



# Local Government Energy Audit: Energy Audit Report



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***Sewer Treatment Plant and  
Animal Control Office  
Township of Livingston***

81 Naylor Avenue  
Livingston, NJ 07039

June 20, 2108

Final Report by:

**TRC Energy Services**

## Disclaimer

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

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

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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# I EXECUTIVE SUMMARY

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The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for the Town of Livingston Sewer Treatment Plant and Animal Control Office.

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.

## I.1 Facility Summary

The Town of Livingston Sewer Treatment Plant and Animal Control Office is a 38,504 square foot waste water treatment plant facility comprised of 13 buildings of different construction types. The animal control office was converted from one of the old sewer treatment plant garages in 1955 and is located at the entrance of the sewer treatment plant complex. The facility was initially constructed in 1938 and consisted of conventional activated sludge plant with digesters and drying beds. The facility has been enlarged and updated five times since the original construction. The most recent update to the facility was in 1993 and involved the construction of the advanced treatment building, which houses the micro screens, sludge thickeners, pumps, and the control room.

As most of the facility buildings are older, there are some infiltration issues throughout. The majority of the motors are from 1993 and are approaching the end of useful life, however, are all high efficiency motors. The lighting is a combination of various technology types including linear fluorescents, LEDs, and high intensity discharge lamps. The facility demonstrated high potential for onsite generation including combined heat and power (CHP) as well as solar installations.

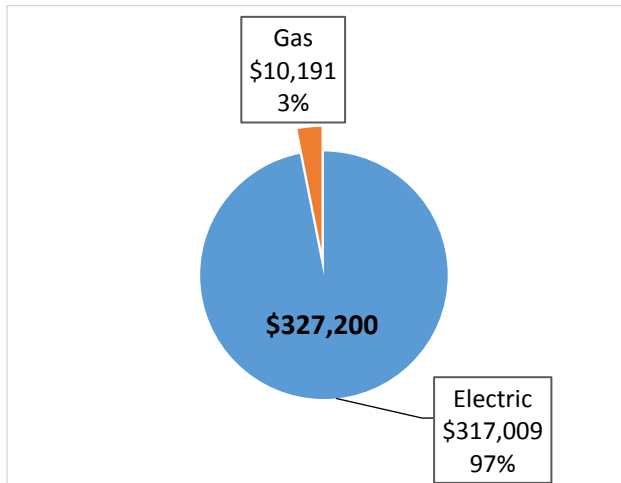
A thorough description of the facility and our observations are located in Section 2.

## I.2 Your Cost Reduction Opportunities

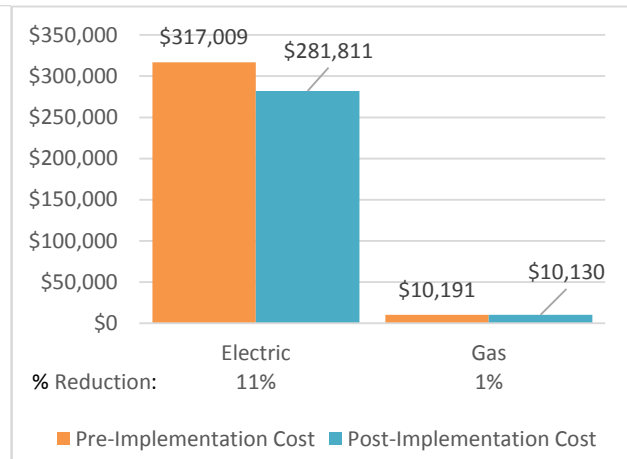
### **Energy Conservation Measures**

TRC evaluated seven measures which together represent an opportunity for the sewer treatment plant and animal control office to reduce annual energy costs by \$35,260 and annual greenhouse gas emissions by 341,353 lbs CO<sub>2</sub>e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 9.6 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 the sewer treatment plant and animal control office's annual energy use by 10%.

**Figure 1 – Previous 12 Month Utility Costs**



**Figure 2 – Potential Post-Implementation Costs**



A detailed description of the sewer treatment plant and animal control office’s existing energy use can be found in Section 3.

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

**Figure 3 – Summary of Energy Reduction Opportunities**

Energy Conservation Measure	Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>										
ECM 1   Retrofit Fixtures with LED Lamps	Yes	11,956	3.5	0.0	\$1,244.90	\$6,897.80	\$320.00	\$6,577.80	5.3	12,039
<b>Lighting Control Measures</b>										
ECM 2   Install Occupancy Sensor Lighting Controls	Yes	530	0.1	0.0	\$55.21	\$502.00	\$75.00	\$427.00	7.7	534
<b>Motor Upgrades</b>										
ECM 3   Premium Efficiency Motors	Yes	45,374	6.2	0.0	\$4,724.64	\$41,903.30	\$0.00	\$41,903.30	8.9	45,691
<b>Variable Frequency Drive (VFD) Measures</b>										
ECM 4   Install Premium Efficiency Motors Blower VFD's	Yes	274,472	47.5	0.0	\$28,579.80	\$300,000.00	\$18,000.00	\$282,000.00	9.9	276,391
<b>Electric Unitary HVAC Measures</b>										
ECM 5   Install High Efficiency Electric AC	Yes	4,653	2.8	0.0	\$484.53	\$9,075.84	\$368.00	\$8,707.84	18.0	4,686
<b>HVAC System Improvements</b>										
ECM 6   Install Dual Enthalpy Outside Economizer Control	Yes	1,046	0.2	0.0	\$108.91	\$500.00	\$250.00	\$250.00	2.3	1,053
<b>Domestic Water Heating Upgrade</b>										
ECM 7   Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	8.2	\$61.55	\$28.68	\$0.00	\$28.68	0.5	959
<b>TOTALS</b>		<b>338,031</b>	<b>60.4</b>	<b>8.2</b>	<b>\$35,259.55</b>	<b>\$358,907.62</b>	<b>\$19,013.00</b>	<b>\$339,894.62</b>	<b>9.6</b>	<b>341,353</b>

\* - 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 than usage of a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

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

**HVAC System Improvements** generally involve the installation of automated controls to reduce heating and cooling demand during periods of reduced demand. These measures could encompass changing temperature setpoints, using outside air for free cooling, or limiting excessive outside air during extreme outdoor air temperature conditions. These measures save energy by reducing the demand on HVAC systems and the amount of time systems operate.

**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 six 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 the sewer treatment plant and animal control office include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Perform Proper Boiler Maintenance

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

### **On-Site Generation Measures**

TRC evaluated the potential for installing on-site generation for the sewer treatment plant and animal control office. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array and a Microturbine CHP system.



**Figure 4 – Photovoltaic Potential**

Potential	High	
System Potential	107	kW DC STC
Electric Generation	127,477	kWh/yr
Displaced Cost	\$11,090	/yr
Installed Cost	\$306,000	

**Figure 5 – Combined Heat and Power Potential**

Potential	High	
System Type	Microturbine	
System Potential	220	kW
Electric Generation	1,778,008	kWh/yr
Thermal Generation	9,016,458	MBtu/yr
Displaced Cost	\$110,236	/yr
Installed Cost	\$679,000	

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

### I.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)
- Large Energy Users Program (LEUP)
- Combined Heat and Power Program (CHP)
- 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 SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

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

This facility may also qualify for incentives through the Large Energy Users Program (LEUP). This program provides facilities with greater energy usage added flexibility in the types of measures to be installed, where they are installed, and when. You may use internal resources or an outside contractor. Depending on your facilities' annual energy consumption and ECMs, LEUP incentives may be significantly higher compared to other programs.

