Local Government Energy Audit:
Energy Audit Report

Sewage Treatment Plant

1502 Lamberton Rd

Trenton City, New Jersey 08611

City of Trenton

December 31, 2018

Final Report by:

TRC Energy Services

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain 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. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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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 the Sewage Treatment Plant.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey local governments in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

The Sewage Treatment Plant is approximately a 44,362 square foot facility. There are many buildings throughout the facility that house industrial process equipment. The Plant is in operation 24 hours a day, seven days a week, year round with the exception of the Administration Building. This office building is occupied Monday through Friday between 8:00 AM and 4:00 PM. The remainder of the facility is comprised of the Main Sewage Pump Station, Screen + Gate House, garage and shops, Service Water and Efficient Pump Station, Intermediate Pumping Station, Digester and Operating Building, Maintenance Building, Dechlorinating Building as well as a Primary and Secondary Sludge Pump Stations. The majority of the facility is mechanical space and industrial process areas.

The facility was originally constructed in the 1940's. The sewage treatment plant operates to collect, treat and dispose of waste-water throughout the City of Trenton. The capacity of the plant was said to range between 16 and 27 million gallons per day (MGD), and typically operates at 19 MGD. However, based on the municipal chapter of the Mercer County Wastewater Management Plan, the flow rate is about 13 MGD and permitted up to 20 MGD. Motors and lighting at the Sewage Treatment Plant consists of aging and inefficient equipment in need of replacement. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC recommends six measures which together represent an opportunity for Trenton to reduce annual energy costs by roughly $32,834 and annual greenhouse gas emissions by 351,677 lbs CO_2e at the Sewage Treatment Plant. We estimate that if all measures were implemented as recommended, the project would pay for itself in 9.5 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2a, respectively. Together these six measures represent an opportunity to reduce Sewage Treatment Plant's annual energy costs by 10%.

Including all seven evaluated measures, there is an opportunity to reduce annual energy costs by roughly $39,416 and annual greenhouse gas emissions by 422,166 lbs CO_2e.with a simple payback of 12.5 years. In this case, the breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2b, respectively. Together these measures represent an opportunity to reduce Sewage Treatment Plant's annual energy use by 12%.

Figure 1 – Previous 12 Month Utility Costs

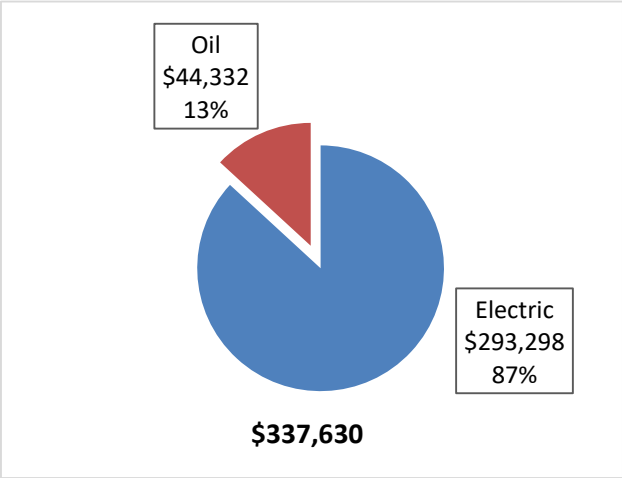


Figure 2a – Potential Post-Implementation Costs (High Priority Measures)

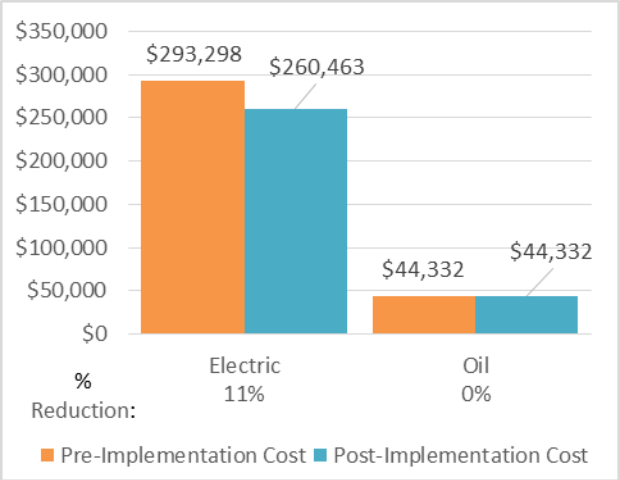
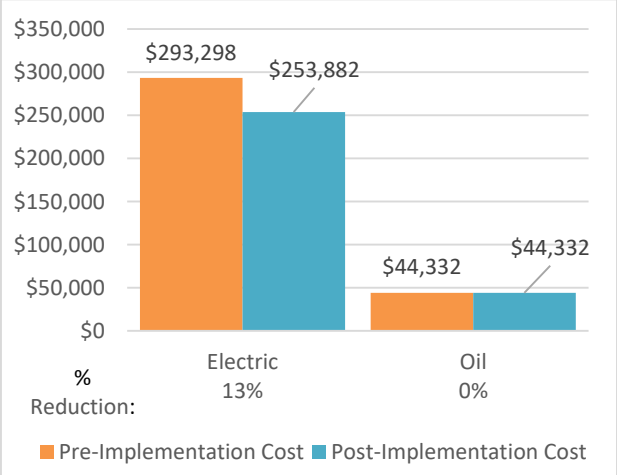


Figure 2b– Potential Post-Implementation Costs (All Evaluated Measures)



A detailed description of the Sewage Treatment Plant's existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	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			**323,810**	**50.6**	**0.0**	**$30,443.93**	**$314,752.42**	**$26,110.00**	**$288,642.42**	**9.5**	**326,074**
ECM 1	Install LED Fixtures	Yes	203,539	29.6	0.0	$19,136.29	$287,317.43	$22,900.00	$264,417.43	13.8	204,962
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	16,268	2.6	0.0	$1,529.48	$8,541.00	$610.00	$7,931.00	5.2	16,382
ECM 3	Retrofit Fixtures with LED Lamps	Yes	104,003	18.4	0.0	$9,778.16	$18,893.99	$2,600.00	$16,293.99	1.7	104,730
Lighting Control Measures			**2,879**	**0.8**	**0.0**	**$270.72**	**$3,688.00**	**$440.00**	**$3,248.00**	**12.0**	**2,900**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	2,278	0.7	0.0	$214.14	$3,088.00	$440.00	$2,648.00	12.4	2,294
ECM 5	Install High/Low Lighitng Controls	Yes	602	0.1	0.0	$56.59	$600.00	$0.00	$600.00	10.6	606
Motor Upgrades			**70,000**	**16.3**	**0.0**	**$6,581.27**	**$179,769.93**	**$0.00**	**$179,769.93**	**27.3**	**70,490**
	Premium Efficiency Motors	No	70,000	16.3	0.0	$6,581.27	$179,769.93	$0.00	$179,769.93	27.3	70,490
Variable Frequency Drive (VFD) Measures			**22,545**	**3.4**	**0.0**	**$2,119.66**	**$19,780.60**	**$0.00**	**$19,780.60**	**9.3**	**22,703**
ECM 6	Install VFDs on Hot Water Pumps	Yes	22,545	3.4	0.0	$2,119.66	$19,780.60	$0.00	$19,780.60	9.3	22,703
TOTALS			**419,235**	**71.1**	**0.0**	**$39,415.59**	**$517,990.95**	**$26,550.00**	**$491,440.95**	**12.5**	**422,166**
TOTALS (High Priority)			**349,235**	**54.8**	**0.0**	**$32,834.32**	**$338,221.02**	**$26,550.00**	**$311,671.02**	**9.5**	**351,677**

Lighting Upgrades generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measures save energy by reducing the power used by the lighting components due to improved electrical efficiency.

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when not needed. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Motor Upgrades generally involve replacing older standard efficiency motors with high efficiency standard (NEMA Premium®). Motor replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

Domestic Hot Water upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlet when not in use.

Energy Efficient Practices

TRC also identified 12 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Sewage Treatment Plant include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Clean Evaporator/Condenser Coils on AC Systems
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

For details on these energy efficient practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for the Sewage Treatment Plant. Based on the configuration of the site and its loads there is a moderate potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	457	kW DC STC
Electric Generation	343,867	kWh/yr
Displaced Cost	$29,920	/yr
Installed Cost	$1,307,000	

For details on our evaluation and on-site generation potential, please refer to Section 6.

