



Local Government Energy Audit: Energy Audit Report



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Sewage Treatment Plant

1223 Valley Road

Stirling, New Jersey 07980

Township of Longhill

October 25, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPUB) has sponsored this Local Government Energy Audit (LGEA) Report for the Sewage Treatment Plant.

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

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

I.1 Facility Summary

The Sewage Treatment Plant is a 50,000 square foot campus constructed in 1930. There are several buildings on the campus including a fuel building, digester building, pump building, generator building, and sand filter building. All the buildings are single story facilities including production (treatment) areas, offices, and support areas. Additionally the plant includes exterior treatment areas, including storage tanks, which are not conditioned. The plant is licensed to process 900,000 gallons of wastewater per day and is currently operating at about 85% of that permitted limit.

Lighting at the facility consists largely of 40-Watt T12 fluorescent fixtures with some 34-Watt T12 U-bend fluorescent fixtures; all of which are inefficient in performance when compared to the latest lighting technology available in the market. In addition to linear fluorescent technology, the facility also has several compact fluorescent, high pressure sodium, and metal halide lamps. Exterior lighting is provided primarily by high pressure sodium fixtures ranging between 70 and 250-Watts, and the parking lot lighting by 250-Watt metal halide sources. Interior and exterior lighting control is provided by manual switches.

Cooling and ventilation are provided by package AC systems. Heating is provided by a fuel oil boiler.

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 six measures and recommends four measures which together represent an opportunity for the Sewage Treatment Plant to reduce annual energy costs by roughly \$5,725 and annual greenhouse gas emissions by 55,355 lbs CO₂e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 7.9 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 Sewage Treatment Plant's annual energy use by 4%.

Figure 1 – Previous 12 Month Utility Costs

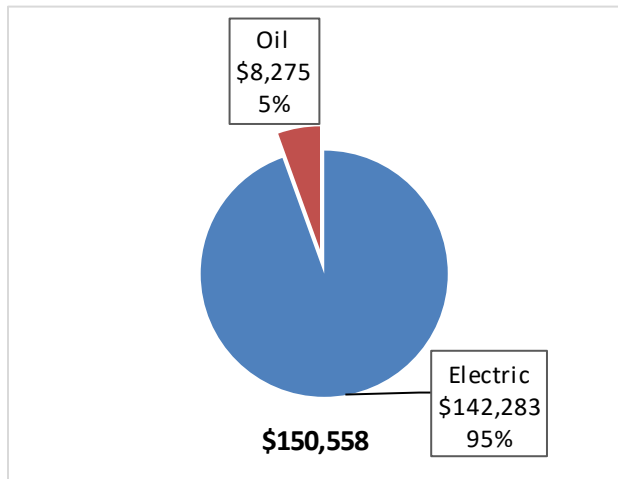
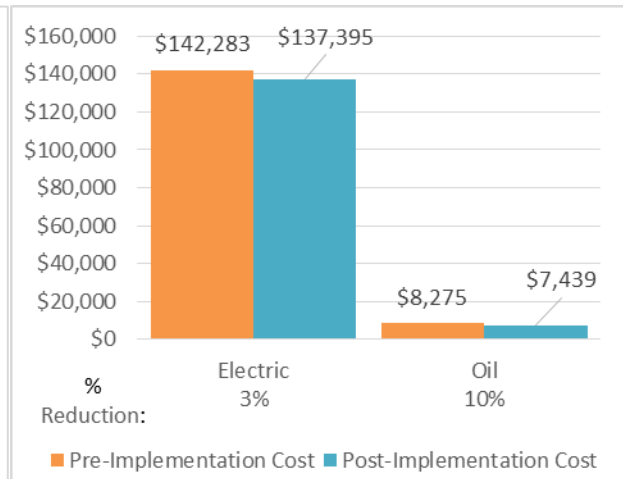


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades			44,530	10.4	0.0	\$4,888.30	\$34,060.10	\$715.00	\$33,345.10	6.8	44,841
ECM 1	Install LED Fixtures	Yes	27,422	4.5	0.0	\$3,010.28	\$21,212.10	\$185.00	\$21,027.10	7.0	27,614
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	9,044	3.1	0.0	\$992.85	\$8,248.00	\$530.00	\$7,718.00	7.8	9,108
ECM 3	Retrofit Fixtures with LED Lamps	Yes	8,064	2.8	0.0	\$885.18	\$4,600.00	\$0.00	\$4,600.00	5.2	8,120
Lighting Control Measures			728	0.3	0.0	\$79.96	\$1,820.00	\$210.00	\$1,610.00	20.1	733
	Install Occupancy Sensor Lighting Controls	No	612	0.2	0.0	\$67.19	\$1,620.00	\$210.00	\$1,410.00	21.0	616
	Install High/Low Lighting Controls	No	116	0.0	0.0	\$12.77	\$200.00	\$0.00	\$200.00	15.7	117
Gas Heating (HVAC/Process) Replacement			0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513
ECM 4	Install High Efficiency Hot Water Boilers	Yes	0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513
TOTALS OF ALL RECOMMENDED MEASURES			44,530	10.4	64.3	\$5,724.67	\$47,309.99	\$1,929.40	\$45,380.59	7.9	55,355
TOTALS OF ALL EVALUATED MEASURES			45,258	10.7	64.3	\$5,804.63	\$49,129.99	\$2,139.40	\$46,990.59	8.1	56,088

* - 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 measure 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.

