Local Government Energy Audit:
Energy Audit Report

Lower Township Municipal Utilities Authority

2900 Bayshore Road

Villas, New Jersey 08251

November 8, 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 saving 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 Lower Township Municipal Utilities Authority (Lower Township MUA).

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

Lower Township MUA contains a 35,757 square foot Waste Water Treatment (WWT) Plant comprised of typical wastewater process equipment such as primary and secondary clarifiers, aeration tanks, blower room as well as a disinfectant process. In addition, the facility also hosts an administration building which houses employee offices, a garage, and a barn for storage. The WWT plant is operational 24 hours a day, seven days a week, year-round. The Administration Building is open during the standard hours from 8:00 AM to 6:00 PM Monday through Friday. In addition to the open clarifiers and aeration tanks the treatment facility consists primarily of buildings shown in the table below. This report incorporates analysis and energy savings from all five buildings below.

Building	Building Size (Sq. ft.)
Administration Building	11,937
Vehicle Garage	6,000
Dewatering Building	7,720
Blower Building	2,600
Pole Barn	1,716

Lighting consists of aging and inefficient T12 as well T8 linear fluorescent fixtures. There are also some exterior metal halide fixtures, some of which have been upgraded to LED lights. HVAC is provided to the office areas via split system packaged ACs with electric heat and heat pumps. The WWT building is not cooled but is heated via electric unit heaters. A thorough description of the facility and our observations are in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 10 measures and recommends nine measures which together represent an opportunity for to reduce annual energy costs by roughly $57,711 and annual greenhouse gas emissions by 715,082 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 6.4 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Waste Water Treatment Plant's annual energy use by 40%.

Figure 1 – Previous 12 Month Utility Costs (All Electric)

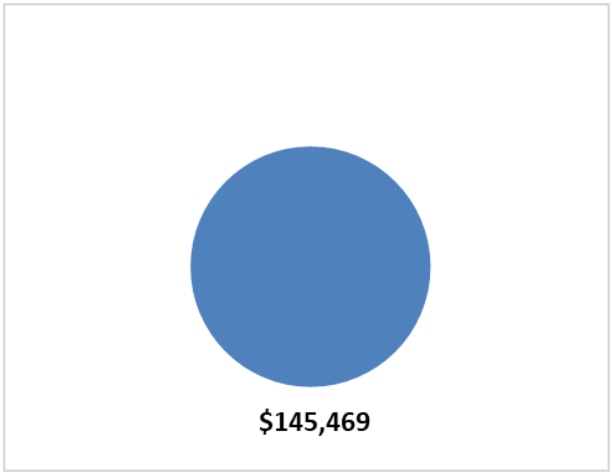
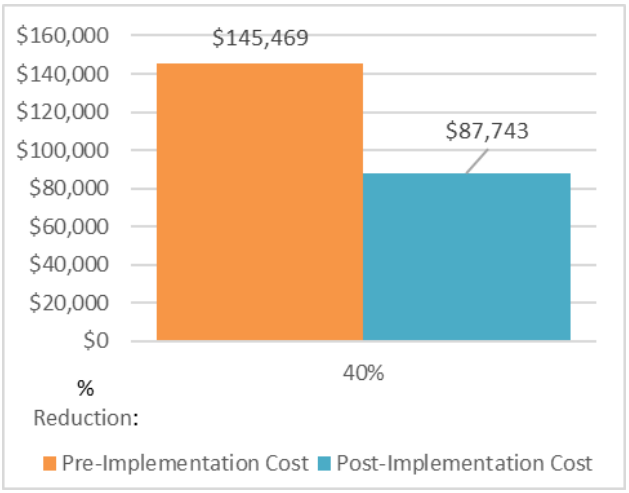


Figure 2 – Potential Post-Implementation Costs



A detailed description of Lower Township MUA'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 Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**155,853**	**13.5**	**$12,669**	**$32,153**	**$5,970**	**$26,183**	**2.1**	**156,943**
ECM 1	Install LED Fixtures	Yes	87,897	7.2	$7,145	$15,627	$4,000	$11,627	1.6	88,512
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	3,862	0.3	$314	$1,135	$70	$1,065	3.4	3,889
ECM 3	Retrofit Fixtures with LED Lamps	Yes	62,708	5.8	$5,098	$14,316	$1,900	$12,416	2.4	63,146
ECM 4	Install LED Exit Signs	Yes	1,386	0.1	$113	$1,076	$0	$1,076	9.5	1,396
Lighting Control Measures			**8,884**	**0.9**	**$722**	**$5,940**	**$770**	**$5,170**	**7.2**	**8,946**
ECM 5	Install Occupancy Sensor Lighting Controls	Yes	8,884	0.9	$722	$5,940	$770	$5,170	7.2	8,946
Motor Upgrades			**533**	**0.1**	**$43**	**$3,134**	**$0**	**$3,134**	**72.3**	**537**
	Premium Efficiency Motors	No	533	0.1	$43	$3,134	$0	$3,134	72.3	537
Variable Frequency Drive (VFD) Measures			**31,172**	**3.7**	**$2,534**	**$11,424**	**$0**	**$11,424**	**4.5**	**31,390**
ECM 6	Install VFDs on Sludge Pumps	Yes	31,172	3.7	$2,534	$11,424	$0	$11,424	4.5	31,390
Domestic Water Heating Upgrade			**2,020**	**0.0**	**$164**	**$29**	**$0**	**$29**	**0.2**	**2,034**
ECM 7	Install Low-Flow Domestic Hot Water Devices	Yes	2,020	0.0	$164	$29	$0	$29	0.2	2,034
Custom Measures			**512,188**	**0.0**	**$41,621**	**$328,000**	**$0**	**$328,000**	**7.9**	**515,769**
ECM 8	Convert to Fine Bubble Aeration	Yes	399,188	0.0	$32,435	$300,000	$0	$300,000	9.2	401,979
ECM 9	Install Automated Dissolved Oxygen (DO) Control	Yes	113,000	0.0	$9,186	$28,000	$0	$28,000	3.0	113,790
TOTALS FOR HIGH PRIORITY MEASURES			**710,117**	**18.1**	**$57,711**	**$377,546**	**$6,740**	**$370,806**	**6.4**	**715,082**
TOTALS FOR ALL EVALUATED MEASURES			**710,650**	**18.2**	**$57,754**	**$380,680**	**$6,740**	**$373,940**	**6.5**	**715,619**

* - 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).

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®). Motors 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.

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.

Energy Efficient Practices

TRC also identified nine 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 Lower Township MUA include:

- Reduce Air Leakage
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Use Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Install Plug Load Controls
- Replace Computer Monitors
- 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 WWT Plant. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	409	kW DC STC
Electric Generation	487,270	kWh/yr
Displaced Cost	$42,390	/yr
Installed Cost	$1,169,700	

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)

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 SmartSart 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 Partner, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

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.

Additional information on relevant incentive programs is located in Section 8 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Michael Chapman	Executive Director	mchapman@ltmua.org	609-886-7146
Designated Representative			
Marc DeBlasio	Exec Vice President	marc.deblasio@rve.com	609-522-5150
TRC Energy Services			
Vish Nimbalkar	Auditor	VNaikNimbalkar@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On April 6, 2018, TRC performed an energy audit at Lower Township MUA located in Villas, New Jersey. TRC's team met with Mike Chapman to review the facility operations and help focus our investigation on specific energy-using systems.

Constructed in 1972, the Lower Township MUA Waste Water Treatment (WWT) Plant is a 35,757 square foot facility comprised of typical wastewater process equipment such as primary and secondary clarifiers, aeration tanks, blower room as well as a disinfectant process. In addition, the facility also hosts an Administration Building which houses employee offices, a garage, and a barn for storage. The WWT plant is operational 24 hours a day, seven days a week, year-round. The Administration Building is open during the standard hours from 8:00 AM to 6:00 PM Monday through Friday. In addition to the open clarifiers and aeration tanks the treatment facility consists primarily of buildings shown in the table below. This report incorporates analysis and energy savings from all five buildings below.

Building	Building Size (Sq. ft.)
Administration Building	11,937
Vehicle Garage	6,000
Dewatering Building	7,720
Blower Building	2,600
Pole Barn	1,716

2.3 Building Occupancy

The WWT plant is operational 24 hours a day, all year. The Adminstration Building is open during standard business hours of 8:00 AM to 6:00 PM, five days a week, excluding holidays. Typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Waste Water Treatment Plant	Weekday	12:00 AM to 12:00 AM
Waste Water Treatment Plant	Weekend	12:00 AM to 12:00 AM

2.4 Building Envelope

All buildings are constructed of concrete CMU block, and structural steel with a brick facade. The buildings have flat roofs over the WWT plant and gabled with composite shingles on the administration building. The administration building has double pane windows which are in good condition and show little sign of excessive infiltration. The WWT plant does not have any major windows. The exterior doors are constructed of aluminum and in good condition.