The Combined Heat & Power Program can be a significant source of funding for this facility since it was identified as a good candidate for CHP on-site generation. As with other programs, please be sure to check the NJCEP website for latest details on current program availability and incentive levels.

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 8.5 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located in Section 8 or: [www.njcleanenergy.com/ci](http://www.njcleanenergy.com/ci).

## 2 FACILITY INFORMATION AND EXISTING CONDITIONS

### 2.1 Project Contacts

Figure 6 – Project Contacts

Name	Role	E-Mail	Phone #
<b>Customer</b>			
Russell A. Jones	Deputy Township Manager	rjones@livingstonnj.org	(973) 992-5000
<b>Designated Representative</b>			
Esther Lin	Intern	intern2@livingstonnj.org	(973) 992-5000 x5305
<b>TRC Energy Services</b>			
Ignacio Badilla	Auditor	ibadilla@trcsolutions.com	(732) 855-0033

### 2.2 General Site Information

On March 30, 2017, TRC performed an energy audit at the sewer treatment plant and animal control office located in Livingston, New Jersey. TRC’s team met with Joe Greco to review the facility operations and help focus our investigation on specific energy-using systems.

The Livingston Sewer Treatment Plant and Animal Control Office is a 38,504 square foot facility comprised of 13 buildings of different construction types. The animal control office was converted from one of the old sewer treatment plant garages in 1955 and is located at the entrance of the sewer treatment plant complex. The facility was initially constructed in 1938 and consisted of conventional activated sludge plant with digesters and drying beds. The facility has been enlarged and upgraded five times since the original construction. The most recent update to the facility was in 1993 and involved the construction of the advanced treatment building, which houses the micro screens, sludge thickeners and pumps, and the control room.

As most of the facility buildings are older, there are some infiltration issues throughout. The majority of the motors are from 1993 and are approaching the end of useful life. The motors, however, are mostly high efficiency motors. The lighting is a combination various technology types including linear fluorescents, LEDs, and high intensity discharge lamps.

### 2.3 Building Occupancy

The facility is operated by eight employees that work there on a normal schedule, and the facilities systems operate 24 hours per day. The animal control office is operated by one employee who works normal business hours and comes a few times per day on weekends to feed the animals.

Figure 7 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Sewer Treatment Plant	Weekday	8AM - 4:30 PM
Sewer Treatment Plant	Weekend	Varies
Animal Shelter	Weekday	8AM - 4:30 PM
Animal Shelter	Weekend	Varies

## 2.4 Building Envelope

The facilities are mainly single-story slab on grade buildings of brick constructions. The facilities all have flat roofs with EPDM membrane finishes. The animal control office facility was reported to have the most notable infiltration issues. The facility is of brick construction like the other facilities with an unfinished exterior. The insulation levels could not be verified onsite, however, it did not seem to have sufficient insulation. The animal control office is scheduled to be redone in the next year, and we recommend verifying and installing the proper insulation levels and sealing any other sources of infiltration.



*Advanced Treatment Building Envelope*



*Animal Shelter Window*

## 2.5 On-Site Generation

The facility has two emergency generators rated at 450 kW each.

## 2.6 Energy-Using Systems

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

### **Motors and Process Equipment**

#### *Intermediate Pump Station*

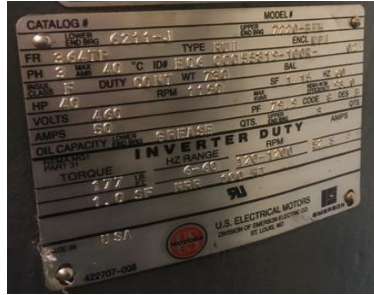
The intermediate pump station houses pumps 1, 2, and 3. The pumps are 40 HP, have 93% nominal efficiency and transfer secondary effluent to the advanced treatment building. The pump station runs one pump 24 hours per day and rotates the active pump once a week. Newer motors of this size have an efficiency of 94.1%. While there are more efficient motors on the market, the small efficiency gains do not justify the capital investment. This situation is typical of many of the motors at this facility.

The blowers are positive displacement type and have 125 HP motors. The blower motors have lower efficiencies than most of the facility motors and are guaranteed at 91.7%. While onsite it was mentioned that the facility was considering replacing the blower motors and installing a variable frequency drive (VFD) system. If VFD's are being considered, the blowers should be replaced as well with centrifugal or rotary screw type blowers to maximize savings since positive displacement blowers lose efficiency quickly at lower speeds. From the available facility design parameters (average flow of 4.2 MGD with a peak of 14 MGD), it would seem that a VFD and rotary screw type combination would make sense. Due to their size and run hours, blowers make up a significant portion of the energy use at waste water treatment facilities due to their size and run hours. The replacement of both motor and blower are justified. A more in depth engineering evaluation of the turn down requirements should be undertaken before selecting a

new blower. Regardless of whether the VFD project is pursued, the motors should be replaced with premium efficiency motors.



**Blower Motor – 91.7% Efficiency**



**Pump Nameplate**



**Intermediate Pump**

### Blower Room

The blower room contains three new turbo blowers with 100 kW motors for the aeration tanks. In general, turbo blowers are the most efficient technology when operating near their design points, however, have the highest upfront cost of any other solution. According to facility staff, these blowers were installed to replace the positive displacement aeration tank blowers, however, it must be noted that the turbo blowers are only efficient in applications with small turndowns. If there are big variations in flow and oxygenation rates required, they would not be the ideal solution. Note that this evaluation would require a more in depth engineering study to determine what the optimal blower would be or what the optimal combination of blower technologies are.

### Tunnel Area

The tunnel area houses the return pumps. The return pumps send some of the sludge back to the aeration tanks to stimulate the activated sludge process. The return pump station houses five 2 HP pumps and three 10 HP pumps. The 2 HP pumps have an efficiency of 84%. While new pumps available today have premium efficiencies of 86.5%, the capital investment would not justify the installation of new pumps. The three 10 HP pumps are rated at 88.5% efficiency and are reported to run two at a time 24/7. New pumps at this size are available at 91.7% efficiency and with these reported run hours, replacing them would yield a 20.2 year payback. While it cannot be recommended as an energy efficiency measure at this time, it should be considered should the electric costs rise or should the pumps fail.



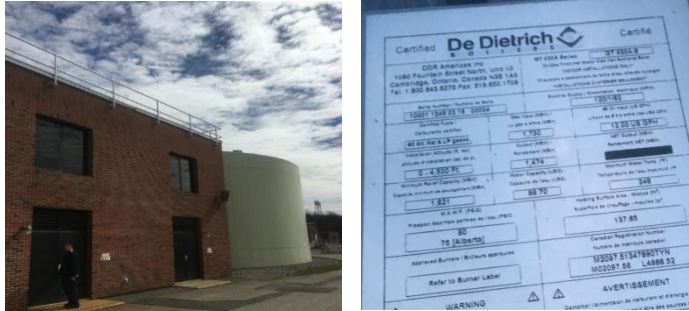
**10 HP nameplate**



**2 HP Nameplate**

## Digester Building

The digester building was recently retrofitted with a new boiler to heat the sludge, according to facility staff this has been an ongoing process. The new boiler is a high efficiency non-condensing boiler, and we do not have natural gas usage data as this area was not operational for the duration of the evaluation period. However, it should be noted that methane is produced as a byproduct of anaerobic digesters and if captured can be used as a secondary fuel to then heat the sludge, presenting an opportunity for significant reductions in energy costs. Because the digesters were designed and expanded early in the life of the sewer treatment plant we were not able to locate detailed drawings for the digesters or any methane collection system.