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

Energy Efficient Practices

TRC also identified 11 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 Sewage Treatment Plant include:

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

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

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	54	kW DC STC
Electric Generation	64,334	kWh/yr
Displaced Cost	\$5,600	/yr
Installed Cost	\$140,400	

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
- Direct Install
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some 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.

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Neil Henry	Township Administrator	administrator@longhillnj.gov	908-647-8000
TRC Energy Services			
Moussa Traore	Auditor	MTraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On February 7, 2017, TRC performed an energy audit at the Sewage Treatment Plant located in Stirling, New Jersey. TRC’s team met with Neil Henry to review the facility operations and help focus our investigation on specific energy-using systems.

2.3 Building Occupancy

The typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Sewerage Treatment Plant	Weekday	9:00 AM - 5:00 PM
Sewerage Treatment Plant	Weekend	Off

2.4 Building Envelope

Township of Longhill Sewage Treatment Plant has six buildings that serve various purposes to the plant. All the buildings are one story facilities. The construction is typically of concrete masonry block with brick type exterior and double pane clear windows with operable frames. The flat roof sections are constructed of built-up roofing material.

Figure 7 – Building Façade



2.5 On-Site Generation

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

2.6 Energy-Using Systems

Lighting System

Lighting at consists largely of 40-Watt T12 fluorescent fixtures with a few 34-Watt T12 U-bend fluorescent fixtures. These sources are inefficient in performance when compared to the latest lighting technology available in the market. Linear fluorescent T12 fixtures are 2-foot U-bend and 4-foot long linear, mainly troffers with diffusers having 2-lamp and 3-lamp configurations. High pressure sodium sources provide illumination for several production areas, including the fuel building and lime room. All the exit signs are LED based fixtures.

Interior lighting control in the building is provided by manual switches.

Figure 8 - Building Lighting Systems

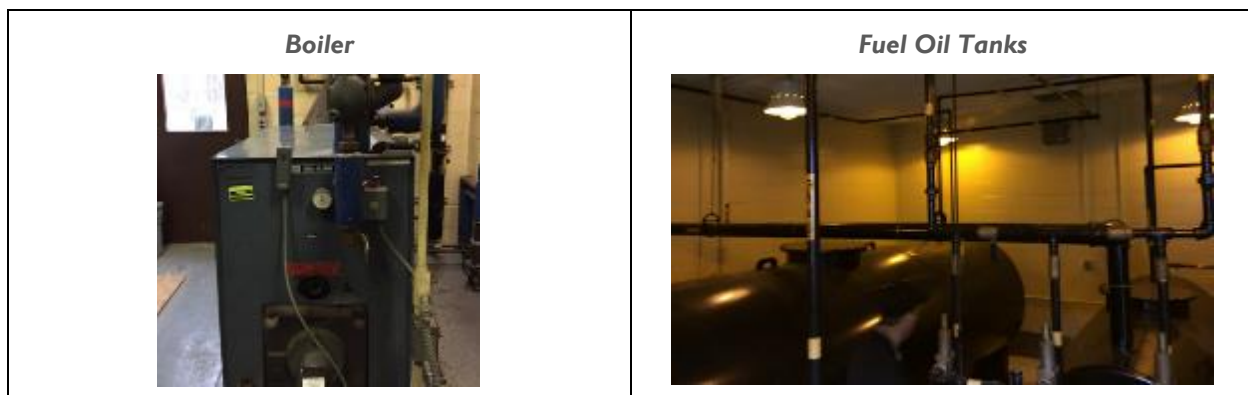


Exterior lighting is provided by a combination of 70-Watt and 250-Watt high pressure sodium fixtures and 250-Watt metal halide lamps.

Hot Water Heating System

The hot water system consists of one Weil- Mclain 552 kBtu/hr output, fuel oil boiler. The boiler has a nominal combustion efficiency of 78%.

Figure 9 – Boiler Systems



Direct Expansion Air Conditioning System (DX)

A 5-ton Carrier direct-expansion (DX) package unit is used to condition the main office facility. The unit is located on the roof of the building. The unit provides air at a constant volume. The unit utilizes a scroll compressor and a DX coil. The unit has an outside air economizer to utilize free cooling when the outside air temperature is lower than the return air temperature.

Figure 10 – Rooftop Package Unit



Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of one Bock fuel oil input hot water heater with an input rating of 152 kBtu/hr and a nominal efficiency of 80%. The water heater has a 50-gallon storage tank.