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Pay for Performance - Existing Building (P4P EB)
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy Aggregator

For facilities wanting 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 in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

Larger facilities with an interest in a more comprehensive whole building approach to energy conservation should consider participating in the Pay for Performance (P4P) program. Projects eligible for this project program must meet minimum savings requirements. Final incentives are calculated based on actual measured performance achieved at the end of the project. The application process is more involved, and it requires working with a qualified P4P contractor, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

There is a High Energy Intensity Buildings category in the P4P program that your facility may qualify for. An alternative savings threshold of 4% source energy savings is offered to customers whose annual energy consumption is heavily weighted to process loads. In order to be considered for this alternative savings threshold, the project must be valuated further.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (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. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce 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. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage 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 DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located in Section 8. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Hoggarth Stephen	Principal Engineer	hstephen@trentonnj.org	609-989-3615
Joe McIntyre	General Superintendent, Sewer Utility	jmcintyre@trentonnj.org	609-989-3094
Leigh A. Jones	Sewage Plant Superintendent	ljones@trentonnj.org	608-989-3171
TRC Energy Services			
Tom Page	Auditor		
Aimee Lalonde	Project Engineer	ALalonde@trcsolutions.com	732-855-0033

2.2 General Site Information

On August 03, 2017, TRC performed an energy audit at the Sewage Treatment Plant located in Trenton City, New Jersey. TRC's team met with Leigh Jones to review the facility operations and help focus our investigation on specific energy-using systems.

Sewage Treatment Plant is a 44,362 square foot facility. There are many buildings throughout the facility that house industrial process equipment. The Plant is in operation 24 hour a day, seven days a week, year round with the exception of the Administration Building. This office building is occupied Monday through Friday between 8:00 AM and 4:00 PM. The remainder of the facility is comprised of the Main Sewage Pump Station, Screen + Gate House, garage and shops, Service Water and Efficient Pump Station, Intermediate Pumping Station, Digester and Operating Building, Maintenance Building, Dechlorinating Building as well as a Primary and Secondary Sludge Pump Stations. The majority of the facility is mechanical space and industrial process areas.

The facility was originally constructed in the 1940's. The Sewage Treatment Plant operates to collect, treat and dispose of waste-water throughout the City of Trenton. The capacity of the plant ranges between 16 to 27 MGD and typically operates at 19 MGD. However, based on the municipal chapter of the Mercer County Wastewater Management Plan, the flow rate is about 13 MGD and permitted up to 20 MGD.

2.3 Building Occupancy

The Sewage Treatment Plant is in operation 24 hours a day, seven days a week, year-round with the exception of the Administration Building. This office building is occupied Monday through Friday between 8:00 AM and 4:00 PM. The typical schedule is presented in the table below:

Figure 6 – Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Administration Building	Weekday	8:00 AM - 4:00 PM
Administration Building	Weekend	No Use
Remainder of Facility	Weekday	24/7/365
Remainder of Facility	Weekend	24/7/365

2.4 Building Envelope

The Administration Building has concrete masonry unit exterior walls with a brick finish. The windows are double pane and operable with metal frames. The flat roof appears to be in fair condition. The main pump house has concrete masonry unit exterior walls with a brick finish. The windows are single pane with metal frames. The sloped metal roof appears to be in fair condition.

Image 1: Building Envelope (Administration Building and Main Pump House)

The grit screening station and vehicle garage buildings have concrete masonry unit exterior walls with part metal cladding and part brick finish. This is a garage type equipment building with sectional steel overhead doors. There is minimal to no existing insulation for the walls and roof.

Image 2: Building Envelope (Screening Grit Station)

The effluent station, chlorination buildings and various pumping stations have concrete masonry unit exterior walls with a brick finish. Each have flat roof sections that appear in fair condition. The digester and operating building are built with poured concrete walls and a brick finish. The windows are single pane with metal frames. There is minimal to no existing insulation for the walls and roof.

The maintenance building has concrete masonry unit exterior walls with a brick finish. The windows are double pane with metal frames. The roof is flat and appears in fair condition. There is minimal to no existing insulation for the walls and roof.

2.5 On-Site Generation

Sewage Treatment Plant does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

Lighting System

Lighting is provided mostly by linear fluorescent fixtures with T8 lamps with electronic ballasts. There are a few fixtures that use the old fluorescent technology with T12 lamps and magnetic ballasts. There are general purpose fixtures throughout the facility with old incandescent screw in lamps. There are also surface or wall mounted fixtures with metal halide or high-pressure sodium lamps and ballasts. The majority of the light fixtures are in fair condition. Most lighting fixtures throughout the facility are manually controlled by wall switches. The exit signs throughout the building are LED.

Image 3: Interior Lighting Systems

The exterior lighting includes building mounted wall pack, flood fixtures and pole mounted area lights. These contain HID technologies which use metal halide or high-pressure sodium lamps and ballasts. These range in wattage and condition. Exterior light fixtures are presumed to be controlled by a time clock or photocell controls.

Image 4: Exterior Lighting Systems

Process Systems

The process systems throughout the Sewage Treatment Plant are mainly driven by motors. Motor electrical consumption is by far the largest end use at the facility. The plant utilizes motorized systems and equipment to collect, treat and dispose of waste-water.

The plant operates main and intermediate sewage pumps that are 50 HP and 75 HP. Most pumps are over 35 years old. They are rotated in operation and the majority are constant speed, however, two of the intermediate pump motors are driven by variable frequency drives. The plant also operates service water station process pumps between 30 HP and 60 HP which are also generally driven by older motors. Their efficiencies are assumed to be between 90% and 92% for the purposes of this report, as this was not confirmed by nameplate data and they were said to have been rebuilt in the 1980s. There are also 15 HP process pumps at the secondary pump station which are standard efficiency and operated by variable frequency drives.

There are a number of smaller process pumps, including for the clarifying tank mixers and the primary settling tank. These range from fractional horsepower up through 5 HP and operate at constant speed. For those that were accessible, they appear to be in fair condition.

Image 5: Various Process System Motors

HVAC Systems & Equipment

There are two hydronic hot water systems at the plant. The largest of the two is in the Digester Building which heats the sludge process space, half of the Sewer Group Maintenance Building and the Sewage Plant Maintenance Building. The smaller system supplies hot water heat to the Main Pump Station and the Administration Building. There are 5 HP and 7.5 HP constant speed motors utilized for supply fans and hot water heating pumps. These are standard to low efficiency and constant speed. The remainder of motors for HVAC systems are fractional horsepower. Fuel oil is provided to the facility to fill four of the plants stationary diesel engines. Deliveries are made to top off these four different tanks and there is no known tracking of how much oil goes into each. Two of those tanks are not used for heating. The fuel oil usage was disaggregated in order to estimate the amount of oil used for heating purposes.

Image 6: Hot Water Heating System in Main Sewage Pumping Station

Image 7: Hot Water Unit Heater

The remainder of the facility and plant areas are heated by electric resistance heat and electric unit heaters. There is an air handling unit that serves the Administration Building. This unit has a 5 HP constant speed supply fan, and is equipped with a hot water coil. The unit is controlled manually by a thermostat.

Image 8: Air Handling Unit with Manual Thermostat Control

Image 9: Split-System-Air-Source Heat Pump

A high efficiency split-system-air-source heat pump that is in good condition also serves part of the Administration Building, along with two other high efficiency split-system air-conditioning systems. The remote condensing units for these split systems are located outside. The largest is about 10 tons and is about 16 years old, nearing the end of its useful life. The smaller units are in good condition.

Image 10: Remote Condensing Units at Administration Building

Mechanical space throughout the facility is heated by electric unit heaters with local manual dial thermostats. They vary in condition and are of standard efficiency. Space temperature set points varied.

Image 11: Electric Unit Heaters and Local Manual Controls

Offices in some areas are cooled by window AC units which are of standard efficiency and vary in condition. They are manually turned on and off as needed in the summer months.

Image 12: Electric through Wall AC Units

Domestic Hot Water Heating System

The domestic hot water heating systems include electric storage tank water heaters throughout the facility. These range in age and condition. They serve restrooms and locker rooms, providing heated water for hand washing sinks throughout the facility. The Administration Building has an 80-gallon capacity water heater with a 36 kW heating element. Power requirements for other domestic water heating systems range from 1.0 to 5.0 kW.

