Electric Generation	179,432	kWh/yr
Thermal Generation	3,205,308	MBtu/yr
Displaced Cost	$10,374	/yr
Installed Cost	$84,000	

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 the plant are identified in the Executive Summary. This section provides an overview of currently available 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 efficiency 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 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 descriptions and application can be found at: www.njcleanenergy.com/ESIP.

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

7.3 SREC Registration Program

The SREC 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. SREC's 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 SREC's 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[7].

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[8].

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Operations Office	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	2,912	2, 4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,009	0.7	2,566	-1	$279	$980	$155	3.0
Operations Office RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.1	47	0	$5	$69	$10	11.6
Ops Break Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	2,912	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,009	0.5	1,711	0	$186	$743	$115	3.4
Ops Break Room Lunch Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	2,912	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,009	0.5	1,711	0	$186	$743	$115	3.4
Ops Break Room Storage	13	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.7	605	0	$66	$894	$130	11.6
Ops Break Room Stairs 1	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,912	0.2	742	0	$81	$275	$40	2.9
Ops Break Room Stairs 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Electrical Area Cage	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	2,912	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,009	0.5	1,711	0	$186	$743	$115	3.4
Ops Break Room Stairs 2	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,912	0.2	557	0	$60	$206	$30	2.9
Ops Break Room Stairs 2	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Main Floor	2	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	8,760	1, 4	Fixture Replacement	Yes	2	LED - Fixtures: High-Bay	Occupancy Sensor	75	6,044	0.4	4,603	-1	$500	$1,990	$370	3.2
Ops Main Floor	11	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1, 4	Fixture Replacement	Yes	11	LED - Fixtures: High-Bay	Occupancy Sensor	75	2,009	2.4	8,415	-2	$914	$10,944	$2,035	9.7
Ops Main Floor	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Main Floor Front Entry	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2, 5	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Daylight Dimming	29	1,747	0.1	444	0	$48	$388	$110	5.8
Ops Main Floor Rear Entry	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2, 5	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Daylight Dimming	29	1,747	0.1	444	0	$48	$388	$110	5.8
Ops Locker Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,009	0.1	428	0	$46	$408	$55	7.6
Ops Locker Room RR	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.1	93	0	$10	$138	$20	11.6
Ops Boiler Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Boiler Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	U	88	2,912	2	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,912	0.1	371	0	$40	$138	$20	2.9
Ops Boiler Room	1	Linear Fluorescent - T12HO: 8' T12HO (110W) - 2L	Wall Switch	U	252	2,912	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	2,912	0.2	566	0	$61	$129	$20	1.8
Ops Bldg 2nd Level Down	15	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,760	2, 4	Relamp & Reballast	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.9	9,649	-2	$1,048	$4,332	$675	3.5
Ops Bldg 2nd Level Down	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Bldg Stairwell 3	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,912	0.2	557	0	$60	$206	$30	2.9
Ops MUA fan Room	1	Linear Fluorescent - T12HO: 8' T12HO (110W) - 2L	Wall Switch	S	252	2,912	2, 4	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	2,009	0.2	636	0	$69	$399	$20	5.5