Figure 11 – Domestic Hot Water Heater



Building Process Load

The sewage treatment plant is a complex process facility that includes several steps in treating the waste and water. At a high level, the process involves the following:

Screening

Screening is the first stage of the wastewater treatment process during which large objects like broken bottles, bottle tops, plastics, etc. that would damage the wastewater equipment are removed.

Primary Treatment

This process involves separation of organic matter from the waste water by processing the fluid in large settlement tanks where the solids settle at the bottom of the tank. Settled solids are called “sludge” which is scrapped and removed by pumping for further treatment. The wastewater left behind is moved to the secondary process.

Figure 12 – Sewage Treatment Plant



Secondary Treatment

Secondary treatment consists of aerating the water to support the bacteria to break down the tiny bits of sludge that escaped the sludge scrapping process. The water is stored in the aeration tanks where air is supplied through the blowers.

Final Treatment

In this stage treated water is again passed through settlement tanks where more sludge is collected, scrapped, and moved away resulting in water that is almost free from harmful substances. Finally, water is flowed over a medium/filter where it is filtered through a bed of sand to remove any additional particles.

Process Energy Summary

Overall, the wastewater treatment typically relies on motors (pumps and blowers) to achieve treatment. As noted during the audit sewage treatment plant has a total rated motor capacity of over 500 hp. Process motors contribute substantially to the electric load/use at the facility, over 80% of the total. The majority of the motors are constant speed motors with some variable speed motors such as in the influent system and oxidation equipment. Most of the larger motors were observed to be rated at or near premium efficiency, rendering motor replacement/upgrade measures not cost effective.

Process equipment was not considered for control measures considering the complexity of the process which would then require a detailed feasibility analysis for process based changes such as VFD on pumps and blowers, control equipment upgrades, etc.

Building Plug Load

The facility contains several systems which contribute to plug load including copier, microwave, refrigerator, washer, and dryer.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

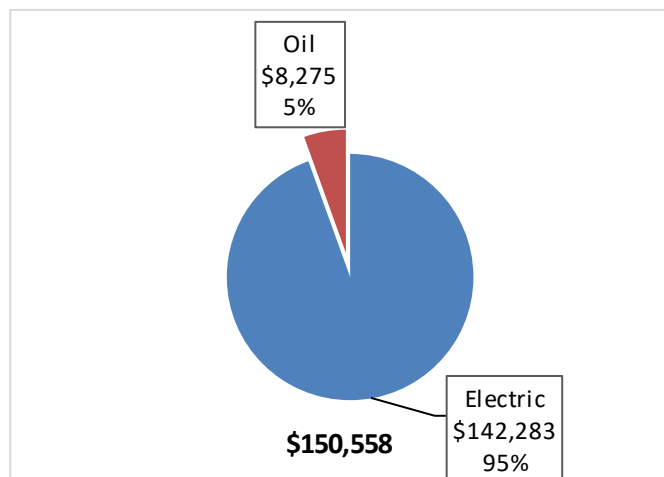
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 13 - Utility Summary

Utility Summary for Sewage Treatment Plant		
Fuel	Usage	Cost
Electricity	1,296,129 kWh	\$142,283
No. 2 Fuel Oil	4,587 Gallons	\$8,275
Total		\$150,558

The current annual energy cost for this facility is \$150,558 as shown in the chart below.

Figure 14 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was \$0.110/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 15 - Electric Usage & Demand