Image 13: Domestic Hot Water Systems

Building Plug Load

The facility plug loads include general office and café equipment. These include refrigerators, fans and computers. Plug loads are the smallest energy consuming end-use systems at this facility.

Image 14: Plug Load Equipment

2.7 Water-Using Systems

There are restrooms at this facility. These are likely equipped with faucets that are rated for 2.2 gallons per minute (gpm) or higher, toilets that are rated at 2.5 gallons per flush (gpf) and urinals that are rated at 2 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and no. 2 fuel oil was analyzed to identify opportunities for savings. In addition, data for electricity and no. 2 fuel oil was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

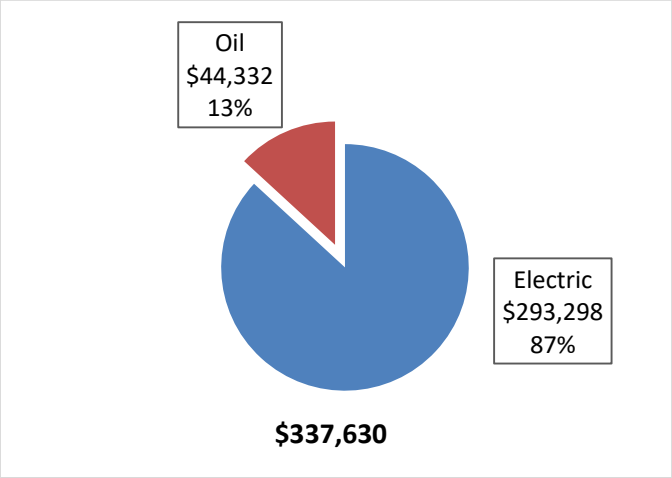
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Sewage Treatment Plant		
Fuel	**Usage**	**Cost**
Electricity	3,119,595 kWh	$293,298
No. 2 Fuel Oil	22,174 Gallons	$44,332
Total		**$337,630**

The current annual energy cost for this facility is $337,630 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.094/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The facility pays electric demand charges. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

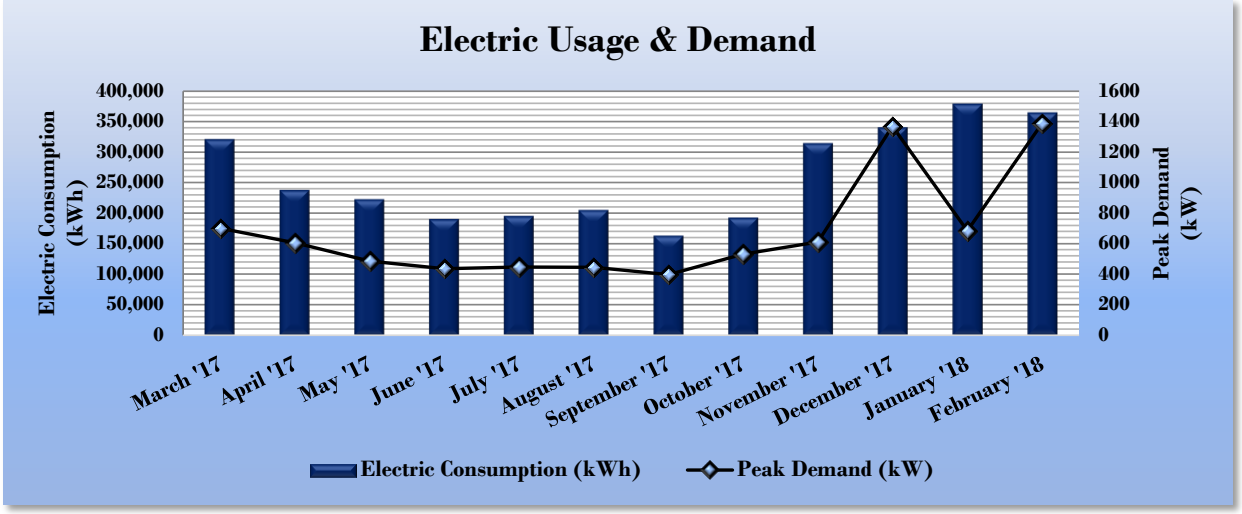


Figure 10 - Electric Usage & Demand

Electric Billing Data for Sewage Treatment Plant						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
4/5/17	29	319,950	700	$8,230	$28,446	Yes
5/5/17	30	237,481	605	$7,113	$21,614	Yes
6/6/17	32	222,229	486	$10,511	$24,871	Yes
7/7/17	31	189,671	436	$9,436	$21,532	No
8/5/17	29	195,036	447	$5,258	$22,090	No
9/6/17	32	204,596	445	$5,676	$22,911	No
10/5/17	29	162,971	397	$4,684	$14,907	No
11/3/17	29	192,263	531	$6,231	$17,536	No
12/6/17	33	313,816	611	$7,315	$23,298	No
1/6/18	31	339,464	1,369	$14,905	$30,253	No
2/6/18	31	378,273	685	$8,067	$33,519	No
3/7/18	29	363,845	1,387	$15,094	$32,320	No
Totals	**365**	**3,119,595**	**675**	**$102,520**	**$293,298**	3
Annual	**365**	**3,119,595**	**675**	**$102,520**	**$293,298**	

3.3 No. 2 Fuel Oil Usage

No. 2 fuel oil is provided by Riggins Oil. The average oil cost for the past 12 months is $1.999/gallon, which is the blended rate used throughout the analyses in this report. TRC disaggregated the fuel use based on the information provided. All of the summer deliveries were assumed to be for process only. The remainder of the deliveries were assumed to be for both process and space heating, where the process portion was the same as seen during the summer months. The portion of the oil deliveries assumed to be associated with HVAC use are presented in the table below. Actual usage is not tracked.

Figure 11 – No. 2 Fuel Oil Usage

No. 2 Fuel Oil Billing Data for Sewage Treatment Plant				
Period Ending	Days in Period	Oil Usage (Gallons)	Fuel Cost	TRC Estimated Usage?
4/17/17	30	6,743	$13,482	Yes
5/17/17	30	0	$0	Yes
6/17/17	31	0	$0	Yes
7/17/17	30	0	$0	Yes
8/17/17	31	0	$0	Yes
9/17/17	31	0	$0	Yes
10/17/17	30	0	$0	Yes
11/21/17	35	1,269	$2,537	Yes
12/21/17	30	5,099	$10,194	Yes
1/17/18	27	2,968	$5,934	Yes
2/17/18	31	1,210	$2,419	Yes
3/17/18	28	4,824	$9,644	Yes
Totals	**364**	**22,113**	**$44,211**	12
Annual	**365**	**22,174**	**$44,332**	

3.4 Benchmarking

The Energy Use Intensity (EUI) is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI for commercial buildings is typically 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.