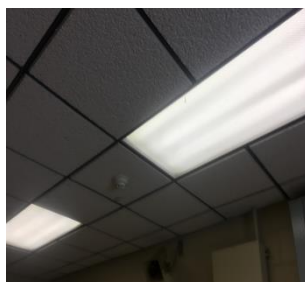


Biogas can be a significant source of energy that can be used either in the boiler or in a combined heat and power (CHP) capacity and presents a viable opportunity that is worth pursuing for this facility. Depending on the quantity, it can be used alone or mixed with natural gas. Implementation would require a more detailed engineering study to verify and optimize the methane production levels. Additionally, siloxane testing should be performed on the biogas prior to implementation as it forms silicon oxide (sandy material) when burned that can wear down and clog combustion equipment. Siloxanes are compounds increasingly found in health and beauty products that make their way into waste water facilities. If found in the biogas, proper steps should be implemented to remove them from the gas train. Please see Section 6.2 of this report for further discussion on the combined heat and power opportunities.

## Lighting System

Lighting is mainly T8 linear fluorescents that were upgraded from the original T12 lighting on an as needed basis. There are still some T12 fixtures remaining throughout the facility. All of the facilities have upgraded the incandescent bulbs to spiral compact fluorescent bulbs with 24-Watt bulbs.

The intermediate pump station is lit by 150-Watt high pressure sodium fixtures, as well as the exterior of the facility. However, facility staff noted that since work hours stop at 4:30 PM there is rarely need for exterior lighting, and none of the staff could recall ever using the exterior lights. The facility did not have any automated lighting controls.



**Control Room T8 Lighting**



**Compact Fluorescent**

## Heating System

Heating in the advanced treatment building is provided by two non-condensing forced draft hot water boilers. The boilers have an output capacity of 1084 kBtu/hr and serve a combination of process loads and building loads through two air handlers located on the roof of the facility. Only one boiler is needed to meet the building and process loads and they are alternated once per month.

The digester building contains a new high efficiency De Deitrich non-condensing hot water boiler with a nameplate efficiency of 85% and output of 1474 kBtu/hr. The boiler is used to warm and stabilize the digester sludge. The digester facility was offline at the time of the audit and for a year and a half prior for repairs and upgrade to the digester facility. The boiler's energy requirements are not known at this time as it was offline for the duration of the evaluation period.

The animal control office is heated by a through-the-wall heat pump. The nameplate was not accessible, however, appeared to be new and approximately of a 1-ton capacity. There was also an electric unit heater that was used for supplemental heat in the winter months. The facility had a boiler in the B side of the building that was no longer being used, and was in the process of being demolished. A temporary unit heater was placed in that area to keep the pipes from freezing the winter.

The lab facility is heated by a rooftop unit with natural gas heat that was installed in 1993. The unit is in poor condition and approaching at the end of its useful life. The remainder of the facilities are either unheated other than from the excess heat from the process loads or are heated by small electric and gas unit heaters.



*Shelter Heat Pump*



*Advanced Treatment Boilers*

## Direct Expansion Air Conditioning System (DX)

The lab facility is cooled by a 4-ton York direct-expansion (DX) package unit with a gas-fired furnace used to supply heat and outside air to the laboratory areas. The unit was installed in 1993 and is in poor condition and should be replaced. The animal control office is cooled by a through the wall heat pump that has approximately one ton of cooling and heating and looks to be within two years old. The nameplate was in the wall area and could not be accessed.

The advanced treatment building has cooling for the control room area and offices. The heating for the control room is provided by a ductless mini-split air conditioner located on the roof. The nameplate was not visible but appears to be about ten years old. The offices are cooled by a ductless mini-split with a 1.5 ton capacity. The unit is excellent condition and was installed about two years ago.



*Lab Building Packaged AC*

## **Domestic Hot Water Heating System**

There is a Bradford White 40 gallon 40 kBtu/hr storage hot water heater located on the B side of the animal control office. The water heater is about five years and in good condition and serves a sink located in the other side of the animal control office.

The advanced treatment building has a 75 Gallon 76 kBtu/hr Bradford White natural gas storage water heater that serves the bathroom areas and is also approximately five years old.

The laboratory area has a small electric water heater that is in good condition.

## **Building Plug Load**

The facility's plug loads are comprised of some small kitchen and office appliances. Overall they comprise a small fraction of the facilities total energy use.

## **2.7 Water-Using Systems**

There are four restrooms at this facility. An inspection of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm). The toilets, one per restroom, did not have a visible flush rating.



### 3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the “typical” energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

#### 3.1 Total Cost of Energy

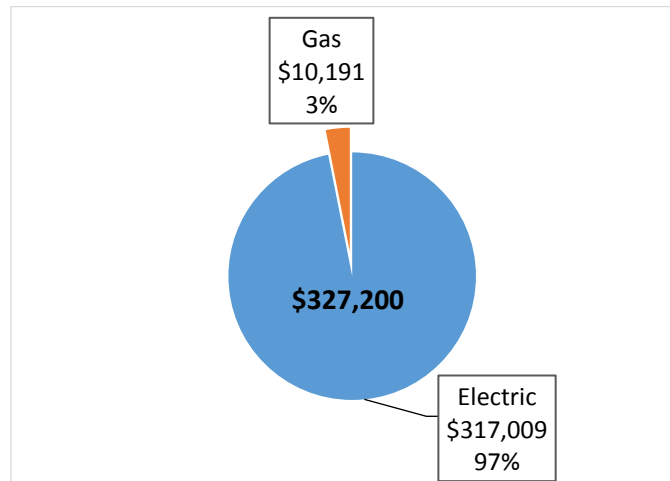
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

*Figure 8 - Utility Summary*

Utility Summary for Sewer Treatment Plant and Animal Control		
Fuel	Usage	Cost
Electricity	3,044,453 kWh	\$317,009
Natural Gas	13,555 Therms	\$10,191
<b>Total</b>		<b>\$327,200</b>

The current annual energy cost for this facility is \$327,200 as shown in the chart below.

*Figure 9 - Energy Cost Breakdown*



### 3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was \$0.104/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. This facility has a peak demand of 526 kW and is billed demand charges. We were provided with summary data and do not have the breakout of demand charges. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 10 - Electric Usage & Demand