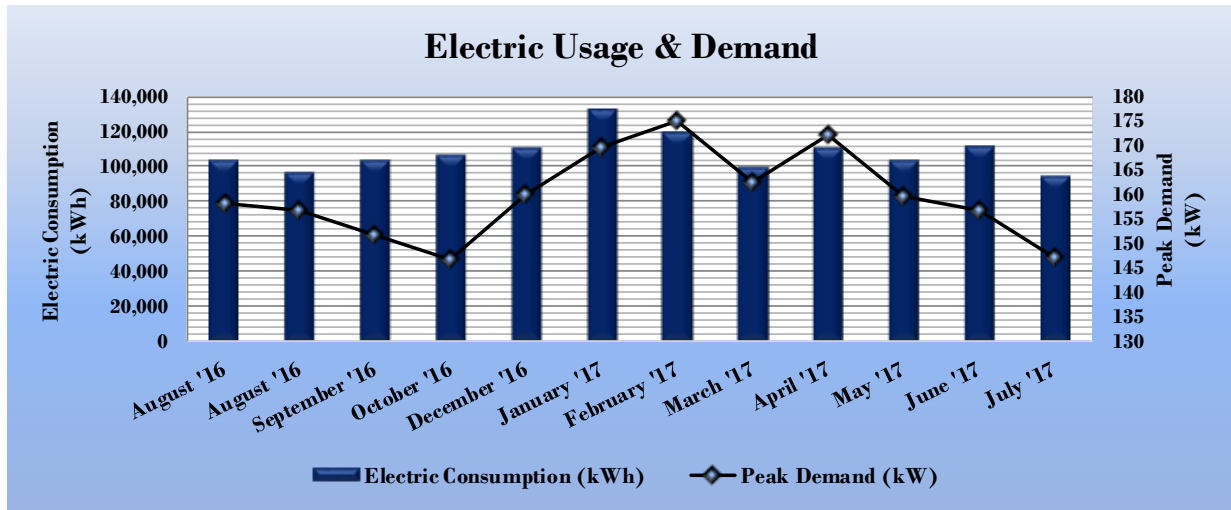


Figure 16 - Electric Usage & Demand

Electric Billing Data for Sewage Treatment Plant					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
8/18/16	30	104,000	158	\$950	\$11,138
9/14/16	27	97,440	157	\$942	\$10,630
10/14/16	30	103,680	152	\$850	\$11,259
11/15/16	32	107,520	147	\$824	\$11,605
12/16/16	31	111,360	160	\$898	\$12,062
1/19/17	34	133,280	170	\$1,047	\$14,447
2/20/17	32	120,320	175	\$1,159	\$13,300
3/20/17	28	99,680	162	\$1,074	\$11,253
4/19/17	30	111,040	172	\$1,139	\$12,470
5/18/17	29	104,480	160	\$1,057	\$11,722
6/20/17	33	112,000	157	\$1,113	\$12,404
7/20/17	30	94,880	147	\$1,044	\$10,382
Totals	366	1,299,680	175	\$12,095	\$142,673
Annual	365	1,296,129	175	\$12,062	\$142,283

3.3 No. 2 Fuel Oil Usage

No. 2 Fuel oil is provided by JCP&L. The average oil cost for the past 12 months is \$1.804/Gallon, which is the blended rate used throughout the analyses in this report. Oil consumption is shown in the table below.

Figure 17 – No. 2 Fuel Oil Usage

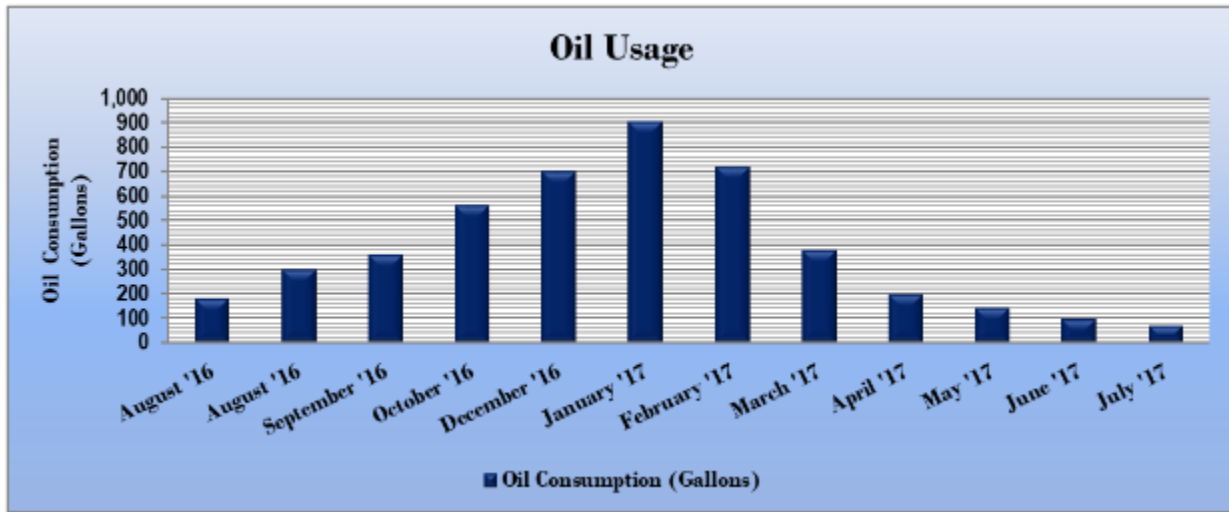


Figure 18 –No. 2 Fuel Oil Usage

No. 2 Fuel Oil Billing Data for Sewage Treatment Plant			
Period Ending	Days in Period	Oil Usage (Gallons)	Fuel Cost
8/18/16	30	180	\$311
9/14/16	27	300	\$518
10/14/16	30	360	\$622
11/15/16	32	560	\$989
12/16/16	31	700	\$1,286
1/19/17	34	900	\$1,654
2/20/17	32	718	\$1,311
3/20/17	28	378	\$688
4/19/17	30	196	\$357
5/18/17	29	140	\$255
6/20/17	33	98	\$178
7/20/17	30	70	\$127
Totals	366	4,600	\$8,298
Annual	365	4,587	\$8,275

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 19 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Sewage Treatment Plant	National Median Building Type: Water/Wastewater Treatment/Pumping
Source Energy Use Intensity (kBtu/ft ²)	290.6	123.1
Site Energy Use Intensity (kBtu/ft ²)	101.2	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 20 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Sewage Treatment Plant	National Median Building Type: Water/Wastewater Treatment/Pumping
Source Energy Use Intensity (kBtu/ft ²)	279.7	123.1
Site Energy Use Intensity (kBtu/ft ²)	96.8	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. As the NJCEP LGEA program did not have access to actual influent flow meter readings plant’s performance is not properly reflected. Therefore, there is no Statement of Energy Performance (SEP) for this property. Please refer to Appendix B: ENERGY STAR® Statement of Energy Performance for more details.