Ops MUA fan Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,912	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,009	0.1	428	0	$46	$408	$55	7.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Ops Bldg 3rd Level Down	9	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,760	2, 4	Relamp & Reballast	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.5	5,789	-1	$629	$2,599	$405	3.5
Ops Bldg 3rd Level Down	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,760	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.1	1,286	0	$140	$578	$90	3.5
Ops Bldg 3rd Level Down Storage Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Bldg 4th Level Down	9	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	S	30	8,760		None	No	9	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	30	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Bldg 4th Level Down	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,760	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,044	0.2	1,930	0	$210	$866	$135	3.5
Ops Bldg 4th Level Down	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Bldg Wet Well	23	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	2,912	1	Fixture Replacement	No	23	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	45	2,912	5.1	18,084	-4	$1,964	$22,217	$2,300	10.1
Ops Bldg Exterior	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		300	4,380		None	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	300	4,380	0.0	0	0	$0	$0	$0	0.0
Ops Storage Room 1	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.1	47	0	$5	$69	$10	11.6
Ops Storage Room 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ops Storage Room 2	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.2	140	0	$15	$206	$30	11.6
Ops Generation Room	5	Compact Fluorescent: (1) 18W Screw-In Lamps	Wall Switch	S	18	2,912	3	Relamp	No	5	LED Lamps: (1) 12W Screw-In Lamps	Wall Switch	12	2,912	0.0	94	0	$10	$86	$5	7.9
Grit Bldg Furnace Room	2	Incandescent: (1) 150W Lamps	Wall Switch	S	150	2,912	3, 4	Relamp	Yes	2	LED Lamps: (1) 22W Screw-In Lamps	Occupancy Sensor	22	2,009	0.2	848	0	$92	$304	$2	3.3
Grit Bldg Main Floor	17	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1	Fixture Replacement	No	17	LED - Fixtures: High-Bay	Wall Switch	45	2,912	3.8	13,366	-3	$1,452	$13,173	$2,550	7.3
Grit Bldg Conveyor Belt Room	4	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1	Fixture Replacement	No	4	LED - Fixtures: High-Bay	Wall Switch	45	2,912	0.9	3,145	-1	$342	$3,100	$600	7.3
Grit Bldg Conveyor Belt Room	2	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1, 4	Fixture Replacement	Yes	2	LED - Fixtures: High-Bay	Occupancy Sensor	75	2,009	0.4	1,530	0	$166	$1,990	$370	9.7
Grit Bldg Stairs	1	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1	Fixture Replacement	No	1	LED - Fixtures: High-Bay	Wall Switch	45	2,912	0.2	786	0	$85	$775	$150	7.3
Grit Bldg Main Floor	7	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1	Fixture Replacement	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	45	2,912	1.5	5,504	-1	$598	$6,762	$700	10.1
Grit Bldg Exhuast Rooms	10	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1, 4	Fixture Replacement	Yes	10	LED - Fixtures: High-Bay	Occupancy Sensor	45	2,009	2.3	8,301	-2	$902	$8,289	$1,570	7.5
Grit Bldg Lower Level	12	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	2,912	1	Fixture Replacement	No	12	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	45	2,912	2.7	9,435	-2	$1,025	$11,592	$1,200	10.1
Grit Bldg Exterior	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		45	4,380		None	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	45	4,380	0.0	0	0	$0	$0	$0	0.0
Grit Bldg Exterior	11	Metal Halide: (1) 400W Lamp	Photocell		458	4,380	1	Fixture Replacement	No	11	LED - Fixtures: High-Bay	Photocell	30	4,380	3.1	20,621	0	$2,270	$8,524	$1,650	3.0
Grit Bldg Parking Lot	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		45	4,380		None	No	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	45	4,380	0.0	0	0	$0	$0	$0	0.0