2.5 On-Site Generation

The WWT Plant has a large solar photovoltaic (PV) array installed on the ground which provides renewable energy to the admin office, and pump buildings. The array generated approximately 1.6 million kWh during the twelve months from Aug 2016 to Sep 2017. The facility used about 54% of the generated electricity onsite while the rest was sold back to the ACE grid.

Marina Energy LLC, a power-purchase agreement provider, was the financier of these solar energy systems.

2.6 Energy-Using Systems

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

Wastewater Treatment

The Lower Township Wastewater Treatment facility is designed to handle 4.0 MGD (million gallons per day) of wastewater. Based on the plant influent flow readings from 2017 and 2018, the plant is operating at approximately 2.0 - 2.1 MGD on average or 50-53% capacity. During the summer months the demand is slightly higher at 2.41 MGD.

As with a typical WWT Plant, the operation starts with the incoming wastewater collected at the plant wet well where a bar screen removes larger non-biodegradable items from the wastewater. The influent then moves to the grit chamber where the larger and heavier particles are removed from the bottom by the process of settling. The grit chamber typically removes items such as rocks, sand, gravel, or other heavy solids which are removed from the wastewater before entering the primary settling tanks. This process happens in the pump room facility which is integrated with the Administration Building.

Following this the somewhat homogenous fluid is moved to the primary settling tanks. Here two small fractional hp motors operate a bottom scrapper and a surface skimmer to remove solid materials/sludge from the influent. The sludge is collected at the bottom portion on the tank and moved to the sludge holding tanks.

The effluent then moves to two large aeration basins with aeration diffusers at the bottom that mix air with the effluent so that bacteria can feed on the organic matter and purify water in the process. The air is provided by three large pumps that are in the blower building – two 125 hp positive displacement 1300 CFM pumps and one 250 hp 3500 CFM centrifugal pump. The larger 250 hp only operates during the summer months when demand is high, while the positive displacement pumps operate the rest of the year. All three pumps are driven by variable frequency drives.

From the aeration basin following the aerobic digestion process, the effluent moves to the secondary clarifier tanks where the return activated sludge pump move the organic bacteria back to the aeration basin. Unwanted sludge is moved to the sludge thickening tanks via two 10 hp pumps. From here the sludge is moved to the anaerobic digester in the dewatering building where it is converted to solid and removed from the plant.

The final stage of the cleaning is treating the clarifier water with sodium hypochloride which is a disinfectant chemical. Four fractional horsepower pumps are used in this process and depending on the demand are operated as needed. Two pumps are driven by a variable frequency drive (VFD) and the other two pumps are constant speed.

Image 1: Wastewater Treatment Plant Overview

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some 40-Watt T12 fixtures. There are some U-bend fluorescent fixtures in the admin building. Most of the fixtures are 2-lamp or 3-lamp, 4-foot long troffers with diffusers.

Lighting control in most spaces is provided by wall switches. The WWT Plant buildings and main lobby areas do not contain any occupancy sensors and are on 24 hours per day throughout the year

Exterior lighting is minimal and consists primarily of efficient metal halide fixtures that are controlled by photocells, although some fixtures were recently changed to LED wallpacks.

Image 2: Various Light Fixtures at the Facility

Direct Expansion Air Conditioning System (DX)

The Administration Building is conditioned by four split system DX AC units with condensing units located on the ground outside with the air supply units located in the attic above the meeting room. The units range in size from 3 to 5 tons with supply fans ranging from 0.5 to 0.8 hp. Each unit also has an electric heater element for space heating. The units are newly installed in 2016 and appeared to be in good condition.

The units are controlled by individual thermostats located in zones such as offices and meeting rooms. They are scheduled to operate between 7:00 AM and 6:00 PM Monday through Friday.

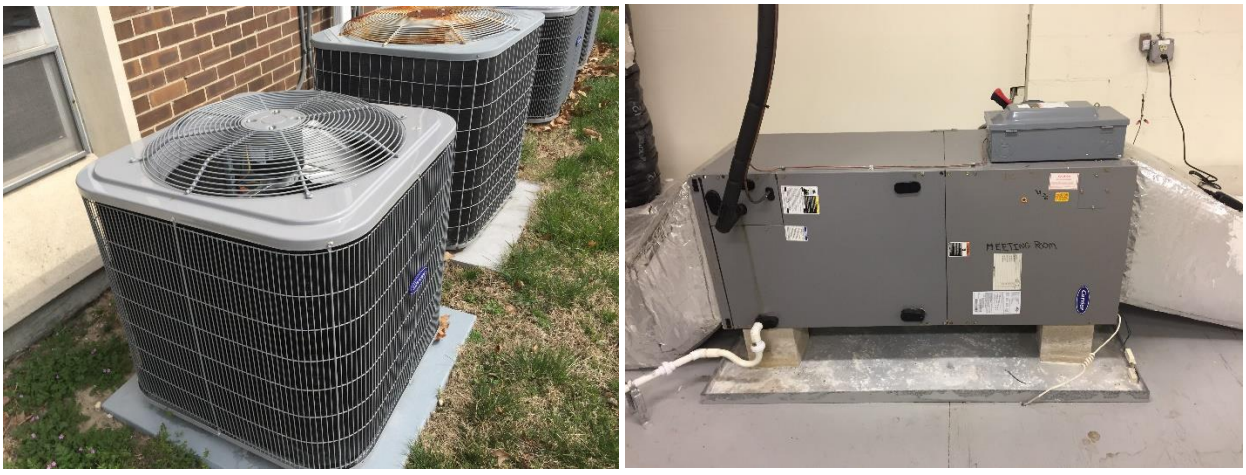


Image 3: Split System AC for Administration Offices

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of a single Bradford White electric heater with an input rating of 4.5 kW. A single 50-gallon storage tank stores and distributes water to the facility restrooms.

Building Plug Load

There are 15 computer work stations throughout Administration/WWT building. There are two large 50-inch LED TV sets in the Administration Building. There are also eight desk printers and one large photocopier in the offices.

Image 4: Building Plug Loads

The kitchen has a refrigerator, microwave, toaster oven, and electric stove. The laboratory contains a refrigerator, mini fridge, and incubator.

Water-Using Systems

There are two restrooms. Faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity was analyzed to identify opportunities for savings. In addition, data for electricity 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 0 for additional information.

3.1 Total Cost of Energy

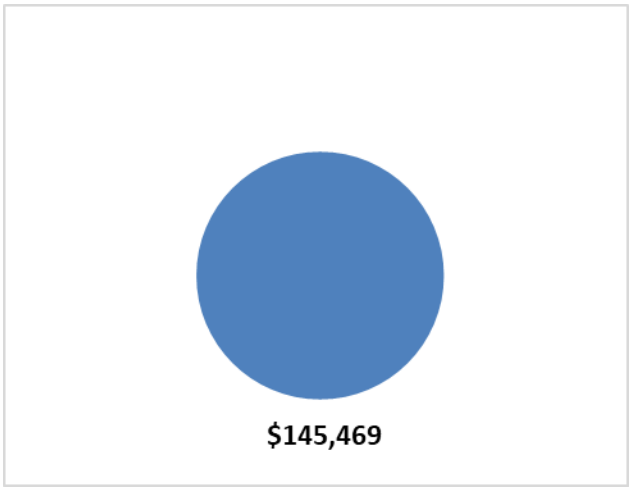
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Waste Water Treatment Plant		
Fuel	**Usage**	**Cost**
Electricity	1,789,486 kWh	$145,469
Total		**$145,469**

The current annual energy cost for this facility is $145,469 as shown in the chart below.

Figure 8 - Energy Cost Breakdown (All Electric)



3.2 Electricity Usage

Electricity is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.081/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. Please note that the unit cost of electricity mentioned above of $0.081/kWh is including the lower rate due to the PPA an PV generation on site as contracted with Marina Energy. This is done to reflect the impact of the ECMs presented in this report on the grid purchased electricity from Atlantic City Electric as well as the PPA with Marina Energy. Through the PPA with Marina Energy Lower Township MUA pays about $0.04/kWh for onsite generated and consumed electricity; whereas the unit rate for ACE grid purchase is around $0.167/kWh. The total for monthly electricity consumption and peak demand are shown in the chart below for the entire facility.