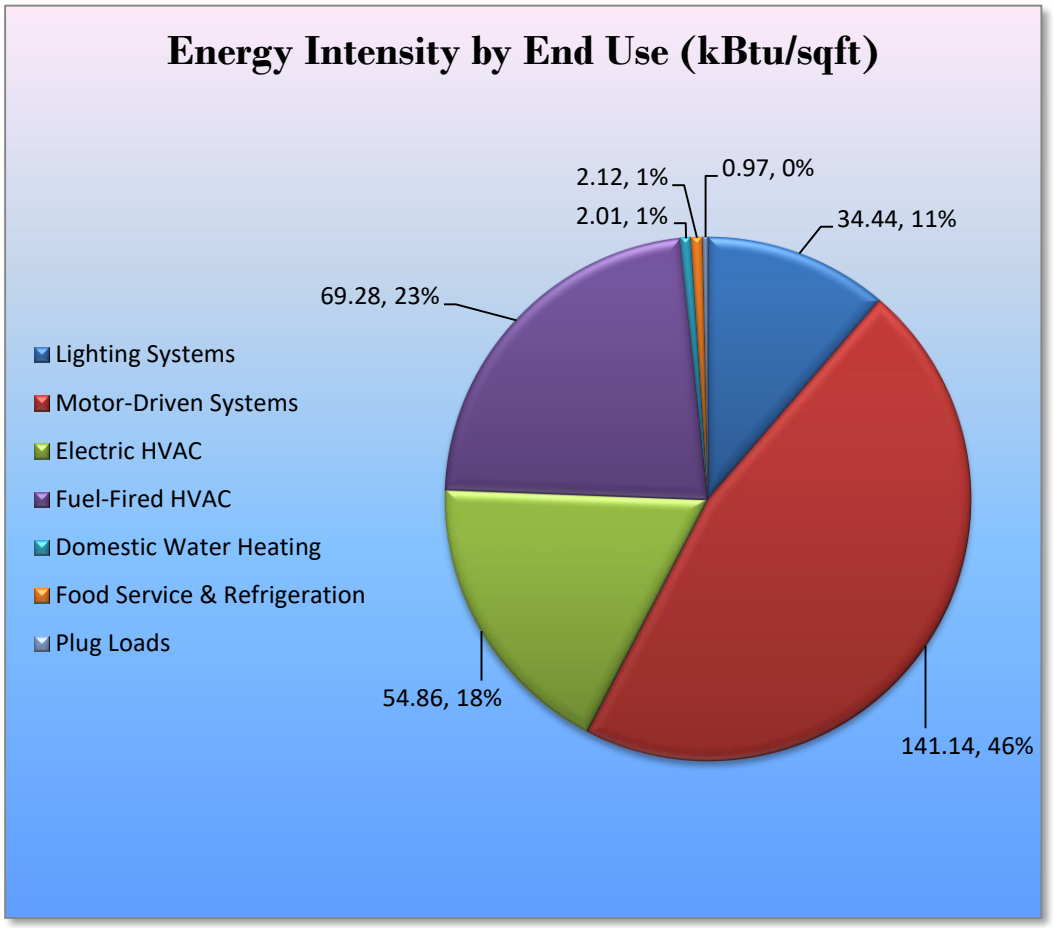
Water/Wastewater treatment plants are benchmarked differently because energy use is related to the process and not the building area. The ENERGY STAR® score for wastewater treatment plants applies to primary, secondary, and advanced treatment facilities, but does not apply to drinking water treatment or distribution utilities. ENERGY STAR® benchmarking for water treatment facilities generally requires input information related to Average Influent Flow (MGD), Average Influent BOD (mg/l), Average Effluent BOD (mg/l), Plant Design Flow Rate (MGD), and whether there is a fixed film trickle filtration process or nutrient removal. Some of this information was not readily available to TRC at the time of the audit.

Therefore, the facility was not benchmarked. For more information see:
https://www.energystar.gov/sites/default/files/tools/Wastewater.pdf.

3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 12 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Sewage Treatment Plant regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, 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. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 13 – Summary of Recommended 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		**323,810**	**50.6**	**0.0**	**$30,443.93**	**$314,752.42**	**$26,110.00**	**$288,642.42**	**9.5**	**326,074**
ECM 1	Install LED Fixtures	203,539	29.6	0.0	$19,136.29	$287,317.43	$22,900.00	$264,417.43	13.8	204,962
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	16,268	2.6	0.0	$1,529.48	$8,541.00	$610.00	$7,931.00	5.2	16,382
ECM 3	Retrofit Fixtures with LED Lamps	104,003	18.4	0.0	$9,778.16	$18,893.99	$2,600.00	$16,293.99	1.7	104,730
Lighting Control Measures		**2,879**	**0.8**	**0.0**	**$270.72**	**$3,688.00**	**$440.00**	**$3,248.00**	**12.0**	**2,900**
ECM 4	Install Occupancy Sensor Lighting Controls	2,278	0.7	0.0	$214.14	$3,088.00	$440.00	$2,648.00	12.4	2,294
ECM 5	Install High/Low Lighitng Controls	602	0.1	0.0	$56.59	$600.00	$0.00	$600.00	10.6	606
Variable Frequency Drive (VFD) Measures		**22,545**	**3.4**	**0.0**	**$2,119.66**	**$19,780.60**	**$0.00**	**$19,780.60**	**9.3**	**22,703**
ECM 6	Install VFDs on Hot Water Pumps	22,545	3.4	0.0	$2,119.66	$19,780.60	$0.00	$19,780.60	9.3	22,703
TOTALS		**349,235**	**54.8**	**0.0**	**$32,834.32**	**$338,221.02**	**$26,550.00**	**$311,671.02**	**9.5**	**351,677**

* - All incentives presented in this table are based on NJ Smart Start Building 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).

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 14 below.

Figure 14 – Summary of Lighting Upgrade 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		**323,810**	**50.6**	**0.0**	**$30,443.93**	**$314,752.42**	**$26,110.00**	**$288,642.42**	**9.5**	**326,074**
ECM 1	Install LED Fixtures	203,539	29.6	0.0	$19,136.29	$287,317.43	$22,900.00	$264,417.43	13.8	204,962
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	16,268	2.6	0.0	$1,529.48	$8,541.00	$610.00	$7,931.00	5.2	16,382
ECM 3	Retrofit Fixtures with LED Lamps	104,003	18.4	0.0	$9,778.16	$18,893.99	$2,600.00	$16,293.99	1.7	104,730

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	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)
Interior	27,016	4.3	0.0	$2,539.99	$38,891.55	$4,900.00	$33,991.55	13.4	27,205
Exterior	176,523	25.4	0.0	$16,596.30	$248,425.88	$18,000.00	$230,425.88	13.9	177,757

Measure Description

We recommend replacing exterior pole mounted and wall pack lighting fixtures containing HID lamps with new high-performance LED light fixtures. We also recommend replacing interior high bay, low bay and wall mounted fixtures containing HID lamps with new high-performance LED fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a traditional HID technologies.

Per discussions with facility personnel, some LED upgrades have been done or in the process of implementation planning since the field work was completed. If this work has been done, it should be noted that the LED savings analysis provided for this measure are an indication of what the facility is already savings, not future savings potential.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	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)
Interior	16,268	2.6	0.0	$1,529.48	$8,541.00	$610.00	$7,931.00	5.2	16,382
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing fluorescent T12 fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	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)
Interior	95,068	17.1	0.0	$8,938.09	$18,248.95	$2,540.00	$15,708.95	1.8	95,733
Exterior	8,935	1.3	0.0	$840.07	$645.04	$60.00	$585.04	0.7	8,998

Measure Description

We recommend retrofitting existing incandescent and fluorescent T8 fixtures with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes and more than ten times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 15 below.

Figure 15 – Summary of Lighting Control 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 Control Measures		**2,879**	**0.8**	**0.0**	**$270.72**	**$3,688.00**	**$440.00**	**$3,248.00**	**12.0**	**2,900**
ECM 4	Install Occupancy Sensor Lighting Controls	2,278	0.7	0.0	$214.14	$3,088.00	$440.00	$2,648.00	12.4	2,294
ECM 5	Install High/Low Lighitng Controls	602	0.1	0.0	$56.59	$600.00	$0.00	$600.00	10.6	606

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

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)
2,278	0.7	0.0	$214.14	$3,088.00	$440.00	$2,648.00	12.4	2,294

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in conference rooms, offices, laboratories and restrooms. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are recommended for single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in locations without local switching or where wall switches are not in the line-of-sight of the main work area and in large spaces. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 5: Install High/Low Lighting Controls

Summary of Measure Economics

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)
602	0.1	0.0	$56.59	$600.00	$0.00	$600.00	10.6	606

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in hallways that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages. Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required. For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches. Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 16 below.

Figure 16 – Summary of Variable Frequency Drive 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)
Variable Frequency Drive (VFD) Measures		**22,545**	**3.4**	**0.0**	**$2,119.66**	**$19,780.60**	**$0.00**	**$19,780.60**	**9.3**	**22,703**
ECM 6	Install VFDs on Hot Water Pumps	22,545	3.4	0.0	$2,119.66	$19,780.60	$0.00	$19,780.60	9.3	22,703

ECM 6: Install VFDs on Hot Water Pumps

Summary of Measure Economics

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)
22,545	3.4	0.0	$2,119.66	$19,780.60	$0.00	$19,780.60	9.3	22,703

Measure Description

We recommend installing variable frequency drives (VFD) to control hot water heating pumps. This applies to the hot water heating system in the Digester Building that heats industrial process space and the maintenance building as well as the system at the Main Pump Station and Administration Building. This measure requires that a majority of the hot water coils be served by 2-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.2 ECM Evaluated But Not Recommended as High Priority

The measure below has been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in the measure description section.