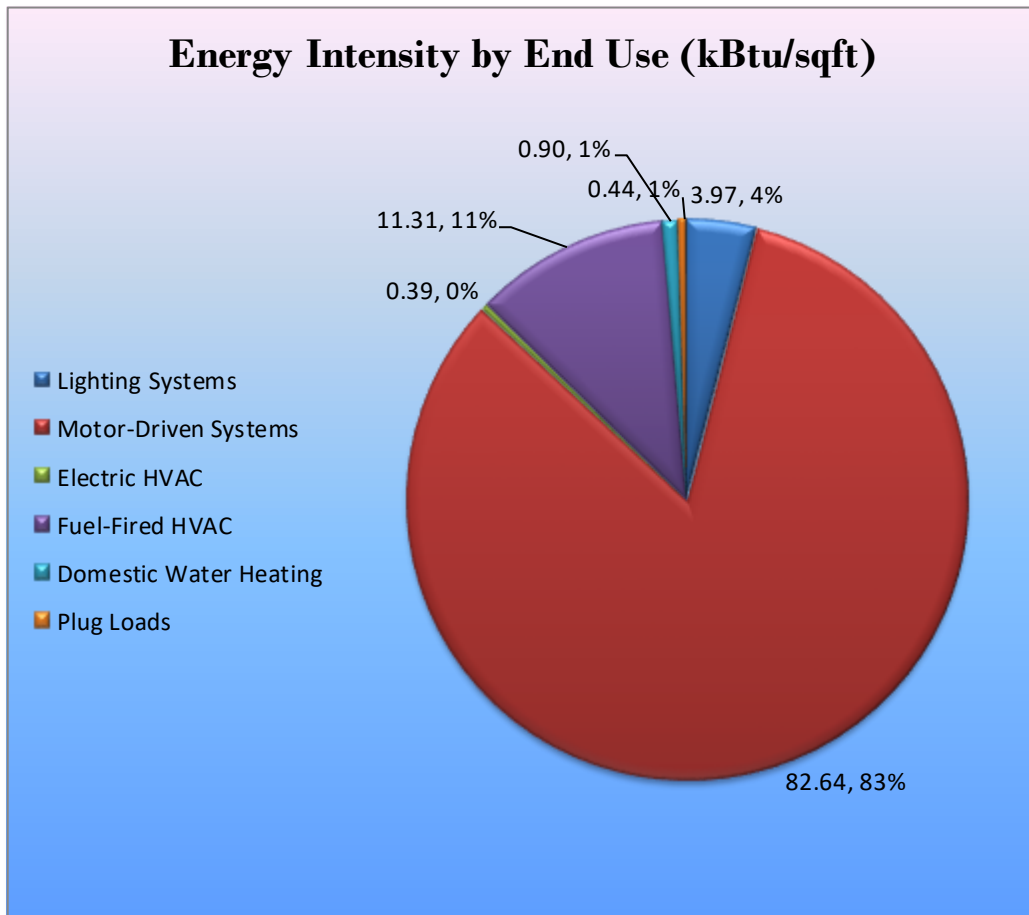
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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 21 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 22 – 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		44,530	10.4	0.0	\$4,888.30	\$34,060.10	\$715.00	\$33,345.10	6.8	44,841
ECM 1	Install LED Fixtures	27,422	4.5	0.0	\$3,010.28	\$21,212.10	\$185.00	\$21,027.10	7.0	27,614
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	9,044	3.1	0.0	\$992.85	\$8,248.00	\$530.00	\$7,718.00	7.8	9,108
ECM 3	Retrofit Fixtures with LED Lamps	8,064	2.8	0.0	\$885.18	\$4,600.00	\$0.00	\$4,600.00	5.2	8,120
Gas Heating (HVAC/Process) Replacement		0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513
ECM 4	Install High Efficiency Hot Water Boilers	0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513
TOTALS		44,530	10.4	64.3	\$5,724.67	\$47,309.99	\$1,929.40	\$45,380.59	7.9	55,355

* - 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 23 below.