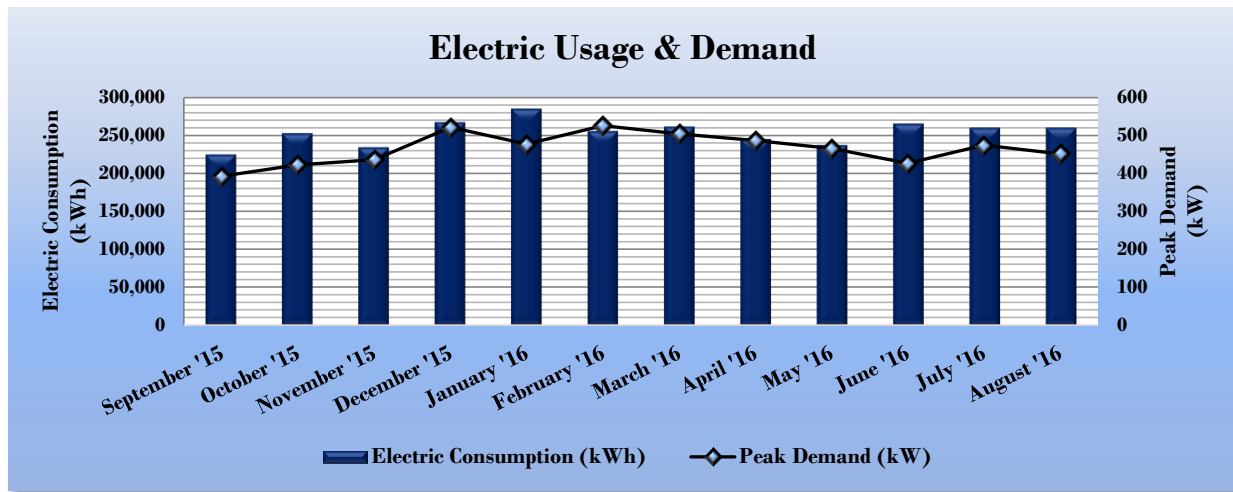


Figure 11 - Electric Usage & Demand

Electric Billing Data for Sewer Treatment Plant and Animal Control					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/24/15	31	223,718	393		\$26,591
10/26/15	32	251,771	423		\$25,177
11/24/15	29	233,305	436		\$23,282
12/24/15	30	266,187	522		\$33,868
1/25/16	32	283,737	477		\$28,034
2/23/16	29	254,495	526		\$25,790
3/24/16	30	260,362	504		\$26,100
4/22/16	29	243,934	487		\$24,543
5/20/16	28	236,251	466		\$23,625
6/21/16	32	264,478	427		\$26,595
7/22/16	31	259,084	474		\$26,328
8/22/16	31	258,790	451		\$26,208
<b>Totals</b>	<b>364</b>	<b>3,036,112</b>	<b>526</b>	<b>\$0</b>	<b>\$316,140</b>
<b>Annual</b>	<b>365</b>	<b>3,044,453</b>	<b>526</b>	<b>\$0</b>	<b>\$317,009</b>

### 3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is \$0.752/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 12 - Natural Gas Usage

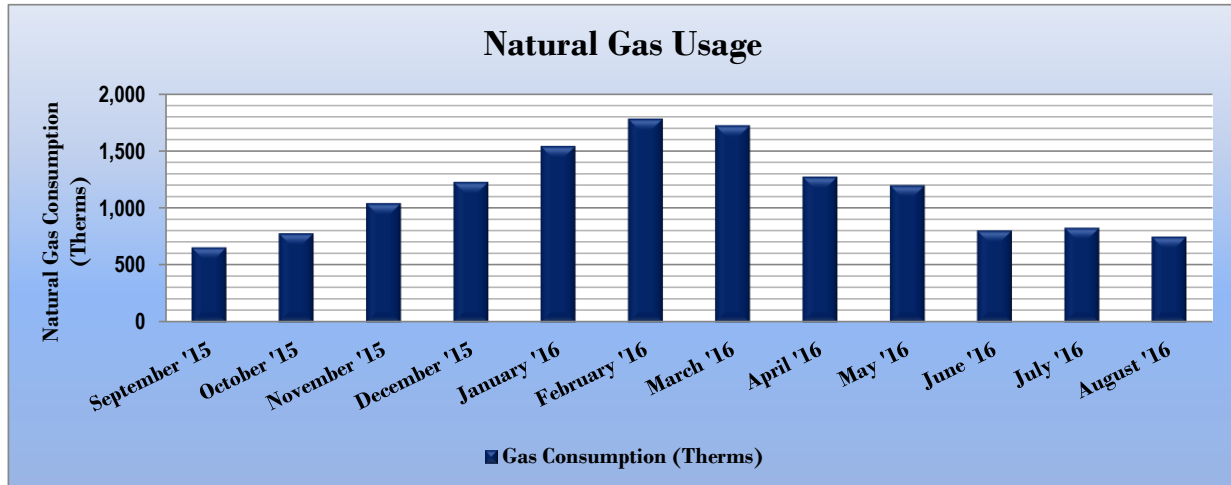


Figure 13 - Natural Gas Usage

Gas Billing Data for Sewer Treatment Plant and Animal Control			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
10/8/15	29	655	\$481
11/6/15	29	777	\$631
12/7/15	31	1,041	\$822
1/11/16	35	1,226	\$998
2/9/16	29	1,541	\$1,257
3/10/16	30	1,779	\$1,452
4/11/16	32	1,721	\$1,247
5/10/16	29	1,274	\$769
6/9/16	30	1,199	\$815
7/7/16	28	803	\$555
8/9/16	33	827	\$625
9/9/16	31	749	\$567
<b>Totals</b>	<b>366</b>	<b>13,593</b>	<b>\$10,219</b>
<b>Annual</b>	<b>365</b>	<b>13,555</b>	<b>\$10,191</b>

### 3.4 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 14 - Energy Use Intensity Comparison – Existing Conditions**

Energy Use Intensity Comparison - Existing Conditions		
	Sewer Treatment Plant and Animal Control	National Median Building Type: Water/Wastewater
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	884.1	123.1
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	305.0	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 15 - Energy Use Intensity Comparison – Following Installation of Recommended Measures**

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Sewer Treatment Plant and Animal Control	National Median Building Type: Water/Wastewater
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	789.8	123.1
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	274.8	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 currently has an ENERGY STAR® score of 37. This score is based on the design average flow rate of the facility of 4.2 MGD and if flow was higher than average for the evaluation year it could have a negative impact on the score.

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

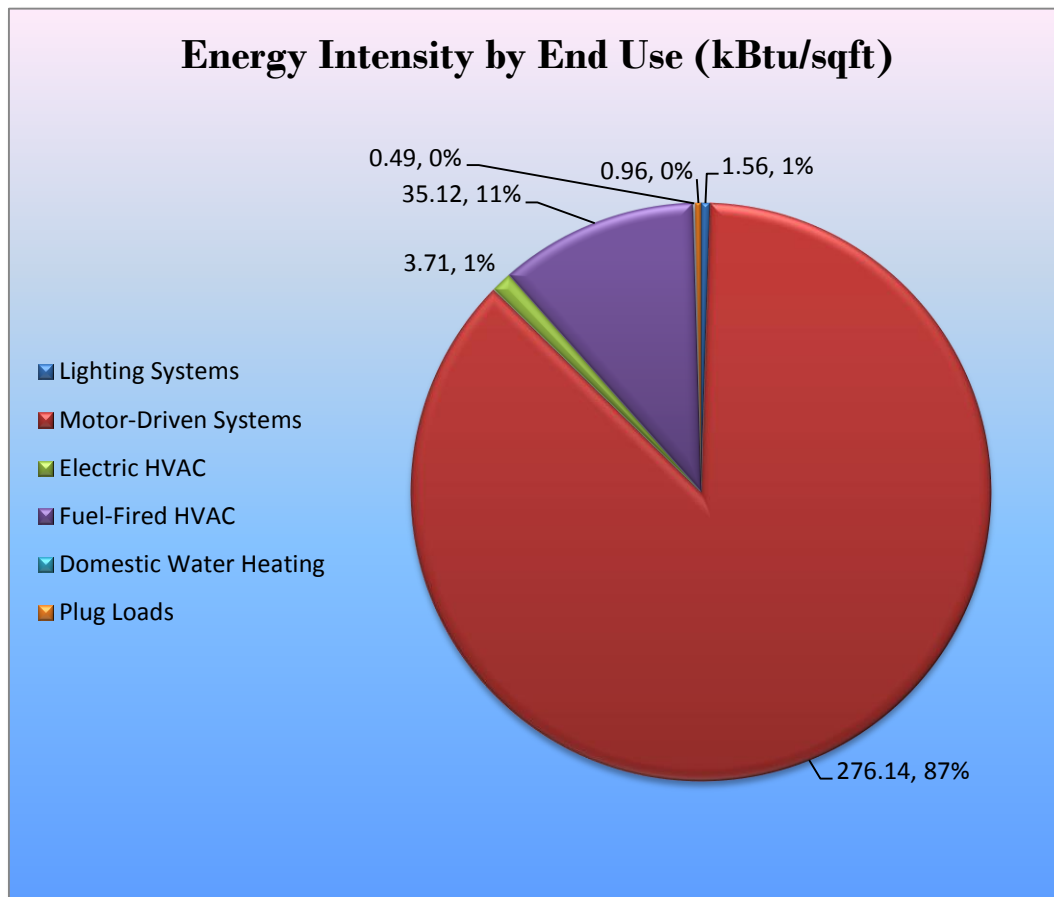
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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>.