Figure 17 – Summary of Measure Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades	**70,000**	**16.3**	**0.0**	**$6,581.27**	**$179,769.93**	**$0.00**	**$179,769.93**	**27.3**	**70,490**
Premium Efficiency Motors	70,000	16.3	0.0	$6,581.27	$179,769.93	$0.00	$179,769.93	27.3	70,490
TOTALS	**70,000**	**16.3**	**0.0**	**$6,581.27**	**$179,769.93**	**$0.00**	**$179,769.93**	**27.3**	**70,490**

* - All incentives presented in this table are based on NJ Smart Start Building 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).

Premium Efficiency Motors

Summary of Measure Economics

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)
70,000	16.3	0.0	$6,581.27	$179,769.93	$0.00	$179,769.93	27.3	70,490

Measure Description

We evaluated replacing standard efficiency motors with *NEMA Premium®* efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

It should be noted that there are several very old motors, many of which appear to be specialty low RPM motors (motor rpm was covered on most nameplates during the data collection). We did an initial estimate of savings for replacing the motors with new high efficiency motors. However, we recommend consulting an electrical contractor or ESCO (energy savings company) to determine the actual motor load, required replacement motor size and efficiency, motor speed and determine if VFDs should be used to set (or vary) the desired operating speed.

Reasons for not Recommending as High Priority

For inefficient equipment and very old equipment that is reaching the end of its useful life, replacement cannot be justified solely on energy savings. Our protocol is to only recommend installation of high efficiency motors when the simple payback is under 13 years. This measure evaluation is therefore provided for demonstration purposes. This measure may be implemented as more of a capital improvement project that may be rolled into a large comprehensive project under an Energy Savings Improvement Project (ESIP). The payback threshold for a comprehensive project under an ESIP is 15 years.

4.3 ECMs Recommended for Further Investigation

Installation of Variable Frequency Drives

Description

We did an initial screening of installing variable frequency drives on the large horsepower process pump motors that are currently operated at constant speed with no VFD installed. This high-level analysis includes the main sewage process pump motors, intermediate pump motors and service water station process pumps. The basis of the screening evaluation was that there is potential to reduce the motor speeds to 90% speed on average throughout the year. This provided a potential savings of 210,000 kWh/year which equates to about $20,000 in annual electric savings. Under those conditions, this measure is anticipated to have a simple payback period of 12 to 15 years. We recommend that if and when the facility consults an electrical contractor or ESCO (energy savings company) to investigate motor upgrades further, they also investigate the potential and feasibility of installation of variable frequency drives for these process pump motors.

Reasons for not Evaluating

This measure requires a higher level of investigation which is beyond the scope of an LGEA analysis. Design level details should be evaluated in order to determine the feasibility, including measure energy and economic results, of implementation. At a high-level screening, this measure cannot be justified solely based on energy savings. Our protocol is to only recommend installation of VFDs when the simple payback is under ten years. This measure screening is therefore provided for demonstration purposes only. This measure may be implemented as more of a capital improvement project that may be rolled into a large comprehensive project under an Energy Savings Improvement Project (ESIP). The payback threshold for a comprehensive project under an ESIP is 15 years.

Boiler Upgrades

Description

We recommend that the facility consults an HVAC contractor or ESCO (energy savings company) to investigate the replacement of the boiler in the Digester Plant with two boilers, one of which is fired by the digester gas as the lead and using the fuel oil fired boiler as back up. A feasibility study would uncover the energy and cost savings potential. Without information regarding how much fuel oil the boilers currently use, we could not provide a preliminary assessment for this measure.

Install Infrared Heaters

Description

We recommend evaluating the replacement of general space unit heaters with low-intensity infrared heating units (the flame is enclosed rather than an open flame on a ceramic or metal surface). Forced air furnaces heat all of the air in the space served, which is inefficient for large volume spaces with relatively few occupants, areas with high ceilings, or areas with high outside air infiltration. Infrared heaters heat object surfaces directly, including the occupants of the space, rather than heating large volumes of air. So, occupants feel comfortable, but energy costs are significantly reduced. Infrared heaters also heat the floor which then re-radiates the heat. As a result, infrared heaters are more effective and efficient at maintaining occupant comfort for certain space types.

Install Occupancy-Controlled Thermostats

Description

We recommend evaluating the replacement of manual thermostats with occupancy-controlled thermostats. Many types of facilities use manually controlled thermostats set by occupants to regulate temperature within the facility, or in certain areas. An occupancy controlled-thermostat is a thermostat paired with a sensor and/or door detector to identify movement and determine if a room is occupied or unoccupied. If occupancy is sensed by the sensor, the thermostat goes into an occupied mode and enables programmed temperature setpoint. If no occupancy is sensed, the thermostat switches to unoccupied mode after a set period of time. By reducing heating temperature setpoint when the space is occupied, the operation of the electric unit heaters may be reduced while still maintaining reasonable space temperatures for building usage at all times. Occupancy controlled thermostats provide energy savings by reducing heating energy usage when rooms are unoccupied. Minimum temperatures for an unoccupied building could be set back to 45°F -55°F until the space is occupied and only then should the temperature setpoint be increased to 70°F.

5 ENERGY EFFICIENT PRACTICES

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

Reduce Air Leakage

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

Close Doors and Windows

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Use Window Treatments/Coverings

A substantial amount of heat gain can occur through uncovered or untreated windows, especially older single pane windows and east or west-facing windows. Treatments such as high-reflectivity films or covering windows with shades or shutters can reduce solar heat gain and, consequently, cooling load and can reduce internal heat loss and the associated heating load.

Perform Proper Lighting Maintenance

In order to sustain optimal lighting levels, lighting fixtures should undergo routine maintenance. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust on lamps, fixtures and reflective surfaces. Together, these factors can reduce total illumination by 20% - 60% or more, while operating fixtures continue drawing full power. To limit this reduction, lamps, reflectors and diffusers should be thoroughly cleaned of dirt, dust, oil, and smoke film buildup approximately every 6 – 12 months.

Develop a Lighting Maintenance Schedule

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

Clean Evaporator/Condenser Coils on AC Systems

Dirty evaporators and condensers coils cause a restriction to air flow and restrict heat transfer. This results in increased evaporator and condenser fan load and a decrease in cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

Perform Proper Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up in order to sustain efficiency and equipment life.

Perform Proper Water Heater Maintenance

At least once a year, 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. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any 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 any 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 over three to four years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "Plug Load Best Practice Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. 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. The EPA WaterSense™ ratings for urinals is 0.5 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

6 On-Site Generation Measures

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey's Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State's electrical needs to be met by renewable sources by 2050.

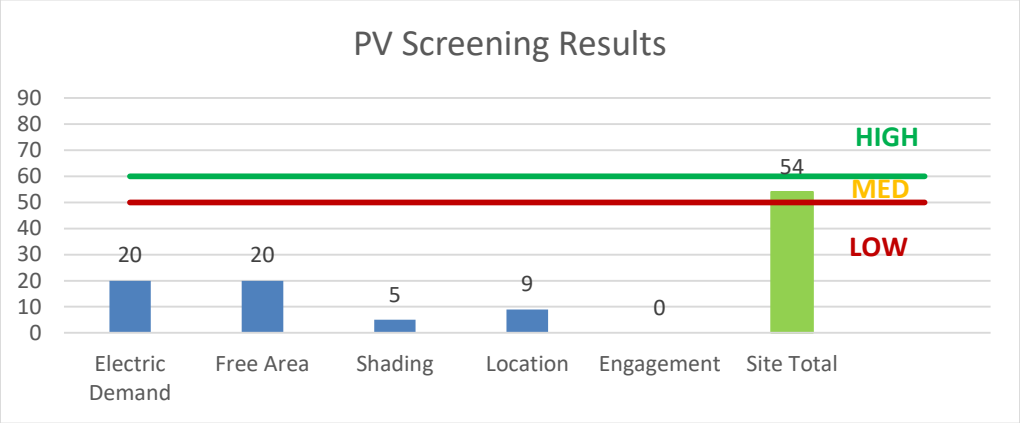
Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a Medium potential for installing a PV array. The amount of free area in the lawn area, ease of installation for a ground mounted system and the lack of shading elements contribute to the mid-level potential for PV at the site. A PV array located on the open lawn area of the site may be feasible. If the Sewage Treatment Plant is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 18 - Photovoltaic Screening