Figure 23 – 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		44,530	10.4	0.0	\$4,888.30	\$34,060.10	\$715.00	\$33,345.10	6.8	44,841
ECM 1	Install LED Fixtures	27,422	4.5	0.0	\$3,010.28	\$21,212.10	\$185.00	\$21,027.10	7.0	27,614
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	9,044	3.1	0.0	\$992.85	\$8,248.00	\$530.00	\$7,718.00	7.8	9,108
ECM 3	Retrofit Fixtures with LED Lamps	8,064	2.8	0.0	\$885.18	\$4,600.00	\$0.00	\$4,600.00	5.2	8,120

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0
Exterior	27,422	4.5	0.0	\$3,010.28	\$21,212.10	\$185.00	\$21,027.10	7.0	27,614

Measure Description

We recommend replacing existing exterior fixtures containing metal halide and high-pressure sodium lamps with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a HID lamp.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	9,044	3.1	0.0	\$992.85	\$8,248.00	\$530.00	\$7,718.00	7.8	9,108
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tube.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	8,064	2.8	0.0	\$885.18	\$4,600.00	\$0.00	\$4,600.00	5.2	8,120
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

We recommend retrofitting existing interior high-pressure sodium lighting technologies with LED lamps. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

The facility should ensure that proposed lamps match the electrical parameters such as voltage, phase, pin and enclosure types before installation and ordering of equipment.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a HID lamp.

4.1.2 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 24 below.

Figure 24 - Summary of Gas-Fired Heating Replacement 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 ₂ e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513
ECM 4	Install High Efficiency Hot Water Boilers	0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513

ECM 4: Install High Efficiency Hot Water Boilers

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 ₂ e Emissions Reduction (lbs)
0	0.0	64.3	\$836.37	\$13,249.89	\$1,214.40	\$12,035.49	14.4	10,513

Measure Description

We recommend replacing older inefficient hot water boiler with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies of approximately 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. If the return water temperature drops below 130°F, the unit will enter “condensing mode” providing more efficient operation. Please be aware that condensing boilers are typically 10% - 15% more expensive than standard high efficiency boilers and should only be selected if the design conditions support “condensing mode” operation.

4.2 ECMs Evaluated But Not Recommended

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

Figure 25 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Control Measures	728	0.3	0.0	\$79.96	\$1,820.00	\$210.00	\$1,610.00	20.1	733
Install Occupancy Sensor Lighting Controls	612	0.2	0.0	\$67.19	\$1,620.00	\$210.00	\$1,410.00	21.0	616
Install High/Low Lighting Controls	116	0.0	0.0	\$12.77	\$200.00	\$0.00	\$200.00	15.7	117
TOTALS	728	0.3	0.0	\$79.96	\$1,820.00	\$210.00	\$1,610.00	20.1	733

* - 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).

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 ₂ e Emissions Reduction (lbs)
612	0.2	0.0	\$67.19	\$1,620.00	\$210.00	\$1,410.00	21.0	616

Measure Description

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

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

Reasons for not Recommending

The facility has relatively low hours of use. Additionally, the potential candidate rooms for occupancy sensors have few light fixtures of relatively low wattage. These factors combine to generate a long payback for the measure, more than the rated useful life of the replacement equipment. The measure is not recommended for implementation on the basis of energy savings alone.

Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
116	0.0	0.0	\$12.77	\$200.00	\$0.00	\$200.00	15.7	117

Measure Description

We typically recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

Reasons for not Recommending

The facility has relatively low hours of use. Additionally, the potential candidate rooms for high/low lighting control have few light fixtures of relatively low wattage. These factors combine to generate a long payback for the measure, more than the rated useful life of the replacement equipment. The measure is not recommended for implementation on the basis of energy savings alone.

5 ENERGY EFFICIENT PRACTICES

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Perform Routine Motor Maintenance

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

Use Fans to Reduce Cooling Load

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

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

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

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

6 ON-SITE GENERATION MEASURES

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

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

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

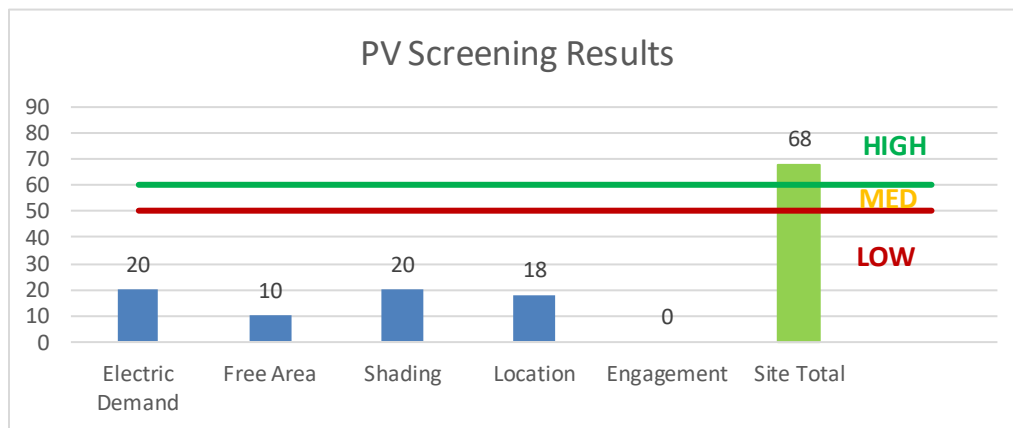
6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the **high** potential for PV at the site. A PV array located on the roof of the building may be feasible. If Sewage Treatment Plant is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 26 - Photovoltaic Screening



Potential	High	
System Potential	54	kW DC STC
Electric Generation	64,334	kWh/yr
Displaced Cost	\$5,600	/yr
Installed Cost	\$140,400	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project’s eligibility to earn SRECs. Registration of the intent to participate in New Jersey’s solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

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

- **Basic Info on Solar PV in NJ:** <http://www.njcleanenergy.com/whysolar>
- **NJ Solar Market FAQs:** <http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs>
- **Approved Solar Installers in the NJ Market:** http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

6.2 Combined Heat and Power

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

CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has a **Low** potential for installing a cost-effective CHP system.