### 3.5 Energy End-Use Breakdown

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

Figure 16 - Energy Balance (% and kBtu/SF)



## 4 ENERGY CONSERVATION MEASURES

### Level of Analysis

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

The following sections describe the evaluated measures.

### 4.1 Recommended ECMs

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

Figure 17 – 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>11,956</b>	<b>3.5</b>	<b>0.0</b>	<b>\$1,244.90</b>	<b>\$6,897.80</b>	<b>\$320.00</b>	<b>\$6,577.80</b>	<b>5.3</b>	<b>12,039</b>
ECM 1	Retrofit Fixtures with LED Lamps	11,956	3.5	0.0	\$1,244.90	\$6,897.80	\$320.00	\$6,577.80	5.3	12,039
<b>Lighting Control Measures</b>		<b>530</b>	<b>0.1</b>	<b>0.0</b>	<b>\$55.21</b>	<b>\$502.00</b>	<b>\$75.00</b>	<b>\$427.00</b>	<b>7.7</b>	<b>534</b>
ECM 2	Install Occupancy Sensor Lighting Controls	530	0.1	0.0	\$55.21	\$502.00	\$75.00	\$427.00	7.7	534
<b>Motor Upgrades</b>		<b>45,374</b>	<b>6.2</b>	<b>0.0</b>	<b>\$4,724.64</b>	<b>\$41,903.30</b>	<b>\$0.00</b>	<b>\$41,903.30</b>	<b>8.9</b>	<b>45,691</b>
ECM 3	Premium Efficiency Motors	45,374	6.2	0.0	\$4,724.64	\$41,903.30	\$0.00	\$41,903.30	8.9	45,691
<b>Variable Frequency Drive (VFD) Measures</b>		<b>274,472</b>	<b>47.5</b>	<b>0.0</b>	<b>\$28,579.80</b>	<b>\$300,000.00</b>	<b>\$18,000.00</b>	<b>\$282,000.00</b>	<b>9.9</b>	<b>276,391</b>
ECM 4	Install Premium Efficiency Motors Blower VFD's	274,472	47.5	0.0	\$28,579.80	\$300,000.00	\$18,000.00	\$282,000.00	9.9	276,391
<b>Electric Unitary HVAC Measures</b>		<b>4,653</b>	<b>2.8</b>	<b>0.0</b>	<b>\$484.53</b>	<b>\$9,075.84</b>	<b>\$368.00</b>	<b>\$8,707.84</b>	<b>18.0</b>	<b>4,686</b>
ECM 5	Install High Efficiency Electric AC	4,653	2.8	0.0	\$484.53	\$9,075.84	\$368.00	\$8,707.84	18.0	4,686
<b>HVAC System Improvements</b>		<b>1,046</b>	<b>0.2</b>	<b>0.0</b>	<b>\$108.91</b>	<b>\$500.00</b>	<b>\$250.00</b>	<b>\$250.00</b>	<b>2.3</b>	<b>1,053</b>
ECM 6	Install Dual Enthalpy Outside Economizer Control	1,046	0.2	0.0	\$108.91	\$500.00	\$250.00	\$250.00	2.3	1,053
<b>Domestic Water Heating Upgrade</b>		<b>0</b>	<b>0.0</b>	<b>8.2</b>	<b>\$61.55</b>	<b>\$28.68</b>	<b>\$0.00</b>	<b>\$28.68</b>	<b>0.5</b>	<b>959</b>
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	8.2	\$61.55	\$28.68	\$0.00	\$28.68	0.5	959
<b>TOTALS</b>		<b>338,031</b>	<b>60.4</b>	<b>8.2</b>	<b>\$35,259.55</b>	<b>\$358,907.62</b>	<b>\$19,013.00</b>	<b>\$339,894.62</b>	<b>9.6</b>	<b>341,353</b>

\* - 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 18 below.

*Figure 18 – 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>11,956</b>	<b>3.5</b>	<b>0.0</b>	<b>\$1,244.90</b>	<b>\$6,897.80</b>	<b>\$320.00</b>	<b>\$6,577.80</b>	<b>5.3</b>	<b>12,039</b>
ECM 1	Retrofit Fixtures with LED Lamps	11,956	3.5	0.0	\$1,244.90	\$6,897.80	\$320.00	\$6,577.80	5.3	12,039

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 I: 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 <sub>2</sub> e Emissions Reduction (lbs)
Interior	11,956	3.5	0.0	\$1,244.90	\$6,897.80	\$320.00	\$6,577.80	5.3	12,039
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 compact fluorescent lamps with LEDs. 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 a fluorescent tubes and more than ten times longer than many incandescent lamps.



## 4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 19 below.

*Figure 19 – 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>	<b>530</b>	<b>0.1</b>	<b>0.0</b>	<b>\$55.21</b>	<b>\$502.00</b>	<b>\$75.00</b>	<b>\$427.00</b>	<b>7.7</b>	<b>534</b>
ECM 2   Install Occupancy Sensor Lighting Controls	530	0.1	0.0	\$55.21	\$502.00	\$75.00	\$427.00	7.7	534

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 2: 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 <sub>2</sub> e Emissions Reduction (lbs)
530	0.1	0.0	\$55.21	\$502.00	\$75.00	\$427.00	7.7	534

#### *Measure Description*

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in office areas and conference room 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 overridden 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 Motor Upgrades

Our recommendations for motor upgrades are summarized in Figure 20 below.

**Figure 20 – Summary of Motor Upgrade ECMs**

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Motor Upgrades</b>	<b>45,374</b>	<b>6.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>\$4,724.64</b>	<b>\$41,903.30</b>	<b>\$0.00</b>	<b>\$41,903.30</b>	<b>8.9</b>	<b>45,691</b>
ECM 3   Premium Efficiency Motors	45,374	6.2	0.0	0.0	0.0	0.0	\$4,724.64	\$41,903.30	\$0.00	\$41,903.30	8.9	45,691

### **ECM 3: 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 <sub>2</sub> e Emissions Reduction (lbs)
45,374	6.2	0.0	\$4,724.64	\$41,903.30	\$0.00	\$41,903.30	8.9	45,691

#### *Measure Description*

We recommend replacing the fractional HP exhaust fans in the facility that run 24/7 with electronically commutated motors (ECMs). While ECMs are known for their ability to vary speed, they have efficiencies of 85% and can reduce the facility exhaust energy by up to 30%. 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.