Potential	Medium	
System Potential	457	kW DC STC
Electric Generation	343,867	kWh/yr
Displaced Cost	$29,920	/yr
Installed Cost	$1,307,000	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order 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 developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

- **Basic Info on Solar PV in NJ**: http://www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: http://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

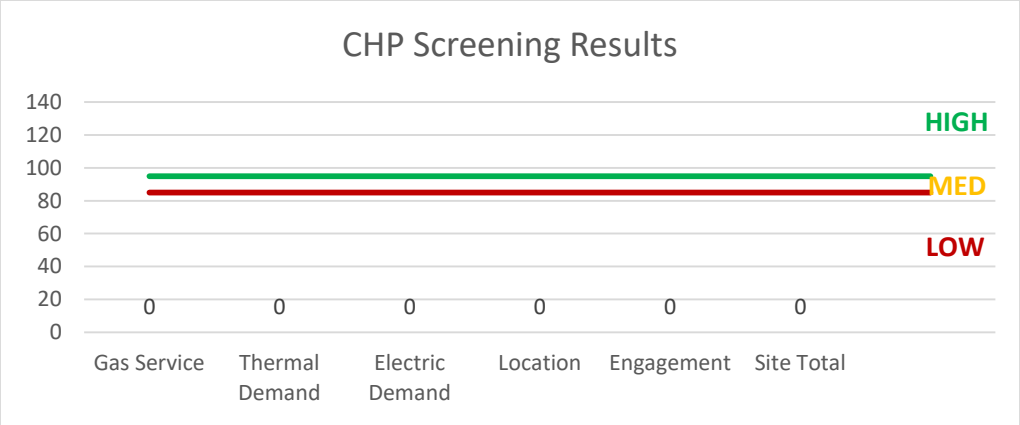
Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric generation from a CHP system is typically interconnected to local power distribution systems. Heat is recovered from exhaust and ancillary cooling systems and interconnected to the existing hot water (or steam) distribution systems.

CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use 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 a low potential for installing a cost-effective CHP system. However, lack of gas service in turn provides a zero potential for CHP at the site. This section is provided for informational purposes only.

For a list of qualified firms in New Jersey specializing in commercial CHP cost assessment and installation, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

Figure 19 - Combined Heat and Power Screening



7 DEMAND RESPONSE

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage 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 DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

Typically an electric customer needs to be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with a greater capability to quickly curtail their demand during peak hours will receive higher payments. Customers with back-up generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature set points on thermostats, so that air conditioning units run less frequently, or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, in order to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a demand response activity in most situations.

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

DR potential should be further investigated if it is found cost effective for process pumps to be controlled by VFD and if some variability in operations in consistent with process requirements.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 20 for a list of the eligible programs identified for each recommended ECM.

Figure 20 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x			x		
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x			x		
ECM 3	Retrofit Fixtures with LED Lamps	x			x		
ECM 4	Install Occupancy Sensor Lighting Controls	x			x		
ECM 5	Install High/Low Lighitng Controls				x		
ECM 6	Install VFDs on Hot Water Pumps				x		

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a "whole-building" energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey's largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity's annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: www.njcleanenergy.com/ci.

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program 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

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, 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

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

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

8.2 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program 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. P4P is a generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also utilize the P4P program.

Please note that the scope of work presented in this audit report does not quite meet the requirements of the P4P program as outlined above. However, due to the size of the facility and existing conditions, it may be considered a High Energy Intensity Building which requires 4% of source energy savings to qualify with lighting contributing to less than 50% of these claimed savings. Should claimed savings be scaled down to meet those requirements at a later point in time, for example through further evaluation or the modeling process, this facility could potentially meet the requirements necessary to participate in the P4P program.

Incentives

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

How to Participate

To participate in the P4B EB program you will need to contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

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

8.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SRP prior to the start of construction in order 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 RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

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

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. 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. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. 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 can be leveraged to help further reduce the total project cost of eligible measures.

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 utilized 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. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

8.5 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (DR) program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third-party (i.e. non-utility) energy supplier.

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 is purchasing electricity from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: 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	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Ground	65	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	65	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	89	4,380	8.44	58,648	0.0	$5,513.98	$126,944.55	$6,500.00	21.84
Conference Room	17	Halogen Incandescent: Screw in Lamp	Wall Switch	66	2,080	Relamp	Yes	17	LED Screw-In Lamps: Screw in Lamp	Occupancy Sensor	10	1,456	0.66	2,170	0.0	$203.99	$1,183.80	$120.00	5.21
Conference Room	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.58	1,905	0.0	$179.14	$1,411.60	$275.00	6.34
Break Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.19	635	0.0	$59.71	$650.53	$115.00	8.97
Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,456	0.19	631	0.0	$59.37	$609.50	$70.00	9.09
Hallway	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Chief Engineer's Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.19	635	0.0	$59.71	$496.53	$100.00	6.64
Assistant Chief's Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.19	635	0.0	$59.71	$496.53	$100.00	6.64
Superintendent's Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.10	318	0.0	$29.86	$306.27	$60.00	8.25
Admin Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.19	635	0.0	$59.71	$496.53	$100.00	6.64
Men's Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	143	0.0	$13.42	$117.00	$20.00	7.23
Electrical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.06	214	0.0	$20.13	$175.50	$30.00	7.23
HVAC Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	143	0.0	$13.42	$117.00	$20.00	7.23
Small Lab Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.05	180	0.0	$16.96	$233.00	$40.00	11.38
Main Lab	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	361	0.0	$33.92	$350.00	$60.00	8.55
Main Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.58	1,905	0.0	$179.14	$1,411.60	$275.00	6.34
Main Lab	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Lab	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.19	635	0.0	$59.71	$650.53	$115.00	8.97
Back Hall	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Back Hall	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,080	0.02	63	0.0	$5.90	$63.20	$0.00	10.72
Back Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.10	318	0.0	$29.86	$306.27	$60.00	8.25
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.04	121	0.0	$11.39	$95.13	$20.00	6.60
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,080	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,080	0.01	35	0.0	$3.25	$48.20	$10.00	11.74
Storage Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	71	0.0	$6.71	$58.50	$10.00	7.23

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
Storage Closet 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.04	121	0.0	$11.39	$95.13	$20.00	6.60
Double Door Front	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.07	242	0.0	$22.78	$190.27	$40.00	6.60
Side Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.07	242	0.0	$22.78	$190.27	$40.00	6.60
Admin Exterior	4	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.54	3,753	0.0	$352.89	$1,562.71	$400.00	3.29
Admin Exterior (in back)	1	High-Pressure Sodium: (1) 70W Lamp	None	95	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	29	4,380	0.04	301	0.0	$28.27	$390.68	$100.00	10.28
Exterior	2	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.27	1,877	0.0	$176.45	$781.35	$200.00	3.29
Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	71	0.0	$6.71	$58.50	$10.00	7.23
Entrance	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office Left	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.05	180	0.0	$16.96	$233.00	$40.00	11.38
Break Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	71	0.0	$6.71	$58.50	$10.00	7.23
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	71	0.0	$6.71	$58.50	$10.00	7.23
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	2,080	0.03	110	0.0	$10.37	$53.75	$5.00	4.70
Central Control	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,000	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.06	412	0.0	$38.72	$175.50	$30.00	3.76
Central Control	4	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	4	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.13	849	0.0	$79.79	$215.01	$20.00	2.44
Central Control	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Central Control	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	4,000	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	4,000	0.01	56	0.0	$5.28	$31.90	$5.00	5.09
Central Control	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,000	0.01	73	0.0	$6.84	$35.90	$5.00	4.51
Locker Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,000	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.02	137	0.0	$12.91	$58.50	$10.00	3.76
Basement	18	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	18	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.60	3,819	0.0	$359.04	$967.55	$90.00	2.44
Sub Basement	19	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	19	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.63	4,031	0.0	$378.99	$1,021.31	$95.00	2.44
Primary Tanks	3	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	3	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.10	636	0.0	$59.84	$161.26	$15.00	2.44
Primary Tanks	4	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	41	4,380	0.25	1,767	0.0	$166.17	$1,562.71	$400.00	7.00
Exterior	5	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.67	4,692	0.0	$441.12	$1,953.39	$500.00	3.29
Exterior	1	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	41	4,380	0.06	442	0.0	$41.54	$390.68	$100.00	7.00
Main Room Screen	21	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	4,000	Fixture Replacement	No	21	LED - Fixtures: High-Bay	Wall Switch	89	4,000	2.83	17,996	0.0	$1,691.96	$28,194.60	$3,150.00	14.80