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	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
Operations Building 4th Level	Sump Pumps	2	Water Supply Pump	5.0	89.5%	No	W	1,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building Roof	Grit Building	1	Exhaust Fan	5.0	85.5%	No	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Gate Valve Control	3	Other	3.4	89.5%	No	W	140		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Gate Valve Control	1	Other	7.8	91.0%	No	W	140		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Parkson Unit	3	Other	3.0	89.5%	No	W	475		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Grit Collector	3	Other	7.5	91.0%	No	W	475		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Conveyor Belt	2	Other	2.0	86.5%	No	W	475		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Screw Motor	3	Other	1.0	85.5%	No	W	475		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Exhaust Fans	2	Exhaust Fan	10.0	91.7%	No	W	3,391		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Operation Building Main Floor	Water Plant Operations	1	Process Pump	300.0	95.0%	Yes	W	3,595		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Operation Building Main Floor	Water Plant Operations	1	Process Pump	300.0	95.0%	Yes	W	3,595		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Operation Building Main Floor	Water Plant Operations	1	Process Pump	300.0	95.0%	Yes	W	3,595		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Operation Building Main Floor	Water Plant Operations	1	Process Pump	300.0	95.0%	Yes	W	3,595		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building	Furnce Blower	1	Process Blower	2.0	86.5%	No	W	910		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Grit Building Roof	Grit Building	2	Exhaust Fan	1.5	85.5%	No	W	910		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Ops Building	Gnerator Exhaust	1	Exhaust Fan	1.0	85.5%	No	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Ops Bldg Boiler Room	Condensate Pump	2	Condensate Pump	0.5	84.2%	No	W	2,745		No	84.2%	No		0.0	0	0	$0	$0	$0	0.0
Ops Building Lower Level	Seal Water System	2	Water Supply Pump	1.5	75.5%	No	W	2,745		No	75.5%	No		0.0	0	0	$0	$0	$0	0.0
Ops Building Lower Level	Hydrolic Ball Valve System	4	Process Pump	1.0	85.5%	No	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Ops Building Lower Level	Air Compressor	1	Air Compressor	10.0	91.7%	No	W	6,978		No	91.7%	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
Ops Building Lower Level	Wet Well Fresh Air Intake	1	Makeup Air Fan	5.0	89.5%	No	W	2,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Ops Building Lower Level	Wet Well Fresh Air Intake	1	Makeup Air Fan	5.0	89.5%	No	W	2,745		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0