Figure 9 - Electric Usage & Demand

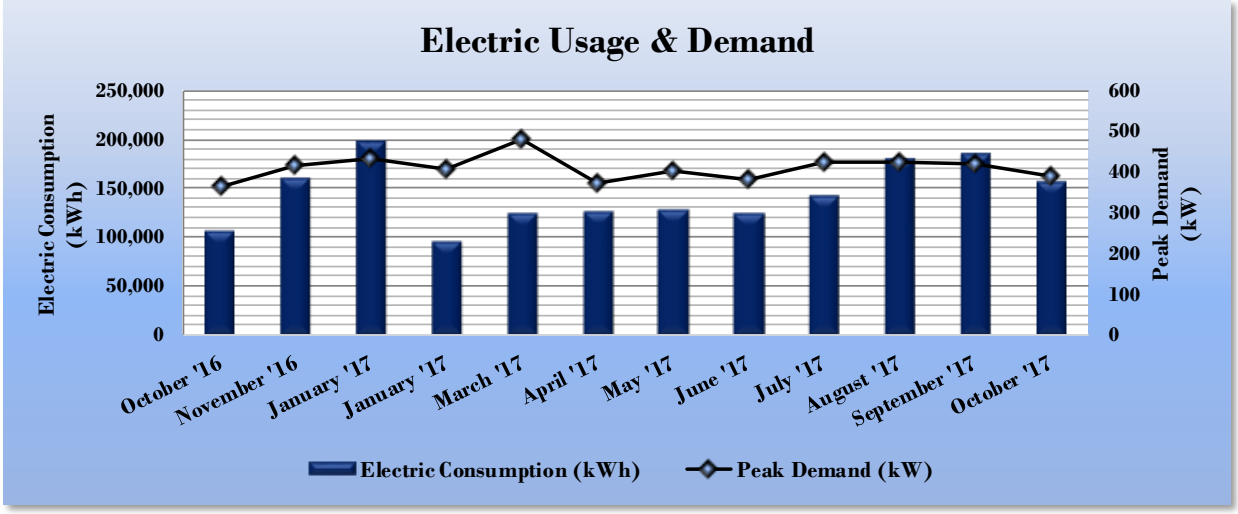


Figure 10 - Electric Usage & Demand

Electric Billing Data for Waste Water Treatment Plant					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
11/15/16	27	106,497	362	0	8,011
12/15/16	29	160,441	416	0	15,620
1/18/17	33	198,150	432	0	22,356
2/15/17	27	94,988	408	0	11,550
3/17/17	29	125,472	480	0	13,221
4/18/17	31	126,057	374	0	9,914
5/22/17	33	128,083	404	0	8,636
6/19/17	27	123,812	381	0	9,417
7/18/17	28	142,920	424	0	10,504
8/17/17	29	180,213	423	0	11,653
9/19/17	32	186,486	418	0	10,596
10/18/17	28	157,535	388	0	9,210
Totals	**353**	**1,730,654**	**480.23**	**$0**	**$140,687**
Annual	**365**	**1,789,486**	**480.23**	**$0**	**$145,469**

The following figures show energy (kWh) and demand consumption separately at each wastewater treatment buildings.