7 DEMAND RESPONSE

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

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

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

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

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

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

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

In our opinion this building is not a good candidate for DR.

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	Install LED Fixtures	X		X			
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X		X			
ECM 3	Retrofit Fixtures with LED Lamps	X		X			
ECM 4	Install High Efficiency Hot Water Boilers	X		X			

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

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

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

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers

Electric Unitary HVAC

Gas Cooling

Gas Heating

Gas Water Heating

Ground Source Heat Pumps

Lighting

Lighting Controls

Refrigeration Doors

Refrigeration Controls

Refrigerator/Freezer Motors

Food Service Equipment

Variable Frequency Drives

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

Incentives

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

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at \$0.16/kWh and \$1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one year payback (whichever is less). Program incentives are capped at \$500,000 per electric account and \$500,000 per natural gas account, per fiscal year.

How to Participate

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

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

8.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with a peak electric demand that does not exceed 200 kW for any recent 12-month period. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

The program pays up to **70%** of the total installed cost of eligible measures, up to \$125,000 per project. Direct Install participants will also be held to a fiscal year cap of \$250,000 per entity.

How to Participate

To participate in the Direct Install program you will need to contact the participating contractor who the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Since Direct Install offers a free assessment of eligible measures, Direct Install is also available to small businesses and other commercial facilities too that may not be eligible for the more detailed facility audits provided by LGEA.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

8.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SRP prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

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

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

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

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

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

- (1) Use an Energy Services Company or "ESCO."
- (2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
- (3) Use a hybrid approach of the two options described above where the ESCO is utilized for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility is purchasing electricity from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

9.2 Retail Natural Gas Supply Options

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

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

If your facility is not purchasing natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility is purchasing natural gas from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

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
Main Room	11	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	2,080	Relamp	No	11	LED Screw-In Lamps: LED Lamp	Wall Switch	89	2,080	1.85	5,339	0.0	\$586.08	\$2,200.00	\$0.00	3.75
Main Room	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Switch Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.29	832	0.0	\$91.34	\$702.00	\$60.00	7.03
Switch Room	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Compressor Rm	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	955	0.0	\$104.81	\$972.00	\$95.00	8.37
Boiler Rm	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.19	555	0.0	\$60.89	\$468.00	\$40.00	7.03
Boiler Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Fuel Bldg	6	High-Pressure Sodium: (1) 100W Lamp	Wall Switch	138	2,080	Relamp	No	6	LED Screw-In Lamps: LED Lamp	Wall Switch	41	2,080	0.47	1,362	0.0	\$149.55	\$1,200.00	\$0.00	8.02
Sludge Pump Control Rm	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.05	139	0.0	\$15.22	\$117.00	\$10.00	7.03
Digester Bldg	10	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.48	1,387	0.0	\$152.23	\$1,170.00	\$100.00	7.03
Lime Rm	6	High-Pressure Sodium: (1) 100W Lamp	Wall Switch	138	2,080	Relamp	No	6	LED Screw-In Lamps: LED Lamp	Wall Switch	41	2,080	0.47	1,362	0.0	\$149.55	\$1,200.00	\$0.00	8.02
Rotating Screens	3	Compact Fluorescent: CFL-1L-17W	Wall Switch	17	2,080	None	No	3	Compact Fluorescent: CFL-1L-17W	Wall Switch	17	2,080	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Water Treatment Ext.	7	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	4,380	Fixture Replacement	No	7	LED - Fixtures: Outdoor Post-Mount	Wall Switch	29	4,380	0.38	2,304	0.0	\$252.92	\$4,013.10	\$35.00	15.73
Parking Lot	10	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	10	LED - Fixtures: Outdoor Post-Mount	Wall Switch	89	4,380	1.68	10,221	0.0	\$1,121.96	\$5,733.00	\$50.00	5.07
On Tanks	12	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	12	LED - Fixtures: Outdoor Post-Mount	Wall Switch	89	4,380	2.02	12,265	0.0	\$1,346.35	\$6,879.60	\$60.00	5.07
Digester Bldg Ext.	2	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Post-Mount	Wall Switch	29	4,380	0.11	658	0.0	\$72.26	\$1,146.60	\$10.00	15.73
Pump Bldg Ext.	5	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Post-Mount	Wall Switch	29	4,380	0.27	1,646	0.0	\$180.65	\$2,866.50	\$25.00	15.73
Generator Bldg Ext.	1	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Post-Mount	Wall Switch	29	4,380	0.05	329	0.0	\$36.13	\$573.30	\$5.00	15.73
Switch Room	9	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.43	1,248	0.0	\$137.01	\$1,053.00	\$90.00	7.03
Switch Room	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Generator Rm	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.38	1,109	0.0	\$121.78	\$936.00	\$80.00	7.03
Generator Rm	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Office 1	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,080	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,456	0.16	460	0.0	\$50.47	\$738.00	\$35.00	13.93
Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	5	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,080	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,456	0.20	575	0.0	\$63.08	\$785.00	\$0.00	12.44