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
Operations Office	Office Area	1	Window AC	2.00		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
Operation Building Boiler Room	Operations Building	1	Natural Draft Steam Boiler	######	B	6	Yes	1	Forced Draft Steam Boiler	######	81.00%	Et	0.0	0	85	$576	$39,698	$2,358	64.8
Grit Building Furnace Room	Grit Building	1	Furnace	350.00	B	7	Yes	1	Furnace	350.00	95.00%	AFUE	0.0	0	63	$427	$7,930	$400	17.6

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
Operation Building Boiler Room	Operation Building	1	Storage Tank Water Heater (≤ 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Grit Building	Main Floor Sink	1	Storage Tank Water Heater (≤ 50 Gal)	B		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

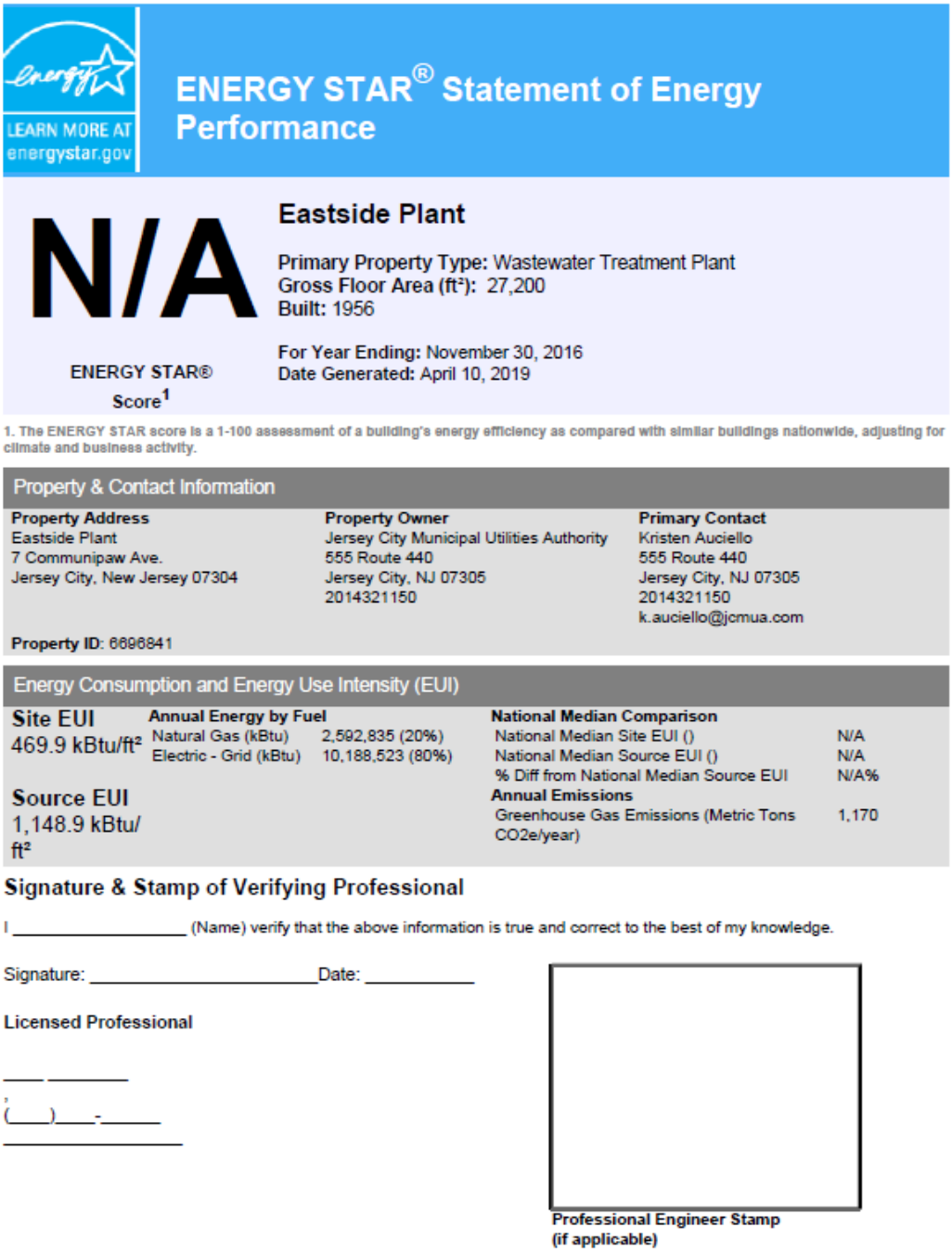
	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Operations Office RR	8	2	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	7	$45	$14	$0	0.3
Locker Room RR	8	2	Faucet Aerator (Lavatory)	1.50	0.50	0.0	0	3	$23	$14	$0	0.6

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Operations Building	1	Desktops	150.0	Yes
Operations Building	3	Microwave Oven	1,000.0	Yes
Operations Building	1	LCD TVs	71.0	Yes
Operations Building	1	Refrigerator	172.0	Yes
Operations Building	2	Mini Fridge	153.0	Yes
Operations Building	1	Fan	100.0	No
Operations Building	1	Paper Shredder	150.0	No
Operations Building	25	Security Cameras	125.0	No
Operations Building	2	Diesel Trucks Plug-In	2,000.0	No
Operation Building	1	Pump Controls System	#######	No

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]

Eastside Plant

Primary Property Type: Wastewater Treatment Plant
Gross Floor Area (ft²): 27,200
Built: 1956

For Year Ending: November 30, 2016
Date Generated: April 10, 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
Eastside Plant 7 Communipaw Ave. Jersey City, New Jersey 07304	Jersey City Municipal Utilities Authority 555 Route 440 Jersey City, NJ 07305 2014321150	Kristen Auciello 555 Route 440 Jersey City, NJ 07305 2014321150 k.auciello@jcmua.com

Property ID: 6696841

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
469.9 kBtu/ft²

Source EUI
1,148.9 kBtu/ft²

Annual Energy by Fuel		National Median Comparison	
Natural Gas (kBtu)	2,592,835 (20%)	National Median Site EUI ()	N/A
Electric - Grid (kBtu)	10,188,523 (80%)	National Median Source EUI ()	N/A
		% Diff from National Median Source EUI	N/A%
		Annual Emissions	
		Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,170

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

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

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