## 4.1.4 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 21 below.

*Figure 21 – 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Variable Frequency Drive (VFD) Measures</b>	<b>274,472</b>	<b>47.5</b>	<b>0.0</b>	<b>\$28,579.80</b>	<b>\$300,000.00</b>	<b>\$18,000.00</b>	<b>\$282,000.00</b>	<b>9.9</b>	<b>276,391</b>
ECM 4   Install Premium Efficiency Motors Blower VFD's	274,472	47.5	0.0	\$28,579.80	\$300,000.00	\$18,000.00	\$282,000.00	9.9	276,391

### ECM 4: Install Premium Efficiency Motors Blower VFD's

#### *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 <sub>2</sub> e Emissions Reduction (lbs)
274,472	47.5	0.0	\$28,579.80	\$300,000.00	\$18,000.00	\$282,000.00	9.9	276,391

#### *Measure Description*

We recommend installing new blowers with VFD's at the intermediate pump station, please note that a more detailed engineering evaluation of the required turn downs would be required before selecting the appropriate blower technology for this application. Please see Section 2.6 of this report for a more detailed discussion on blower selection.

## 4.1.5 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 22 below.

*Figure 22 - Summary of Unitary HVAC 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Electric Unitary HVAC Measures</b>		<b>4,653</b>	<b>2.8</b>	<b>0.0</b>	<b>\$484.53</b>	<b>\$9,075.84</b>	<b>\$368.00</b>	<b>\$8,707.84</b>	<b>18.0</b>	<b>4,686</b>
ECM 5	Install High Efficiency Electric AC	4,653	2.8	0.0	\$484.53	\$9,075.84	\$368.00	\$8,707.84	18.0	4,686

### **ECM 5: Install High Efficiency Air Conditioning Units**

#### *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 <sub>2</sub> e Emissions Reduction (lbs)
4,653	2.8	0.0	\$484.53	\$9,075.84	\$368.00	\$8,707.84	18.0	4,686

#### *Measure Description*

We recommend replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

## 4.1.6 HVAC System Upgrades

Our recommendations for HVAC system improvements are summarized in Figure 23 below.

**Figure 23 - Summary of HVAC System Improvement 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>HVAC System Improvements</b>		<b>1,046</b>	<b>0.2</b>	<b>0.0</b>	<b>\$108.91</b>	<b>\$500.00</b>	<b>\$250.00</b>	<b>\$250.00</b>	<b>2.3</b>	<b>1,053</b>
ECM 6	Install Dual Enthalpy Outside Economizer Control	1,046	0.2	0.0	\$108.91	\$500.00	\$250.00	\$250.00	2.3	1,053

### **ECM 6: Install Dual-Enthalpy Economizers**

#### *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 <sub>2</sub> e Emissions Reduction (lbs)
1,046	0.2	0.0	\$108.91	\$500.00	\$250.00	\$250.00	2.3	1,053

#### *Measure Description*

Dual-enthalpy economizers are used to control a ventilation systems outside air intake in order to reduce a facility's total cooling load. A dual-enthalpy economizer monitors the air temperature and humidity of both the outside and return air. The control supplies the lowest energy (temperature and humidity) air to the air handling system. When outside air conditions allow, outside air can be used for cooling instead of running the air handling system's compressor. This reduces the demand on the cooling system, lowering its usage hours and saving energy.

Savings result from using outside air instead of mechanical cooling when outside air conditions permit.

## 4.1.7 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 24 below.

*Figure 24 - 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 <sub>2</sub> e Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>	<b>0</b>	<b>0.0</b>	<b>8.2</b>	<b>\$61.55</b>	<b>\$28.68</b>	<b>\$0.00</b>	<b>\$28.68</b>	<b>0.5</b>	<b>959</b>
ECM 7   Install Low-Flow Domestic Hot Water Devices	0	0.0	8.2	\$61.55	\$28.68	\$0.00	\$28.68	0.5	959

### **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 <sub>2</sub> e Emissions Reduction (lbs)
0	0.0	8.2	\$61.55	\$28.68	\$0.00	\$28.68	0.5	959

#### *Measure Description*

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. 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 providing adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

## 5 ENERGY EFFICIENT PRACTICES

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

### Reduce Air Leakage

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

### Close Doors and Windows

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

### Perform Lighting Maintenance

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

### Develop a Lighting Maintenance Schedule

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

### Perform Routine Motor Maintenance

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

## **Perform Boiler Maintenance**

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



## 6 ON-SITE GENERATION MEASURES

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

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

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

### 6.1 Photovoltaic

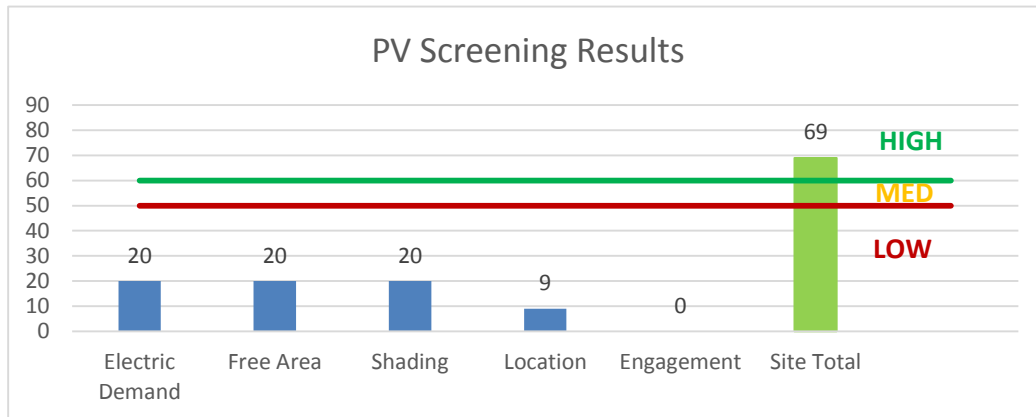
Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical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

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



The amount of free area, ease of installation in the area behind the digester building and the lack of shading elements contribute to the high potential for PV at the site (see above). While ground mounted solar systems can be problematic in certain locations requiring fencing and security, the area is already fenced off and closed to the public. If the sewer treatment plant is interested in pursuing the installation of PV, we recommended conducting a full feasibility study.

Figure 25 - Photovoltaic Screening



<b>Potential</b>	High	
<b>System Potential</b>	107	kW DC STC
<b>Electric Generation</b>	127,477	kWh/yr
<b>Displaced Cost</b>	\$11,090	/yr
<b>Installed Cost</b>	\$306,000	

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](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.