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
Main Room Screen	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage 1	4	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,000	Fixture Replacement	No	4	LED - Fixtures: High-Bay	Wall Switch	89	4,000	0.54	3,428	0.0	$322.28	$5,370.40	$600.00	14.80
Garage 2	6	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	6	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.20	1,273	0.0	$119.68	$322.52	$30.00	2.44
Switch Room	2	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.07	424	0.0	$39.89	$107.51	$10.00	2.44
Restroom	2	Incandescent: Screw in Lamp	Wall Switch	60	4,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	4,000	0.07	424	0.0	$39.89	$107.51	$10.00	2.44
Garage 3	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.46	2,945	0.0	$276.91	$1,404.00	$120.00	4.64
End Garage/Shop	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.31	1,964	0.0	$184.61	$936.00	$80.00	4.64
Switchgear	2	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	4,000	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	89	4,000	0.27	1,714	0.0	$161.14	$781.35	$200.00	3.61
Switchgear	2	High-Pressure Sodium: (1) 100W Lamp	Wall Switch	138	4,000	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	41	4,000	0.13	807	0.0	$75.88	$781.35	$200.00	7.66
Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,000	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.02	137	0.0	$12.91	$58.50	$10.00	3.76
Hallway	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway	12	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	4,000	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,800	0.38	2,441	0.0	$229.51	$1,804.00	$0.00	7.86
Office1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	143	0.0	$13.42	$117.00	$20.00	7.23
Office2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	143	0.0	$13.42	$117.00	$20.00	7.23
Men's Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.16	541	0.0	$50.89	$621.00	$95.00	10.34
Men's Room	2	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	2,080	0.07	221	0.0	$20.74	$107.51	$10.00	4.70
Women's Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.08	271	0.0	$25.44	$445.50	$65.00	14.96
Break Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.19	631	0.0	$59.37	$679.50	$105.00	9.68
Truck Bay 2	7	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.27	1,718	0.0	$161.53	$819.00	$70.00	4.64
Truck Bay 2	3	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	3	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.33	2,122	0.0	$199.47	$161.26	$15.00	0.73
Parking	20	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	20	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	140	4,380	4.26	29,609	0.0	$2,783.76	$39,059.86	$2,000.00	13.31
Pump Room	6	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	6	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.67	4,243	0.0	$398.94	$322.52	$30.00	0.73
Pump Room	2	Incandescent: Screw in Lamp	Wall Switch	100	4,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	15	4,000	0.11	707	0.0	$66.49	$107.51	$10.00	1.47
Main Room	1	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.11	707	0.0	$66.49	$53.75	$5.00	0.73
Bldg Exterior	2	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.27	1,877	0.0	$176.45	$781.35	$200.00	3.29

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
Bldg Exterior	3	Incandescent: Screw in Lamp	None	200	4,380	Relamp	No	3	LED Screw-In Lamps: Screw in Lamp	None	30	4,380	0.33	2,323	0.0	$218.42	$161.26	$15.00	0.67
Exterior	5	Incandescent: Screw in Lamp	None	200	4,380	Relamp	No	5	LED Screw-In Lamps: Screw in Lamp	None	30	4,380	0.56	3,872	0.0	$364.03	$268.77	$25.00	0.67
Exterior	2	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	41	4,380	0.13	884	0.0	$83.08	$781.35	$200.00	7.00
Main Room	2	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.22	1,414	0.0	$132.98	$107.51	$10.00	0.73
Pump Room	5	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	5	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.56	3,536	0.0	$332.45	$268.77	$25.00	0.73
Chlorination Bldg	2	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.27	1,877	0.0	$176.45	$781.35	$200.00	3.29
Electrical Panel Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,000	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.02	137	0.0	$12.91	$58.50	$10.00	3.76
Exterior	2	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.27	1,877	0.0	$176.45	$781.35	$200.00	3.29
Exterior	3	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	41	4,380	0.19	1,326	0.0	$124.63	$1,172.03	$300.00	7.00
Pump Room	10	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.39	2,454	0.0	$230.76	$1,170.00	$100.00	4.64
Pump 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	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Pump Room 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	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Pump Room 2	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.31	1,964	0.0	$184.61	$936.00	$80.00	4.64
Generator Transfer	1	Incandescent: Screw in Lamp	None	200	4,380	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	None	30	4,380	0.11	774	0.0	$72.81	$53.75	$5.00	0.67
Exterior	4	High-Pressure Sodium: (1) 150W Lamp	None	188	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	56	4,380	0.35	2,405	0.0	$226.13	$1,562.71	$400.00	5.14
Exterior	3	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.40	2,815	0.0	$264.67	$1,172.03	$300.00	3.29
Exterior	3	Incandescent: Screw in Lamp	None	200	4,380	Relamp	No	3	LED Screw-In Lamps: Screw in Lamp	None	30	4,380	0.33	2,323	0.0	$218.42	$161.26	$15.00	0.67
Workshops	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.31	1,964	0.0	$184.61	$936.00	$80.00	4.64
8 bays	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	4,000	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,000	0.31	1,964	0.0	$184.61	$936.00	$80.00	4.64
Exterior	12	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	12	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	1.62	11,260	0.0	$1,058.68	$4,688.12	$1,200.00	3.29
Stairwell	9	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	9	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	1.00	6,365	0.0	$598.41	$483.78	$45.00	0.73
Lower Level Pump Room	11	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	11	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	1.23	7,779	0.0	$731.38	$591.28	$55.00	0.73
Lower Level Pump Room	1	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.11	707	0.0	$66.49	$53.75	$5.00	0.73
2nd Floor	4	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	4	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.45	2,829	0.0	$265.96	$215.01	$20.00	0.73
Walkway to Tanks	6	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	4,000	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	56	4,000	0.52	3,295	0.0	$309.76	$2,344.06	$600.00	5.63

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Exterior	4	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	140	4,380	0.85	5,922	0.0	$556.75	$7,811.97	$400.00	13.31
Road Around Entry	15	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	15	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	140	4,380	3.19	22,207	0.0	$2,087.82	$29,294.90	$1,500.00	13.31
Exterior	4	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	140	4,380	0.85	5,922	0.0	$556.75	$7,811.97	$400.00	13.31
Exterior	4	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.54	3,753	0.0	$352.89	$1,562.71	$400.00	3.29
Boiler Room	6	Incandescent: Screw in Lamp	Wall Switch	200	2,080	Relamp	No	6	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	2,080	0.67	2,206	0.0	$207.45	$322.52	$30.00	1.41
Electrical Room	2	Incandescent: Screw in Lamp	Occupancy Sensor	200	1,456	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Occupancy Sensor	30	1,456	0.22	515	0.0	$48.40	$107.51	$10.00	2.01
Main Room	12	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	12	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	1.34	8,486	0.0	$797.87	$645.04	$60.00	0.73
Main Room	4	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	4	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.45	2,829	0.0	$265.96	$215.01	$20.00	0.73
Back Room	1	Incandescent: Screw in Lamp	Occupancy Sensor	200	4,000	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Occupancy Sensor	30	4,000	0.11	707	0.0	$66.49	$53.75	$5.00	0.73
Back Stairwell	6	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	6	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.67	4,243	0.0	$398.94	$322.52	$30.00	0.73
Lower Level Pump Room	16	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	16	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	1.78	11,315	0.0	$1,063.83	$860.05	$80.00	0.73
Front Stairwell	6	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	6	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.67	4,243	0.0	$398.94	$322.52	$30.00	0.73
Exterior	1	High-Pressure Sodium: (1) 150W Lamp	None	188	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	56	4,380	0.09	601	0.0	$56.53	$390.68	$100.00	5.14
Exterior	3	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	41	4,380	0.19	1,326	0.0	$124.63	$1,172.03	$300.00	7.00
Top of tank	9	High-Pressure Sodium: (1) 150W Lamp	None	188	4,380	Fixture Replacement	No	9	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	56	4,380	0.78	5,412	0.0	$508.79	$3,516.09	$900.00	5.14
Area Light Pole	4	Metal Halide: (1) 400W Lamp	None	458	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	137	4,380	0.84	5,849	0.0	$549.90	$7,811.97	$400.00	13.48
Parking Lot	2	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	140	4,380	0.43	2,961	0.0	$278.38	$3,905.99	$200.00	13.31
Inside	1	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.11	707	0.0	$66.49	$53.75	$5.00	0.73
Exterior	2	High-Pressure Sodium: (1) 250W Lamp	None	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	89	4,380	0.27	1,877	0.0	$176.45	$781.35	$200.00	3.29
Pump Room	6	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	6	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.67	4,243	0.0	$398.94	$322.52	$30.00	0.73
Back Room	2	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.22	1,414	0.0	$132.98	$107.51	$10.00	0.73
Rear	1	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	4,000	Fixture Replacement	No	1	LED - Fixtures: Low-Bay	Wall Switch	89	4,000	0.13	857	0.0	$80.57	$1,419.78	$150.00	15.76
Lower Level	4	Incandescent: Screw in Lamp	Wall Switch	200	4,000	Relamp	No	4	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	4,000	0.45	2,829	0.0	$265.96	$215.01	$20.00	0.73