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
Break Rm	6	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,080	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,456	0.24	690	0.0	\$75.70	\$972.00	\$35.00	12.38
Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.05	139	0.0	\$15.22	\$117.00	\$10.00	7.03
Men's Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Men's Rm	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,080	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,456	0.16	460	0.0	\$50.47	\$738.00	\$35.00	13.93
Lab Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lab Rm	4	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,080	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.31	908	0.0	\$99.65	\$796.00	\$95.00	7.03
Ladies Rm	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,080	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	318	0.0	\$34.94	\$504.00	\$55.00	12.85
Ladies Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

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
Sand Filter Bldg	Fuel Pump	2	Process Pump	0.2	85.5%	No	2,745	No	85.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sand Filter Bldg	Lime Mixer	2	Process Pump	3.0	89.5%	No	2,745	No	89.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sand Filter Bldg	Lime Mixer	2	Process Pump	2.0	88.5%	No	2,745	No	88.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sand Filter Bldg	RAS Pump	4	Process Pump	10.0	90.2%	Yes	3,391	No	90.2%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sand Filter Bldg	WAS Pump	2	Process Pump	5.0	88.5%	Yes	2,745	No	88.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sand Filter Bldg	Oxidation Ditches	3	Process Pump	30.0	93.3%	Yes	4,067	No	93.3%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Oxidation Ditches	2	Process Pump	30.0	93.6%	No	4,067	No	93.6%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Oxidation Ditches	2	Process Pump	40.0	94.1%	No	4,067	No	94.1%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	RAS Pump	2	Process Pump	10.0	90.2%	No	3,391	No	90.2%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Influent Pump 1	1	Process Pump	10.0	88.5%	Yes	3,391	No	88.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Influent Pump 2	1	Process Pump	20.0	93.0%	Yes	3,391	No	93.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Influent Pump 3	1	Process Pump	60.0	95.0%	Yes	5,329	No	95.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Influent Pump 4	1	Process Pump	60.0	95.0%	Yes	5,329	No	95.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sewage Treatment Plant	Sludge Thickening Pump	2	Process Pump	7.5	86.5%	No	3,391	No	86.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Centennial Village	Centennial Village	2	Process Pump	2.0	88.5%	No	2,745	No	88.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Morris Town	Morris Town	2	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
New Vennon	New Vennon	3	Process Pump	35.0	93.6%	No	4,067	No	93.6%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Clover Hill	Clover Hill	1	Process Pump	18.0	93.0%	No	3,391	No	93.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Clover Hill	Clover Hill	1	Process Pump	20.0	91.0%	No	3,391	No	91.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Valley Rd	Valley Rd	2	Process Pump	4.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Warren Union Rd	Warren Union Rd	2	Process Pump	14.0	92.4%	No	3,391	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sand Filter Bldg	Sand Filter Bldg	1	Process Pump	0.8	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions						Energy Impact & Financial Analysis								
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Sewage Treatment Plant	Sewage Treatment Plant	1	Packaged AC	5.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions				Proposed Conditions						Energy Impact & Financial Analysis					
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Sewage Treatment Plant	1	Non-Condensing Hot Water Boiler	552.00	Yes	1	Condensing Hot Water Boiler	552.00	91.00%	Et	0.00	0	64.3	\$836.37	\$13,249.89	\$1,214.40	14.39

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Sewage Treatment Plant	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Plug Load Inventory

Existing Conditions				
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Sewerage Treatment Plant	1	Medium Copier	515.0	No
Sewerage Treatment Plant	1	Microwave	1,000.0	No
Sewerage Treatment Plant	1	Large Refrigerator	600.0	No
Sewerage Treatment Plant	1	Medium Refrigerator	50.0	No
Sewerage Treatment Plant	1	Washer	900.0	No
Sewerage Treatment Plant	1	Dryer	1,600.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

For the purposes of this audit, the NJCEP LGEA program did not have access to actual influent flow meter readings and has concerns that the information available to us accurately reflects the plant's actual flow rates. Therefore, there is no Statement of Energy Performance (SEP) for this property. The NJCEP LGEA program has set up a profile within Portfolio Manager, but its intent is solely to provide Longhill Township with a method to track monthly utility bills.