Figure 11 –Electric Usage & Demand at the Administration Building

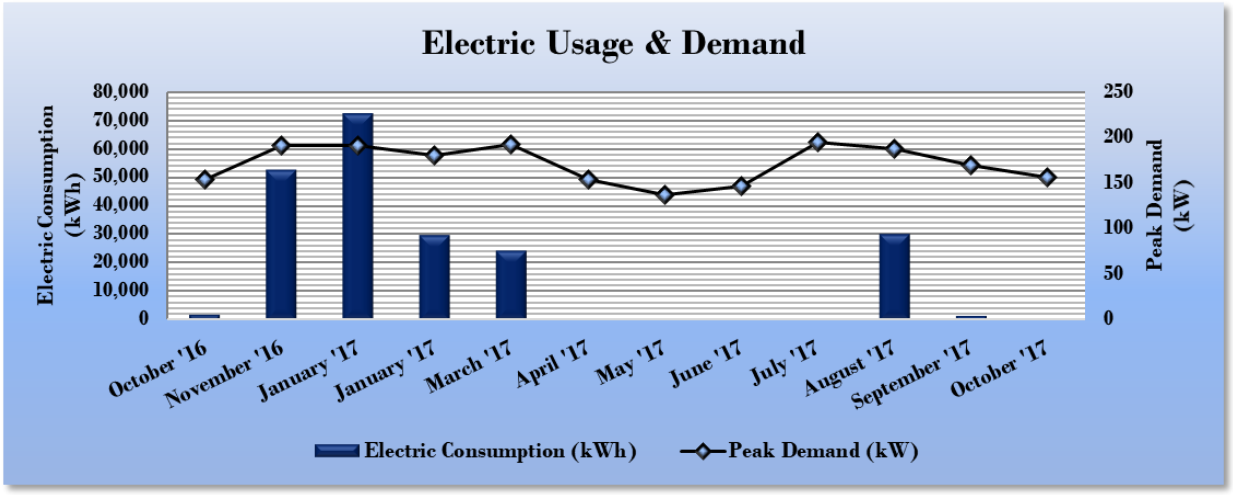


Figure 12 –Electric Usage & Demand at the Vehicle Garage

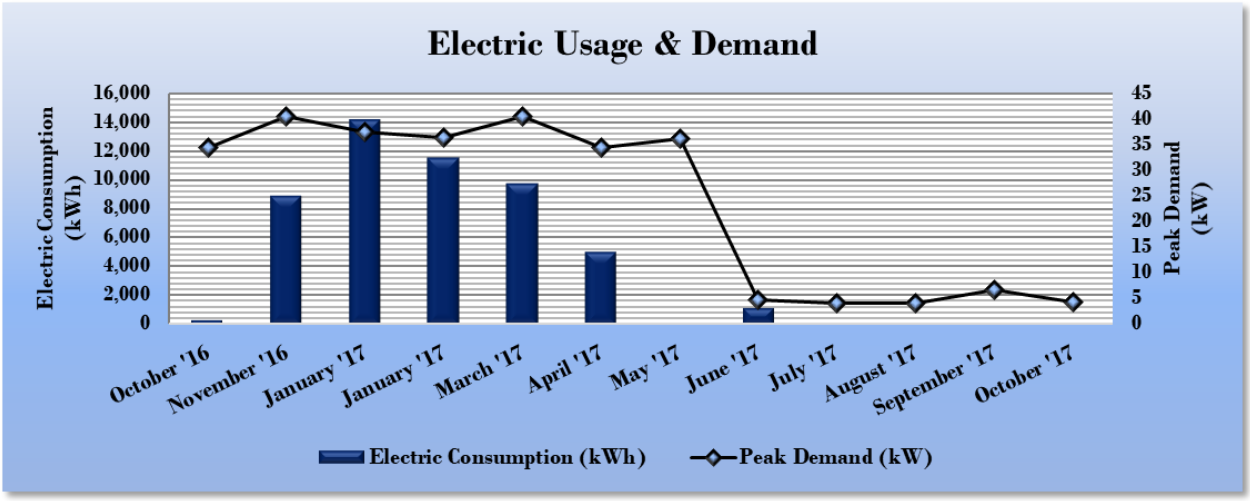


Figure 13 –Electric Usage & Demand at the Dewatering Building

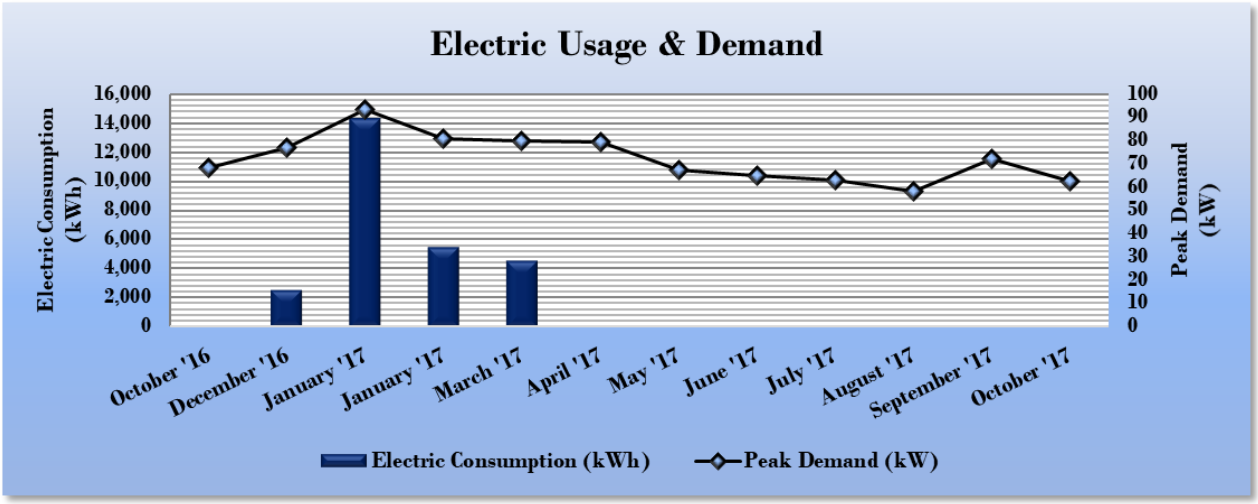


Figure 14 –Electric Usage & Demand at the Pole Barn

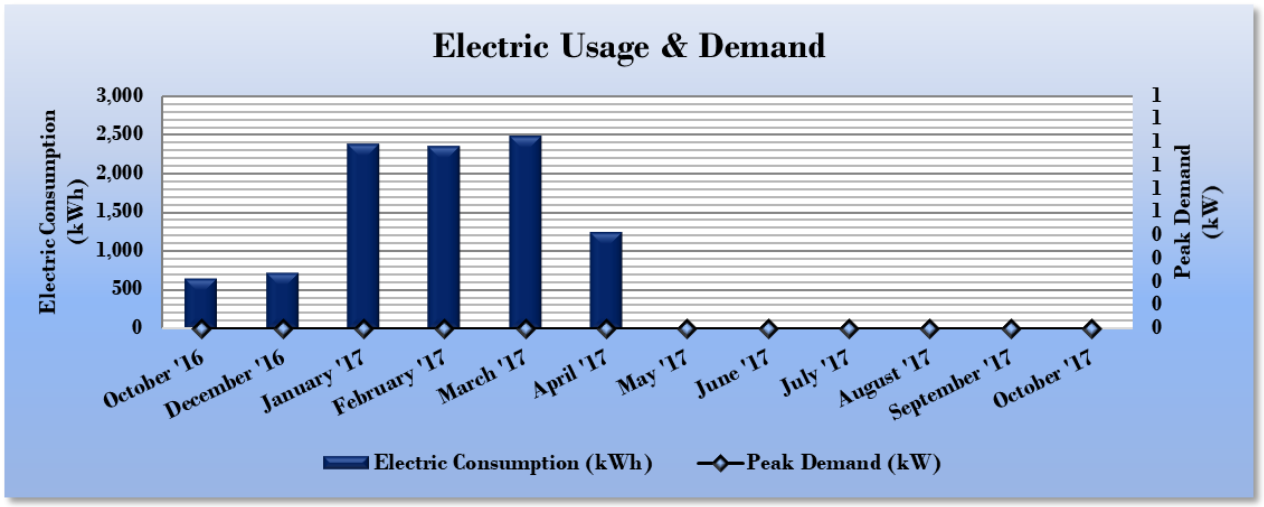
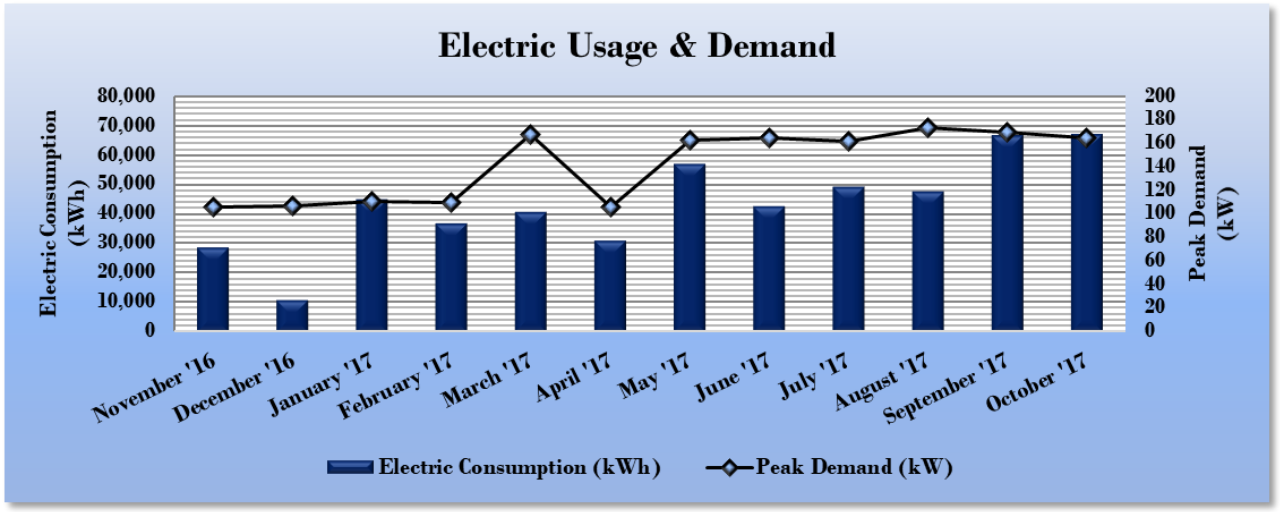


Figure 15 –Electric Usage & Demand at the Blower Building



3.3 Benchmarking

This facility was benchmarked using Portfolio Manager®, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager® analyzes your building's consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

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

Figure 16 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Waste Water Treatment Plant	National Median Building Type: Water/Wastewater Treatment/Pumping
Source Energy Use Intensity (kBtu/ft^2)	536.2	123.1
Site Energy Use Intensity (kBtu/ft^2)	170.8	78.8

Implementation of all recommended measures in this report would improve the building's estimated EUI significantly, as shown in the table below:

Figure 17 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Waste Water Treatment Plant	National Median Building Type: Water/Wastewater Treatment/Pumping
Source Energy Use Intensity (kBtu/ft^2)	323.4	123.1
Site Energy Use Intensity (kBtu/ft^2)	103.0	78.8

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 93 (possibly due to the large renewable generation on site).

A Portfolio Manager® Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

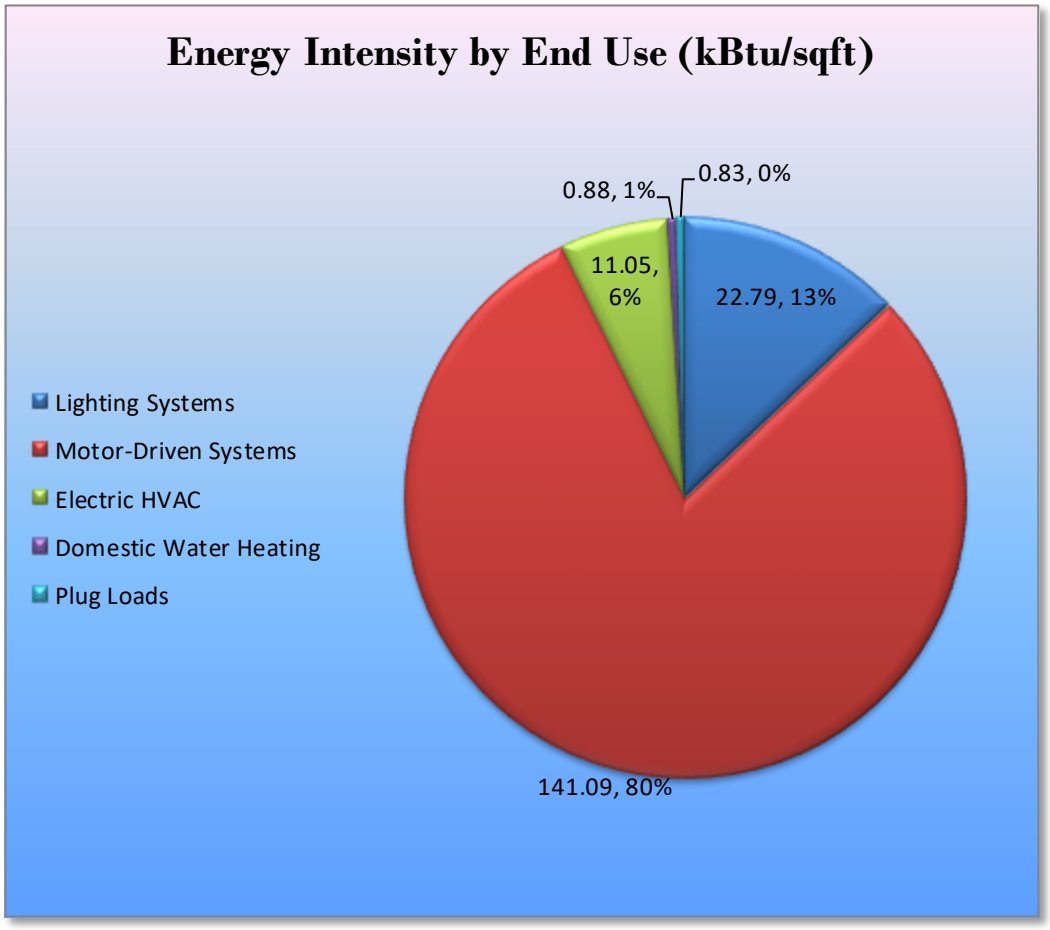
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager® account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

3.4 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 18 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Waste Water 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 were evaluated by the auditor and are recommended for implementation at the facility.