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?	Annual Operating Hours	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
Sewer Treatment Plant	Main Sewage Pumps	2	Process Pump	75.0	90.0%	No	3,285	Yes	94.5%	No		2.56	12,642	0.0	$1,188.58	$23,567.09	$0.00	19.83
Main Pump Station	Main Sewage Pumps	1	Process Pump	75.0	90.0%	No	2,190	Yes	94.5%	No		1.28	4,214	0.0	$396.19	$11,783.54	$0.00	29.74
Main Pump Station	Main Sewage Pumps	2	Process Pump	50.0	90.0%	No	3,285	Yes	94.1%	No		1.56	7,712	0.0	$725.02	$16,108.57	$0.00	22.22
Main Pump Station	Main Sewage Pumps	1	Process Pump	50.0	90.0%	No	2,190	Yes	94.1%	No		0.78	2,571	0.0	$241.67	$8,054.29	$0.00	33.33
Main Pump Station	Intermediate Pumps	1	Process Pump	75.0	90.0%	Yes	3,285	Yes	94.5%	No		0.89	4,376	0.0	$411.43	$11,783.54	$0.00	28.64
Main Pump Station	Intermediate Pumps	2	Process Pump	50.0	90.0%	Yes	2,190	Yes	94.1%	No		1.08	3,559	0.0	$334.62	$16,108.57	$0.00	48.14
Main Pump Station	Intermediate Pumps	1	Process Pump	75.0	90.0%	No	3,285	Yes	94.5%	No		1.28	6,321	0.0	$594.29	$11,783.54	$0.00	19.83
Main Pump Station	Intermediate Pumps	1	Process Pump	50.0	90.0%	No	2,190	Yes	94.1%	No		0.78	2,571	0.0	$241.67	$8,054.29	$0.00	33.33
Admin Building	Exhaust	5	Exhaust Fan	0.1	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Supply Fan for McQuay AHU	1	Supply Fan	5.0	90.0%	No	2,745	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Secondary Pump Station	Secondary Pump Station	4	Process Pump	15.0	92.4%	Yes	3,391	No	92.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Secondary Pump Station	Exhaust	1	Exhaust Fan	0.5	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Service Water Station	Service Water Station	2	Process Pump	30.0	90.0%	No	2,920	Yes	93.6%	No		0.83	3,631	0.0	$341.34	$10,141.76	$0.00	29.71
Service Water Station	Service Water Station	2	Process Pump	60.0	92.0%	No	2,920	Yes	94.5%	No		1.11	4,886	0.0	$459.35	$19,091.98	$0.00	41.56
Service Water Station	Service Water Station	6	Process Pump	40.0	90.0%	No	2,920	Yes	94.1%	No		3.75	16,451	0.0	$1,546.71	$39,375.50	$0.00	25.46
Service Water Station	Service Water Station	2	Water Supply Pump	0.3	74.0%	No	2,920	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Intermediate Pump Station	Domestic Hot Water	1	Water Supply Pump	1.0	90.0%	No	2,745	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Service Water Station	Exhaust	2	Exhaust Fan	0.3	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Tank Station	Metering Pumps	3	Process Pump	0.3	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Digester Plant	Hot Water Heating	2	Heating Hot Water Pump	7.5	87.5%	No	2,100	Yes	91.7%	Yes	2	1.82	10,381	0.0	$975.96	$9,521.18	$0.00	9.76

		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?	Annual Operating Hours	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
Digester Plant	Hot Water Heating	2	Heating Hot Water Pump	3.0	84.7%	No	2,100	Yes	89.5%	Yes	2	0.76	4,308	0.0	$404.99	$7,624.98	$0.00	18.83
Primary Pump Station	Primary Pump Station	6	Process Pump	3.0	84.7%	No	2,745	No	84.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Primary Pump Station	Primary Pump Station	1	Water Supply Pump	0.3	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maintenance Building	Maintenance Building	2	Heating Hot Water Pump	5.0	86.5%	No	2,745	No	86.5%	Yes	2	1.13	8,925	0.0	$839.11	$6,551.70	$0.00	7.81
Clarifier Tank Mixers	Clarifier Tank Mixers	3	Process Pump	1.0	90.0%	No	2,745	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Primary Settling Tank	Primary Settling Tank	8	Process Pump	5.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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 (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	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
Admin Building	Admin Building	1	Split-System AC	1.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Admin Building	1	Split-System AC	10.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Admin Building	1	Split-System Air-Source HP	2.50	29.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Pumping Station	Main Pumping Station	2	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage & Shops	Garage & Shops	1	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Admin Building	2	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage & Shops	Garage & Shops	7	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maintenance Building	Maintenance Building	2	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maintenance Building	Maintenance Building	3	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Secondary Pump Station	Secondary Pump Station	2	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Secondary Pump Station	Secondary Pump Station	2	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Service Water Station	Service Water Station	1	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Intermediate Pump Station	Intermediate Pump Station	1	Electric Resistance Heat		51.20	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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)	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
Digester Plant	Digester Plant	1	Non-Condensing Hot Water Boiler	6,700.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Pumping Station	Puming Station, Admin Bldg and Other	2	Non-Condensing Hot Water Boiler	1,054.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	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
Admin Building	Admin Building	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Pumping Station	Main Pumping Station	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage & Shops	Garage & Shops	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Tank Station	Tank Station	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Intermediate Pump Station	Intermediate Pump Station	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Digester Plant	Digester Plant	2	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Admin Building	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	2	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maim Pump Station	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maintenance Building	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Admin Building	1	Electric Convection Oven (Half Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Maintenance Building	1	Electric Convection Oven (Full Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Marine Terminal Facility	3	Computer	120.0	
Marine Terminal Facility	2	Printer	250.0	
Marine Terminal Facility	2	Fan	100.0	
Marine Terminal Facility	2	Radio	25.0	
Marine Terminal Facility	1	Coffee Machine	900.0	
Marine Terminal Facility	6	Microwave	1,500.0	
Marine Terminal Facility	2	TV	120.0	
Marine Terminal Facility	2	Mini Fridge	260.0	
Marine Terminal Facility	1	Misc Equipment	4,000.0	

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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N/A

ENERGY STAR® Score[1]

Sewage Treatment Plant

Primary Property Type: Wastewater Treatment Plant
Gross Floor Area (ft²): 44,362
Built: 1927

For Year Ending: February 28, 2018
Date Generated: October 08, 2018

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
Sewage Treatment Plant 1520 Lamberton Street Trenton, New Jersey 08611	City of Trenton 319 East State Street Trenton, NJ 08618 (____)____-_____	Hoggarth Stephen 319 East State Street Trenton, NJ 08618 6099893615 hstephen@trentonnj.org

Property ID: 5992169

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
308.7 kBtu/ft²

Source EUI
741.3 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	10,644,058 (78%)
Fuel Oil (No. 2) (kBtu)	3,051,628 (22%)

National Median Comparison	
National Median Site EUI ()	N/A
National Median Source EUI ()	N/A
% Diff from National Median Source EUI	N/A%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,305

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)