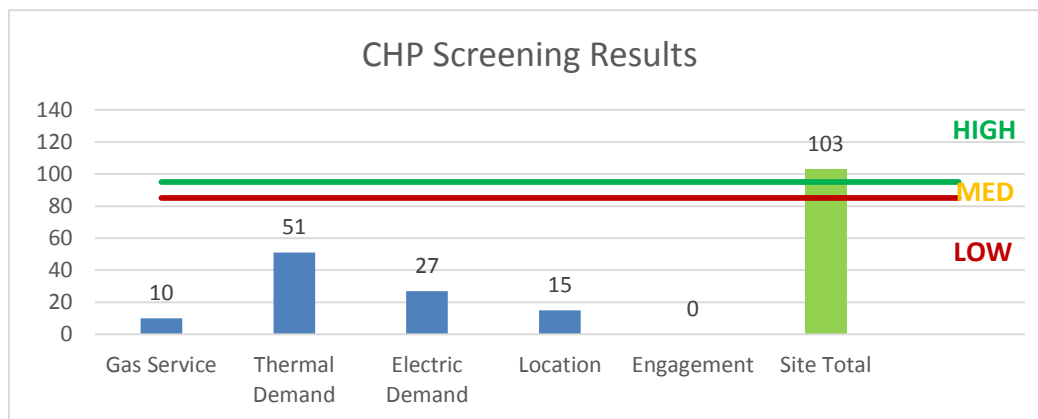
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

The constant thermal demand throughout the year as well as relatively flat electric demand curve are the main factors that contribute to the potential for CHP at the site. Based on the amount of heating required for the digester and advanced treatment building required throughout the year as well as the potential for biogas integration, a reciprocating engine CHP plant may be feasible. If the sewer treatment plant is interested in pursuing the installation of CHP, we recommended a more detailed feasibility study be conducted.

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/](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/).

**Figure 26 - Combined Heat and Power Screening**



<b>Potential</b>	High	
<b>System Type</b>	Microturbine	
<b>System Potential</b>	220	kW
<b>Electric Generation</b>	1,778,008	kWh/yr
<b>Thermal Generation</b>	9,016,458	MBtu/yr
<b>Displaced Cost</b>	\$110,236	/yr
<b>Installed Cost</b>	\$679,000	

Please see Section 8.3 for additional information in the Combined Heat & Power Program.

## 7 DEMAND RESPONSE

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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.

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

*Figure 27 - 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	Retrofit Fixtures with LED Lamps	x			x	x	
ECM 2	Install Occupancy Sensor Lighting Controls	x			x	x	
ECM 3	Premium Efficiency Motors	x			x	x	
ECM 4	Install Premium Efficiency Motors Blower VFD's		x		x	x	
ECM 5	Install High Efficiency Electric AC	x			x	x	
ECM 6	Install Dual Enthalpy Outside Economizer Control	x			x	x	
ECM 7	Install Low-Flow Domestic Hot Water Devices				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. The Pay for Performance (P4P) program is a “whole-building” energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey’s largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity’s annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

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

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: [www.njcleanenergy.com/ci](http://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](http://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](http://www.njcleanenergy.com/P4P).



### 8.3 Combined Heat and Power and Fuel Cell

#### Overview

One of the goals of the State of New Jersey is to enhance energy efficiency through on-site power generation with recovery and productive use of waste heat, and to reduce existing and new demands to the electric power grid. The Combined Heat & Power (CHP) program provides incentives for eligible CHP or Waste Heat to Power (WHP) projects. Eligible CHP or Waste Heat to Power (WHP) projects must achieve an annual system efficiency of at least 65% (Lower Heating Value - LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

#### Incentives

Eligible Technologies	Size (Installed Rated Capacity)	Incentive (\$/kW)	% of Total Cost Cap per Project <sup>3</sup>	\$ Cap per Project <sup>3</sup>	
Powered by non-renewable or renewable fuel source <sup>4</sup>	≤500 kW	\$2,000	30-40% <sup>2</sup>	\$2 million	
	Gas Internal Combustion Engine	>500 kW - 1 MW			\$1,000
	Gas Combustion Turbine	> 1 MW - 3 MW	\$550	30%	\$3 million
	Microturbine	>3 MW	\$350		
	Fuel Cells with Heat Recovery	>3 MW	\$350		
Waste Heat to Power*	<1 MW	\$1,000	30%	\$2 million	
	> 1MW	\$500		\$3 million	

\*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, incentive levels, and requirements.

#### How to Participate

You work with a qualified developer or consulting firm to complete the CHP Application. Once the application is approved the project can be installed. Information about the CHP program can be found at: [www.njcleanenergy.com/CHP](http://www.njcleanenergy.com/CHP).

## 8.4 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects 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. SRECs are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

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

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar 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](http://www.njcleanenergy.com/srec).

## 8.5 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 description and application can be found at: [www.njcleanenergy.com/ESIP](http://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

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### 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](http://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](http://www.state.nj.us/bpu/commercial/shopping.html).

# Appendix A: Equipment Inventory & Recommendations

## Lighting Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	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
Animal Shelter	12	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	3,000	None	Yes	12	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	2,100	0.10	415	0.0	\$43.21	\$270.00	\$35.00	5.44
Animal Shelter B Side	1	Linear Fluorescent - T-8: 8' T8 (59W) - 2L	Wall Switch	110	2,500	Relamp	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	2,500	0.03	107	0.0	\$11.18	\$110.00	\$0.00	9.84
Intermediate Pump Building	4	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	2,000	Relamp	No	4	LED Screw-In Lamps: CORN Lamp	Wall Switch	50	2,000	0.45	1,248	0.0	\$129.90	\$800.00	\$0.00	6.16
Chemical Feed Building	2	Linear Fluorescent - T-12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.12	401	0.0	\$41.77	\$96.40	\$0.00	2.31
Chemical Feed Building Polymer Room	2	Linear Fluorescent - T-12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.12	401	0.0	\$41.77	\$96.40	\$0.00	2.31
Primary Pump Station	2	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	2	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.03	90	0.0	\$9.41	\$80.00	\$10.00	7.44
Lab Buildings	10	Linear Fluorescent - T-8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.37	1,271	0.0	\$132.37	\$482.00	\$0.00	3.64
Conference Room	4	Linear Fluorescent - T-8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,750	0.16	566	0.0	\$58.95	\$308.80	\$20.00	4.90
Office	8	Linear Fluorescent - T-8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	8	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.29	1,017	0.0	\$105.90	\$385.60	\$0.00	3.64
Bathrooms	2	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	2	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.03	90	0.0	\$9.41	\$80.00	\$10.00	7.44
Back room	4	Linear Fluorescent - T-8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,750	0.16	566	0.0	\$58.95	\$308.80	\$20.00	4.90
Shop Building	10	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	10	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.13	452	0.0	\$47.07	\$400.00	\$50.00	7.44
Shop Building	4	Linear Fluorescent - T-8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,500	0.18	633	0.0	\$65.89	\$380.53	\$0.00	5.78
Middle Tunnel	5	Linear Fluorescent - T-8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	No	5	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,500	0.23	791	0.0	\$82.36	\$475.67	\$0.00	5.78
Lower Tunnel	5	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	5	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.07	226	0.0	\$23.53	\$200.00	\$25.00	7.44
Chlorine Building	8	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	8	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.10	362	0.0	\$37.65	\$320.00	\$40.00	7.44
Garage	8	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	8	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.10	362	0.0	\$37.65	\$320.00	\$40.00	7.44
Digester Building	29	Compact Fluorescent CFS24	Wall Switch	24	2,500	Relamp	No	29	LED Screw-In Lamps: LED A19	Wall Switch	8	2,500	0.38	1,311	0.0	\$136.49	\$1,160.00	\$145.00	7.44
Advanced Treatment Building Control Room	3	Linear Fluorescent - T-8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,500	0.12	420	0.0	\$43.68	\$225.60	\$0.00	5.16
Hallway	1	U-Bend Fluorescent - T-8: U T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,500	0.02	82	0.0	\$8.53	\$63.20	\$0.00	7.41
Hallway	3	Linear Fluorescent - T-8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,500	0.12	420	0.0	\$43.68	\$225.60	\$0.00	5.16
Offices	3	Linear Fluorescent - T-8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,500	0.12	420	0.0	\$43.68	\$225.60	\$0.00	5.16
Bathrooms	2	Linear Fluorescent - T-8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.03	90	0.0	\$9.41	\$96.40	\$0.00	10.24
Closet	1	Linear Fluorescent - T-8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.01	45	0.0	\$4.71	\$48.20	\$0.00	10.24
Locker Room	1	Linear Fluorescent - T-8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.01	45	0.0	\$4.71	\$48.20	\$0.00	10.24