Figure 19 – 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		**155,853**	**13.5**	**0.0**	**$12,669.47**	**$32,153.16**	**$5,970.00**	**$26,183.16**	**2.1**	**156,943**
ECM 1	Install LED Fixtures	87,897	7.2	0.0	$7,145.29	$15,627.08	$4,000.00	$11,627.08	1.6	88,512
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	3,862	0.3	0.0	$313.93	$1,135.00	$70.00	$1,065.00	3.4	3,889
ECM 3	Retrofit Fixtures with LED Lamps	62,708	5.8	0.0	$5,097.60	$14,315.53	$1,900.00	$12,415.53	2.4	63,146
ECM 4	Install LED Exit Signs	1,386	0.1	0.0	$112.66	$1,075.55	$0.00	$1,075.55	9.5	1,396
Lighting Control Measures		**8,884**	**0.9**	**0.0**	**$722.21**	**$5,940.00**	**$770.00**	**$5,170.00**	**7.2**	**8,946**
ECM 5	Install Occupancy Sensor Lighting Controls	8,884	0.9	0.0	$722.21	$5,940.00	$770.00	$5,170.00	7.2	8,946
Variable Frequency Drive (VFD) Measures		**31,172**	**3.7**	**0.0**	**$2,534.00**	**$11,423.85**	**$0.00**	**$11,423.85**	**4.5**	**31,390**
ECM 6	Install VFDs on Sludge Pumps	31,172	3.7	0.0	$2,534.00	$11,423.85	$0.00	$11,423.85	4.5	31,390
Domestic Water Heating Upgrade		**2,020**	**0.0**	**0.0**	**$164.20**	**$28.68**	**$0.00**	**$28.68**	**0.2**	**2,034**
ECM 7	Install Low-Flow Domestic Hot Water Devices	2,020	0.0	0.0	$164.20	$28.68	$0.00	$28.68	0.2	2,034
Custom Measures		**512,188**	**0.0**	**0.0**	**$41,621.09**	**$328,000.00**	**$0.00**	**$328,000.00**	**7.9**	**515,769**
ECM 8	Convert to Fine Bubble Aeration	399,188	0.0	0.0	$32,435.18	$300,000.00	$0.00	$300,000.00	9.2	401,979
ECM 9	Install Automated Dissolved Oxygen (DO) Control	113,000	0.0	0.0	$9,185.90	$28,000.00	$0.00	$28,000.00	3.0	113,790
TOTALS		**710,117**	**18.1**	**0.0**	**$57,710.97**	**$377,545.69**	**$6,740.00**	**$370,805.69**	**6.4**	**715,082**

* - 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 20 below.

Figure 20 – 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		**155,853**	**13.5**	**0.0**	**$12,669.47**	**$32,153.16**	**$5,970.00**	**$26,183.16**	**2.1**	**156,943**
ECM 1	Install LED Fixtures	87,897	7.2	0.0	$7,145.29	$15,627.08	$4,000.00	$11,627.08	1.6	88,512
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	3,862	0.3	0.0	$313.93	$1,135.00	$70.00	$1,065.00	3.4	3,889
ECM 3	Retrofit Fixtures with LED Lamps	62,708	5.8	0.0	$5,097.60	$14,315.53	$1,900.00	$12,415.53	2.4	63,146
ECM 4	Install LED Exit Signs	1,386	0.1	0.0	$112.66	$1,075.55	$0.00	$1,075.55	9.5	1,396

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	58,618	4.8	0.0	$4,765.13	$10,548.28	$2,700.00	$7,848.28	1.6	59,028
Exterior	29,279	2.4	0.0	$2,380.16	$5,078.80	$1,300.00	$3,778.80	1.6	29,484

Measure Description

We recommend replacing existing fixtures containing metal halide, high pressure sodium, and fluorescent exit signs with new high-performance LED light 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 fluorescent tubes and more than 10 times longer than many incandescent lamps.

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	3,862	0.3	0.0	$313.93	$1,135.00	$70.00	$1,065.00	3.4	3,889
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing 4-foot linear fluorescent fixtures by removing T12 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 and more than 10 times longer than many incandescent lamps.

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	62,708	5.8	0.0	$5,097.60	$14,315.53	$1,900.00	$12,415.53	2.4	63,146
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing linear fluorescent and U-bend T8 tubes 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 10 times longer than many incandescent lamps.

ECM 4: Install LED Exit Signs

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	1,386	0.1	0.0	$112.66	$1,075.55	$0.00	$1,075.55	9.5	1,396
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing all incandescent or compact fluorescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 21 below.

Figure 21 – 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		**8,884**	**0.9**	**0.0**	**$722.21**	**$5,940.00**	**$770.00**	**$5,170.00**	**7.2**	**8,946**
ECM 5	Install Occupancy Sensor Lighting Controls	8,884	0.9	0.0	$722.21	$5,940.00	$770.00	$5,170.00	7.2	8,946

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 5: 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)
8,884	0.9	0.0	$722.21	$5,940.00	$770.00	$5,170.00	7.2	8,946

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in the administration building offices and restroom areas. 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.

4.1.3 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 22 below.

Figure 22 – 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		**31,172**	**3.7**	**0.0**	**$2,534.00**	**$11,423.85**	**$0.00**	**$11,423.85**	**4.5**	**31,390**
ECM 6	Install VFDs on Sludge Pumps	31,172	3.7	0.0	$2,534.00	$11,423.85	$0.00	$11,423.85	4.5	31,390

ECM 6: Install VFDs on Sludge 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)
31,172	3.7	0.0	$2,534.00	$11,423.85	$0.00	$11,423.85	4.5	31,390

Measure Description

We recommend installing a variable frequency drives (VFD) to control the three 10 hp sludge pumps. It was noted during the audit that the motor output speed is currently controlled via antiquated gear box controls which do not save energy. A VFD would modulate pump speed to maintain a differential pressure setpoint or influent flow requirements. Energy savings results from reducing pump motor speed (and power) as flow reduces. The magnitude of energy savings is based on the estimated amount of time that the system operates at reduced loads.

4.1.4 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 23 below.

Figure 23 - Summary of Domestic Water Heating 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)
Domestic Water Heating Upgrade		**2,020**	**0.0**	**0.0**	**$164.20**	**$28.68**	**$0.00**	**$28.68**	**0.2**	**2,034**
ECM 7	Install Low-Flow Domestic Hot Water Devices	2,020	0.0	0.0	$164.20	$28.68	$0.00	$28.68	0.2	2,034

ECM 7: Install Low-Flow DHW Devices

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)
2,020	0.0	0.0	$164.20	$28.68	$0.00	$28.68	0.2	2,034

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand in the two restrooms. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators reduce hot water usage, relative to standard aerators, which saves energy.

Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.1.5 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 24 below.

Figure 24 - Summary of Custom 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)
Custom Measures		**512,188**	**0.0**	**0.0**	**$41,621.09**	**$328,000.00**	**$0.00**	**$328,000.00**	**7.9**	**515,769**
ECM 8	Convert to Fine Bubble Aeration	399,188	0.0	0.0	$32,435.18	$300,000.00	$0.00	$300,000.00	9.2	401,979
ECM 9	Install Automated Dissolved Oxygen (DO) Control	113,000	0.0	0.0	$9,185.90	$28,000.00	$0.00	$28,000.00	3.0	113,790

ECM 8: Convert to Fine Bubble Aeration

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)
399,188	0.0	0.0	$32,435.18	$300,000.00	$0.00	$300,000.00	9.2	401,979

Measure Description

There are a variety of systems used to aerate wastewater. Aerator effectiveness is determined by the overall oxygen transfer rate of the aerator in terms of pounds of oxygen provided per hp-hour. The higher the overall oxygen transfer rate is the more effective the aerator is.

Mechanical agitators, mixers and fountains expend some of the energy input in moving water into the air rather than directly aerating the water. Using fans or blowers to introduce air to the wastewater through diffusers is an effective method of aerating wastewater. The effectiveness of the blowers for aeration improves as the size of the bubbles produced diminishes. Fine bubbles have more surface area than coarse bubbles for the same volume of air and rise slower. The combination of greater surface area and slower rise time means that fine bubbles have more contact with the wastewater than coarse bubbles.

Although converting from mechanical agitators, mixers and fountains to fine bubble aeration can result in significant energy savings it will also require significant capital expenditures to install a complete new aeration system. Converting from a coarse bubble aeration system to a fine bubble aeration system will generally be more cost effective than converting from mechanical agitation since the blowers serving the coarse bubble system can typically be used for the fine bubble system.

Converting to a fine bubble aeration system will require further engineering evaluation. Some things to consider when converting a coarse bubble system to a fine bubble system are: fine bubble systems operate at slightly higher pressure than coarse bubble systems, the type and layout of the new fine bubble diffusers, and the airflow rate through the diffusers (generally lower is better).

ECM 9: Install Automated Dissolved Oxygen (DO) Control

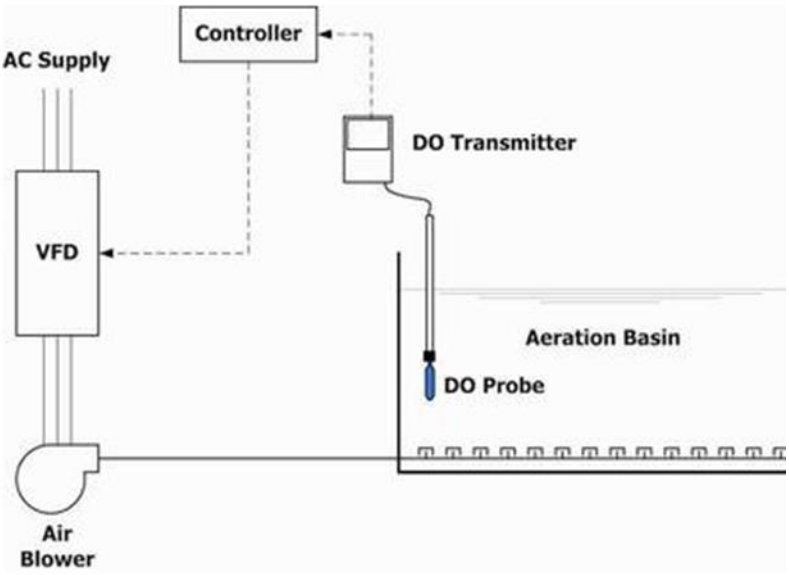
Summary of Measure Economics

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)
113,000	0.0	0.0	$9,185.90	$28,000.00	$0.00	$28,000.00	3.0	113,790

Measure Description

For a wastewater aeration system to function properly, a minimum level of dissolved oxygen (DO) must be maintained in the wastewater to support the microbes that digest the waste material. Because of fluctuations in biological loading, the oxygen demand in most aeration systems is constantly changing. At many wastewater treatment plants, the operators measure the DO level daily or weekly and adjust the number of aerators operating or the speed of the aerators based on the most recent DO readings. In some plants, the aerator operation is manually adjusted only based on anticipated influent rates and outside air temperature or timeclocks are used to schedule the operation of the aerators based on historical plant operations. This type of "control" often ends up producing higher levels of DO than are required which means excess energy is expended to provide more aeration than necessary. However, if the DO level is too low the resulting process problems will far outweigh any energy savings.

The alternative control method is to use a dissolved oxygen control system. This control system has dissolved oxygen sensors located throughout the basin or pond. The number of aerators operating or the speed of the aerators in a variable speed system is controlled to maintain the DO level at the setpoint. When the DO level is above the setpoint aerators are turned off or slowed down and conversely aerators are turned on or sped up when the DO level is below setpoint. The DO control system should be designed by someone familiar with the type of aeration system used at the facility. Site personnel should consider further study of the costs and potential savings associated with automated aeration controls.



4.2 ECM Evaluated But Not Recommended

The measure below have 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 25 – Summary of Measures 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	**533**	**0.1**	**0.0**	**$43.35**	**$3,134.10**	**$0.00**	**$3,134.10**	**72.3**	**537**
Premium Efficiency Motors	533	0.1	0.0	$43.35	$3,134.10	$0.00	$3,134.10	72.3	537
TOTALS	**533**	**0.1**	**0.0**	**$43.35**	**$3,134.10**	**$0.00**	**$3,134.10**	**72.3**	**537**

* - 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)
533	0.1	0.0	$43.35	$3,134.10	$0.00	$3,134.10	72.3	537

Measure Description

We recommend replacing standard efficiency motors with NEMA Premium® efficiency motors for the three 10 hp sludge pumps. 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.

Reasons for not Recommending

Based on the cost effectiveness and the simple payback being longer than the equipment useful life for the new motors this measure has not been recommended for replacement. The facility could still choose to implement the measure based on bundled approach and available incentive programs from the NJCEP.

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.

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 Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

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.

Clean and/or Replace HVAC Filters

Air filters work to reduce the amount of indoor air pollution and increase occupant comfort. Over time, filters become less and less effective as particulate buildup increases. In addition to health concerns related to clogged filters, filters that have reached saturation also restrict air flow through the facility's air conditioning or heat pump system, increasing the load on the distribution fans and decreasing occupant comfort levels. Filters should be checked monthly and cleaned or replaced when appropriate.

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 Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Replace Computer Monitors

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

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).

Refer to Section 4.1.4 for any low-flow ECM recommendations.

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.

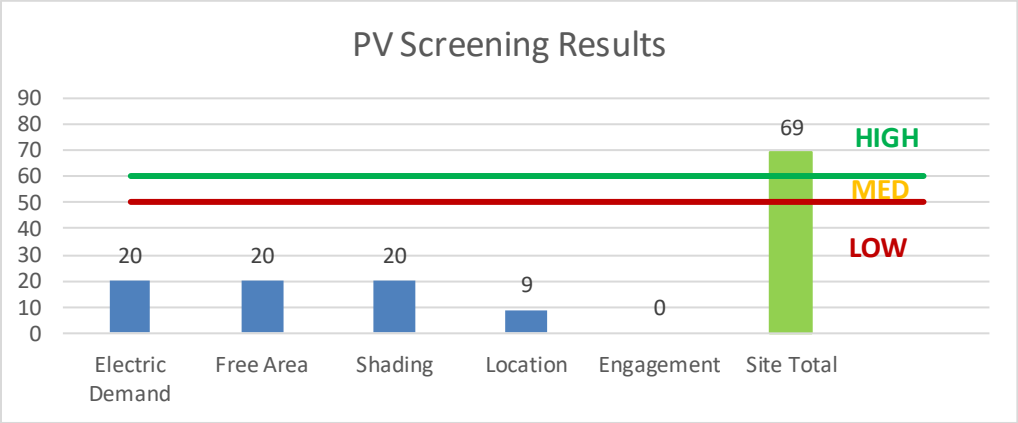
6.1 Photovoltaic

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.

Although Lower Township already has a large PV array, 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 High potential for installing a PV array.

If there is interest in pursuing the installation of additional PV, we recommended a full feasibility study be conducted.

Figure 26 - Photovoltaic Screening



Potential	High	
System Potential	409	kW DC STC
Electric Generation	487,270	kWh/yr
Displaced Cost	$42,390	/yr
Installed Cost	$1,169,700	

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.