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	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
Locker Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.07	254	0.0	\$26.47	\$96.40	\$0.00	3.64
SO2 Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.12	401	0.0	\$41.77	\$96.40	\$0.00	2.31

## Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		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
Intermediate Pump Station	STP	3	Process Blower	125.0	91.7%	No	5,200	Yes	95.4%	Yes	3	53.41	316,002	0.0	\$32,904.17	\$300,000.00	\$18,000.00	9.12
Intermediate Pump Station	STP	3	Process Pump	40.0	93.0%	No	2,920	No	93.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Chemical Feed Building	STP	2	Process Pump	0.3	65.0%	No	2,745	No	65.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Chemical Feed Building Polymer Room	STP	2	Process Pump	1.0	80.0%	No	2,745	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Chemical Feed Building Polymer Room	STP	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
Nitrification Clarifiers	Nitrification Tanks	2	Other	0.8	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Final Tanks	Tanks 1,2,3,4	4	Other	0.5	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Primary Tanks	Tanks 1,2,3,	4	Other	0.8	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Behind Primary Tanks	Muffin Monster - Grinder	1	Other	5.0	87.5%	No	2,745	No	87.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Primary Pump Station	STP	3	Process Pump	10.0	88.0%	No	152	No	88.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Blower Room	Aeration Tanks	3	Process Blower	100.0	94.0%	Yes	5,329	No	94.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Middle Tunnel	STP	5	Process Pump	2.0	84.0%	No	4,500	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lower Tunnel	STP	3	Process Pump	10.0	88.5%	No	3,391	No	88.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Chlorine Building	STP	1	Process Pump	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Supernatant Building	STP	2	Process Pump	5.0	81.0%	No	2,745	No	81.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Supernatant Tank	STP	1	Other	1.0	81.0%	No	2,745	No	81.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Effluent Pump Station	STP	2	Process Pump	25.0	92.7%	No	288	No	92.7%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Digester Building	STP Digester	2	Process Pump	10.0	91.7%	No	0	No	91.7%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Digester Building	STP	1	Process Pump	10.0	91.7%	No	0	No	91.7%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building	Thickeners	2	Other	0.8	85.0%	No	2,745	No	85.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		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
Advanced Treatment Building	STP	2	Other	1.5	81.5%	No	2,745	No	81.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building	Micro Screens	3	Other	5.0	87.5%	No	4,380	No	87.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building	Boilers	2	Heating Hot Water Pump	3.0	82.0%	No	1,500	No	82.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building	Advanced Treatment Areas	10	Exhaust Fan	0.5	75.0%	No	8,760	Yes	85.0%	No		0.32	3,844	0.0	\$400.27	\$5,051.30	\$0.00	12.62
Advanced Treatment Building - Basement	STP	2	Process Pump	1.5	85.0%	No	4,380	No	85.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	STP	2	Process Pump	15.0	91.0%	No	1,500	No	91.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	STP	2	Process Pump	30.0	93.6%	No	4,380	No	93.6%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	Recirculation Pumps	3	Process Pump	40.0	94.1%	No	365	No	94.1%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	Re-Aeration Pumps	2	Process Pump	5.0	89.4%	No	1,000	No	89.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	STP	2	Process Pump	7.5	89.5%	No	1,095	No	89.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	Aeration Pumps	2	Air Compressor	7.5	89.5%	No	2,500	No	89.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	RAS Pumps	3	Process Pump	30.0	92.7%	No	4,067	No	92.7%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building - Basement	WAS Pumps	3	Process Pump	20.0	92.4%	No	1,095	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00



### Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions									Energy Impact & Financial Analysis							
		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
Animal Shelter	A Building	1	Through-The-Wall HP	12.00	12.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Animal Shelter	A Building	2	Electric Forced Air Furnace		24.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Animal Shelter	B Building	1	Electric Forced Air Furnace		12.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Shop Building	Shop Building	2	Electric Forced Air Furnace		24.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lab Building	Lab Building	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		17.50		Yes	2.99	5,699	0.0	\$593.44	\$9,575.84	\$618.00	15.09
Advanced Treatment	Control Room	1	Ductless Mini-Split AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment	offices	1	Ductless Mini-Split AC	1.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions							Energy Impact & Financial Analysis								
		System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years		
Lab Roof	Lab	1	Furnace	99.00	No								0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Digester Building	Digester	1	Non-Condensing Hot Water Boiler	1,474.00	No								0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lab Roof	Lab	1	Warm Air Unit Heater	99.00	No								0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment	Advanced Treatment	2	Non-Condensing Hot Water Boiler	1,084.00	No								0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
		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
Animal Shelter B Side	Animal Shelter	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Advanced Treatment Building	Advanced Treatment 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

Location	Recommendation Inputs				Energy Impact & Financial Analysis							
	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	
Bathrooms	4	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	8.2	\$61.55	\$28.68	\$0.00	0.47	

### Plug Load Inventory

Location	Existing Conditions			
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Animal Shelter	1	Microwave	1,100.0	No
Animal Shelter	1	Refrigerator (food)	350.0	No
Animal Shelter	1	Refrigerator (animals/medicine)	350.0	No
Animal Shelter	1	Washer	1,500.0	No
Animal Shelter	1	Dryer	4,500.0	No
Lab Buildings	1	Mini Fridge	250.0	No
Lab Buildings	1	Electric over	1,500.0	No

## Appendix B: ENERGY STAR® Statement of Energy Performance

### ENERGY STAR® Statement of Energy Performance

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# 37

ENERGY STAR®  
Score<sup>1</sup>

## Sewer Treatment Plant

Primary Property Type: Wastewater Treatment Plant  
Gross Floor Area (ft<sup>2</sup>): 38,504  
Built: 1938

For Year Ending: September 30, 2016  
Date Generated: October 20, 2017

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		
<b>Property Address</b> Sewer Treatment Plant 81 Naylon Avenue Livingston, New Jersey 07039	<b>Property Owner</b> _____ ( ) - _____	<b>Primary Contact</b> _____ ( ) - _____
Property ID: 6081117		

Energy Consumption and Energy Use Intensity (EUI)			
<b>Site EUI</b>	<b>Annual Energy by Fuel</b>	<b>National Median Comparison</b>	
304.2 kBtu/ft <sup>2</sup>	Natural Gas (kBtu) 1,355,688 (12%)	National Median Site EUI (kBtu/ft <sup>2</sup> )	266.5
	Electric - Grid (kBtu) 10,357,041 (88%)	National Median Source EUI (kBtu/ft <sup>2</sup> )	772.2
		% Diff from National Median Source EUI	14%
<b>Source EUI</b>		<b>Annual Emissions</b>	
881.6 kBtu/ft <sup>2</sup>		Greenhouse Gas Emissions (Metric Tons CO <sub>2</sub> e/year)	1,221

### 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)