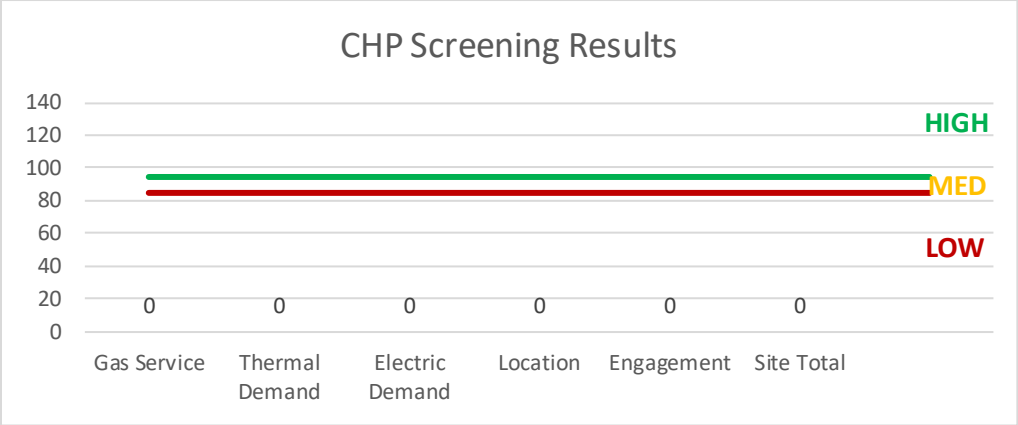
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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.

Lack of gas service, low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

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 27 - 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. Due to Lower Township's necessary continuous operation this facility is not suitable to participate in the DR program.

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 28 for a list of the eligible programs identified for each recommended ECM.

Figure 28 - 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 LED Exit Signs				X		
ECM 5	Install Occupancy Sensor Lighting Controls	X			X		
ECM 6	Install VFDs on Sludge Pumps		X		X		
ECM 7	Install Low-Flow Domestic Hot Water Devices		X		X		
ECM 8	Convert to Fine Bubble Aeration		X		X		
ECM 9	Install Automated Dissolved Oxygen (DO) Control		X		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.

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.

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.

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.

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third-party supplier for natural gas commodity.

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

If your facility is not purchasing natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility is purchasing natural gas 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 natural gas 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
Admin Bldg. Auto Control Room	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	8,736	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.68	8,292	0.0	$674.08	$1,427.00	$300.00	1.67
Admin Bldg. Auto Control RoomAuto Control Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	8,736	Relamp & Reballast	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	8,736	0.08	933	0.0	$75.83	$294.00	$15.00	3.68
Admin Bldg. Charlie's Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	8,736	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	6,115	0.24	2,898	0.0	$235.61	$650.53	$115.00	2.27
Admin Bldg. Sludge Pump Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.21	2,606	0.0	$211.85	$468.00	$80.00	1.83
Admin Bldg. Sodium Hypo Pump Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.11	1,303	0.0	$105.93	$234.00	$40.00	1.83
Blower Building (#2)	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.11	1,303	0.0	$105.93	$234.00	$40.00	1.83
Blower Building (#2)	4	Exit Signs: Fluorescent	Wall Switch	20	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	Wall Switch	6	8,760	0.05	554	0.0	$45.06	$430.22	$0.00	9.55
Blower Building (#2)	6	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	8,736	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	8,736	1.07	13,031	0.0	$1,059.27	$2,344.06	$600.00	1.65
Blower Building (#2)	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	8,736	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.14	1,747	0.0	$142.04	$351.00	$30.00	2.26
Paint Building (#10)	5	Compact Fluorescent: Screw-In: (13W) - 1L	Wall Switch	13	8,736	Relamp	No	5	LED Screw-In Lamps: Screw-In LED: (9W) - 1L	Wall Switch	9	8,736	0.02	197	0.0	$16.05	$268.77	$0.00	16.75
WAS Pump Building (#3)	6	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	8,736	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	8,736	1.07	13,031	0.0	$1,059.27	$2,344.06	$600.00	1.65
Secondary Clarifier	2	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	8,736	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	8,736	0.36	4,344	0.0	$353.09	$781.35	$200.00	1.65
Admin Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.13	1,629	0.0	$132.41	$292.50	$50.00	1.83
Admin Hallway	2	Exit Signs: Fluorescent	None	20	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.02	277	0.0	$22.53	$215.11	$0.00	9.55
Office Hallway	2	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	110	8,736	Relamp	No	2	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	0.06	750	0.0	$60.99	$220.00	$0.00	3.61
Admin Bldg. Engineer Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	8,736	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	6,115	0.12	1,449	0.0	$117.80	$460.27	$75.00	3.27
Admin Bldg. Room 202 Kitchen	2	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	110	8,736	Relamp	Yes	2	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	6,115	0.10	1,177	0.0	$95.66	$490.00	$35.00	4.76
Admin Bldg. Supply Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.08	977	0.0	$79.45	$175.50	$30.00	1.83
Admin Bldg. 203 Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.41	4,940	0.0	$401.56	$1,242.00	$190.00	2.62
Dewatering Building (#7)	9	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	110	8,736	Relamp	No	9	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	0.28	3,376	0.0	$274.45	$990.00	$0.00	3.61
Dewatering Building (#7)	6	Metal Halide: (1) 175W Lamp	Wall Switch	215	8,736	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	53	8,736	0.79	9,625	0.0	$782.42	$2,344.06	$600.00	2.23
Garage (#6)	7	Metal Halide: (1) 320W Lamp	Wall Switch	365	8,736	Fixture Replacement	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	96	8,736	1.53	18,588	0.0	$1,511.07	$2,734.74	$700.00	1.35
Garage Office (#6)	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.11	1,303	0.0	$105.93	$234.00	$40.00	1.83
Garage (#6)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.05	652	0.0	$52.96	$117.00	$20.00	1.83
Garage (#6)	8	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	90	8,736	None	No	8	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	90	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

	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
Garage (#6)	1	Exit Signs: Fluorescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	139	0.0	$11.27	$107.56	$0.00	9.55
Pole Barn (#9)	2	Compact Fluorescent: Screw-In: (13W) - 1L	Wall Switch	13	8,736	Relamp	No	2	LED Screw-In Lamps: Screw-In LED: (9W) - 1L	Wall Switch	9	8,736	0.01	79	0.0	$6.42	$107.51	$0.00	16.75
Pole Barn (#9)	9	LED Screw-In Lamps: Screw-In: (10W) - 1L	Wall Switch	10	8,736	None	No	9	LED Screw-In Lamps: Screw-In: (10W) - 1L	Wall Switch	10	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Bldg. Conf. Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.31	2,593	0.0	$210.82	$991.20	$160.00	3.94
Admin Bldg. Conf. Room	6	Compact Fluorescent: Screw-In: (26W) - 2L	Occupancy Sensor	52	6,115	Relamp	Yes	6	LED Screw-In Lamps: Screw-In LED: (9W) - 2L	Occupancy Sensor	18	4,281	0.19	1,634	0.0	$132.79	$1,185.04	$70.00	8.40
Admin Bldg. Meeting room 108	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.61	5,187	0.0	$421.64	$1,442.40	$250.00	2.83
Admin Bldg. Mens Restroom	4	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Wall Switch	49	8,736	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	6,115	0.08	1,023	0.0	$83.14	$522.80	$35.00	5.87
Admin Bldg. Mens Restroom	2	Compact Fluorescent: Screw-In: (13W) - 2L	Wall Switch	26	8,736	Relamp	Yes	2	LED Screw-In Lamps: Screw-In LED: (9W) - 2L	Occupancy Sensor	18	6,115	0.02	265	0.0	$21.51	$215.01	$0.00	10.00
Admin Bldg. Ladies Restroom	4	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Wall Switch	49	8,736	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	6,115	0.08	1,023	0.0	$83.14	$522.80	$35.00	5.87
Admin Bldg. Ladies Restroom	2	Compact Fluorescent: Screw-In: (13W) - 2L	Wall Switch	26	8,736	Relamp	Yes	2	LED Screw-In Lamps: Screw-In LED: (9W) - 2L	Occupancy Sensor	18	6,115	0.02	265	0.0	$21.51	$215.01	$0.00	10.00
Admin Bldg. Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	8,736	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.18	2,211	0.0	$179.76	$380.53	$80.00	1.67
Admin Bldg. Break Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.20	1,729	0.0	$140.55	$570.80	$95.00	3.39
Admin Bldg. Finance 112	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.20	1,729	0.0	$140.55	$570.80	$95.00	3.39
Admin Bldg. Finance 112	2	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Occupancy Sensor	49	6,115	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,281	0.04	358	0.0	$29.10	$126.40	$0.00	4.34
Admin Bldg. Hallway	6	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Occupancy Sensor	49	6,115	Relamp	No	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	6,115	0.08	663	0.0	$53.93	$379.20	$0.00	7.03
Admin Bldg. Exec Director's Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.20	1,729	0.0	$140.55	$570.80	$95.00	3.39
Admin Bldg. Exec Director's Office	2	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Occupancy Sensor	49	6,115	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,281	0.04	358	0.0	$29.10	$126.40	$0.00	4.34
Admin Bldg. Office Supervisor	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	8,736	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,115	0.31	3,705	0.0	$301.17	$991.20	$160.00	2.76
Admin Bldg. Attic	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.16	1,955	0.0	$158.89	$351.00	$60.00	1.83
Admin Bldg. Billing 104	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.41	3,458	0.0	$281.09	$1,141.60	$190.00	3.39
Admin Bldg. Mail Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	6,115	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,281	0.20	1,729	0.0	$140.55	$570.80	$95.00	3.39
Admin Bldg. Lobby	6	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Occupancy Sensor	49	6,115	Relamp	No	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	6,115	0.08	663	0.0	$53.93	$379.20	$0.00	7.03
Admin Bldg. Vestibule	2	U-Bend Fluorescent - RWT8: U RWT8 (28W) - 2L	Wall Switch	49	8,736	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	8,736	0.03	316	0.0	$25.68	$126.40	$0.00	4.92
Admin Bldg. Vestibule	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	42	8,736	None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	42	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Bldg. Exterior	5	Metal Halide: (1) 320W Lamp	Wall Switch	365	8,736	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	96	8,736	1.09	13,277	0.0	$1,079.34	$1,953.39	$500.00	1.35

	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
Admin Bldg. Exterior	3	Metal Halide: (1) 400W Lamp	Wall Switch	458	8,736	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	120	8,736	0.82	10,010	0.0	$813.72	$1,172.03	$300.00	1.07
Plant Exterior	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	37	8,736	None	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	37	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Pump Bulding (#2) Exterior	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	23	8,736	None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	23	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sodium Phosphate (#1) Exterior	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	23	8,736	None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	23	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
WAS Pump Building (#3) Exterior	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	42	8,736	None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	42	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Settling Plant Exterior	3	Metal Halide: (1) 150W Lamp	Wall Switch	190	8,736	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	45	8,736	0.35	4,294	0.0	$349.08	$1,172.03	$300.00	2.50
Clarifier Catwalk	2	Metal Halide: (1) 100W Lamp	Wall Switch	128	8,736	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	42	8,736	0.14	1,698	0.0	$138.03	$781.35	$200.00	4.21
Garage (#6) Exterior	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	23	8,736	None	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	23	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway	2	Exit Signs: Fluorescent	None	20	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.02	277	0.0	$22.53	$215.11	$0.00	9.55
Generator Room	1	Exit Signs: Fluorescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	139	0.0	$11.27	$107.56	$0.00	9.55
Generator Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	8,736	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.36	4,423	0.0	$359.51	$761.07	$160.00	1.67
Generator Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Occupancy Sensor	46	6,115	Relamp & Reballast	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,115	0.10	871	0.0	$70.78	$392.00	$20.00	5.26
Generator Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	8,736	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	8,736	0.03	311	0.0	$25.28	$98.00	$5.00	3.68
Restrooms	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.14	1,647	0.0	$133.85	$504.00	$75.00	3.20

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
Admin Building	Confercence Room HVAC	1	Supply Fan	0.5	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Executive Director's Office	1	Supply Fan	0.8	80.0%	No	2,745	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	N/A	1	Supply Fan	0.8	80.0%	No	2,745	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Meeting Room	1	Supply Fan	0.8	80.0%	No	2,745	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Raw Sewage Pump	1	Water Supply Pump	75.0	94.1%	Yes	2,920	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Raw Sewage Pump	1	Water Supply Pump	75.0	94.1%	Yes	2,920	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Raw Sewage Pump	1	Water Supply Pump	60.0	94.5%	Yes	2,920	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sludge Pump	1	Water Supply Pump	10.0	90.2%	No	2,920	Yes	91.7%	Yes	1	1.29	10,600	0.0	$861.69	$5,375.00	$0.00	6.24
Treatment Facility	Sludge Pump	1	Water Supply Pump	10.0	90.2%	No	2,920	Yes	91.7%	Yes	1	1.29	10,600	0.0	$861.69	$5,375.00	$0.00	6.24
Treatment Facility	Sludge Pump	1	Water Supply Pump	10.0	90.2%	No	2,920	No	90.2%	Yes	1	1.25	10,505	0.0	$853.98	$3,807.95	$0.00	4.46
Treatment Facility - Blower Building	Blower Motor	1	Process Blower	125.0	94.5%	Yes	0	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility - Blower Building	Blower Motor	1	Process Blower	125.0	94.5%	Yes	6,072	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility - Blower Building	Blower Motor	1	Process Blower	250.0	95.0%	Yes	2,688	No	95.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	WAS pump	1	Process Pump	10.0	91.7%	Yes	2,920	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	WAS pump	1	Process Pump	10.0	89.5%	Yes	0	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Secondary Clarifier	2	Process Pump	1.0	84.0%	No	2,920	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sludge Pump	1	Process Pump	7.5	89.5%	No	2,920	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sludge Pump	1	Process Pump	7.5	89.5%	No	2,920	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sludge Pump	1	Process Pump	7.5	89.5%	No	2,920	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sludge Pump	1	Process Pump	7.5	89.5%	No	0	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		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
Treatment Facility	Sodium Hypochloride	2	Process Pump	0.8	79.0%	Yes	2,745	No	79.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sodium Hypochloride	2	Process Pump	0.3	70.0%	Yes	2,745	No	70.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility - Dewatering Building	Deaerator	1	Process Pump	100.0	75.0%	Yes	1,248	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility - Dewatering Building	Deaerator	1	Process Pump	20.0	75.0%	No	1,248	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility - Dewatering Building	Deaerator	1	Air Compressor	5.0	89.5%	No	1,248	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility - Dewatering Building	Deaerator	1	Process Pump	3.0	94.1%	Yes	2,745	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Water Supply Pump	1	Process Pump	10.0	89.5%	No	0	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Water Supply Pump	1	Process Pump	10.0	89.5%	No	3,391	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Treatment Facility	Sodium Hypochloride	1	Process Pump	0.5	75.0%	No	2,745	No	75.0%	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 Bldg	Conference Room	1	Packaged AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Bldg	Executive Director's Office	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Bldg	N/A	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Bldg	Meeting Room	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Paint Building (#10)	Paint Building (#10)	1	Electric Resistance Heat		17.06	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
WAS Pump Building (#3)	WAS Pump Building (#3)	2	Electric Resistance Heat		17.06	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building 203 Lab	Admin Building 203 Lab	1	Electric Resistance Heat		11.26	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Dewatering Building (#7)	Dewatering Building (#7)	7	Electric Resistance Heat		17.06	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Admin Building	Offices and Lab	4	Ductless Mini-Split HP	1.86	27.00	No							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

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restroom	4	Faucet Aerator (Lavatory)	2.20	1.00	0.00	2,020	0.0	$164.20	$28.68	$0.00	0.17

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Whole Site	15	Desktop Computers	150.0	Yes
Whole Site	8	Medium Size Printers	60.0	Yes
Whole Site	1	Photocopier	400.0	Yes
Whole Site	2	Microwave	1,000.0	No
Whole Site	2	Compact Refrigerator	152.0	Yes
Whole Site	3	Refrigerator with top freezer	172.0	Yes
Whole Site	2	Coffee Machine	900.0	No
Whole Site	2	Toaster	850.0	No
Whole Site	1	LED TV	100.0	Yes
Whole Site	1	LED TV	119.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Lower Township MUA Treatment Plant (Campus)

Primary Property Type: Wastewater Treatment Plant
Gross Floor Area (ft²): 35,757
Built: 1985

For Year Ending: September 30, 2017
Date Generated: June 18, 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
Lower Township MUA Treatment Plant (Campus) 2900 Bayshore Road Villas, New Jersey 08251	Lower Township Municipal Utilities Authority 2900 Bayshore Road Villas, NJ 08251 609-886-7146	Michael Chapman 2900 Bayshore Road Villas, NJ 08251 609-886-7146 mchapman@ltmua.org

Property ID: 6380004

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
164.7 kBtu/ft²

Source EUI
330.1 kBtu/ft²

Annual Energy by Fuel	
Electric - Solar (kBtu)	3,122,822 (53%)
Electric - Grid (kBtu)	2,764,926 (47%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	326
National Median Source EUI (kBtu/ft²)	653.7
% Diff from National Median Source EUI	-50%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	307

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)