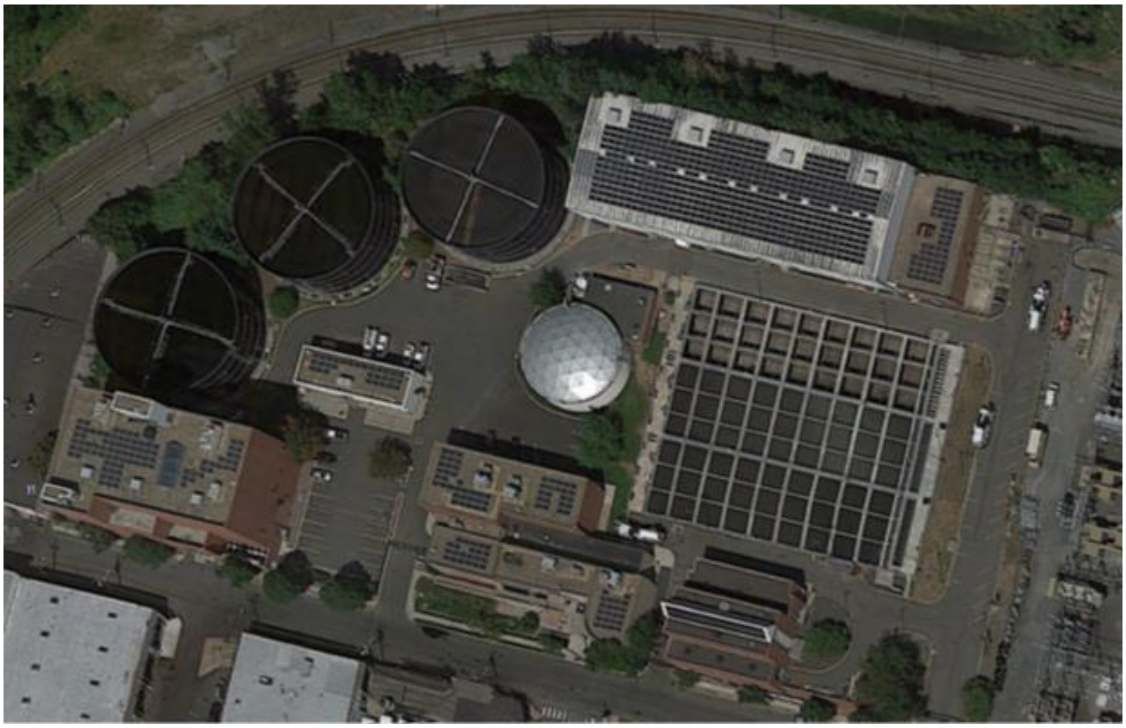
Local Government Energy Audit: Energy Audit Report



Adams Street Wastewater Treatment Plant

North Hudson Sewerage Authority
1600 Adams St.
Hoboken, New Jersey 07030
October 5, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for the Adams Street Wastewater Treatment Plant.

The goal of an LGEA is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and put you in a position to implement the ECMs. The LGEA also sets you on the path to receive financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing the ECMs.

TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist the New Jersey North Hudson Sewerage Authority in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

1.1 Facility Summary

Adams Street Wastewater Treatment Plant is a 335,940 square foot facility comprised of six buildings, three primary clarifiers, three trickle filter tanks, and one sludge holding tank. The plant is located in Hoboken, New Jersey.

Adams Street Wastewater Treatment Plant mostly consists of water treatment process equipment in well maintained operating condition, aging HVAC package units, and inefficient lighting in need of replacement. Five photovoltaic arrays are located throughout the facility, totaling 170kW (STC) of on-site generation capacity. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated five projects which represent an opportunity for Adams Street Wastewater Treatment Plant to reduce annual energy costs by roughly $76,030 and annual greenhouse gas emissions by 895,261 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would play for itself in roughly four years. The breakdown of existing and potential utility costs is illustrated in Figure 1 and Figure 2, respectively. These projects represent an opportunity to reduce Adams Street Wastewater Treatment Plant's annual energy use by 7.6%.

Figure 1 – Previous 12 Month Utility Costs

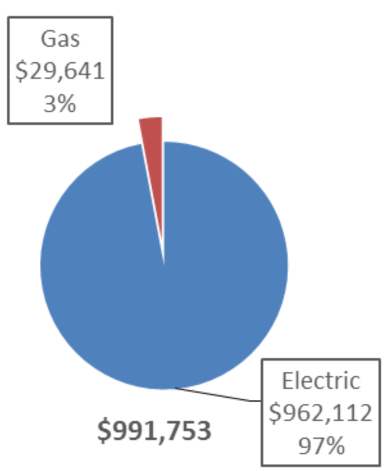
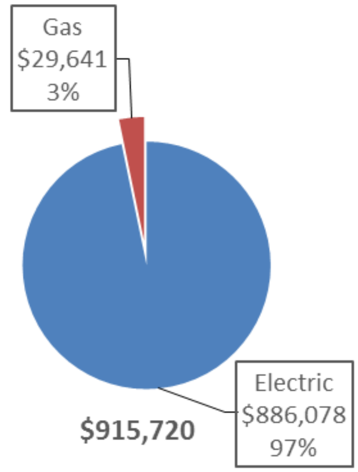


Figure 2 – Potential Post-Implementation Costs



A detailed description of Adams Street Wastewater Treatment Plant's existing energy use can be found in Section 3.

The evaluated measures have been listed and grouped into major categories as shown in Figure 3. Brief descriptions of the categories can be found below and descriptions of the individual opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated NJCEP Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**887,191**	**86.8**	**0.0**	**$75,871.48**	**$319,076.03**	**$15,700.00**	**$303,376.03**	**4.00**	**893,394**
ECM 1	Install LED Fixtures	830,462	73.3	0.0	$71,020.13	$276,798.26	$14,000.00	$262,798.26	3.70	836,269
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	38,336	10.1	0.0	$3,278.44	$34,545.24	$1,190.00	$33,355.24	10.17	38,604
ECM 3	Retrofit Fixtures with LED Lamps	2,667	0.9	0.0	$228.10	$3,335.04	$380.00	$2,955.04	12.96	2,686
Lighting Control Measures		**1,854**	**0.7**	**0.0**	**$158.58**	**$2,308.00**	**$1,345.00**	**$963.00**	**6.07**	**1,867**
ECM 4	Install Occupancy Sensor Lighting Controls	1,090	0.4	0.0	$93.25	$1,508.00	$260.00	$1,248.00	13.38	1,098
ECM 5	Install High/Low Lighitng Controls	764	0.3	0.0	$65.33	$800.00	$800.00	$0.00	0.00	769
TOTALS		**889,045**	**87.5**	**0.0**	**$76,030.06**	**$321,384.03**	**$17,045.00**	**$304,339.03**	**4.00**	**895,261**

* - 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 conditions allow. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Energy Efficient Practices

TRC also identified eight low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems. Through these practices equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance costs can be reduced. Opportunities identified at Adams Street Wastewater Treatment Plant include:

- Perform Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Maintenance on Compressed Air Systems
- 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 sources for Adams Street Wastewater Treatment Plant. The facility has already covered available roof area with photovoltaic (PV) arrays. The largest open area remaining for installing PV is over the primary clarifier tanks. Though feasible, this is a custom solution which substantially increases the cost. Based on the configuration of the site and its loads there is a high potential for installing a PV array. This is moderated by the complexity of the solution and the associated costs, lowering the potential to Medium.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	429	kW DC STC
Electric Generation	511,098	kWh/yr
Displaced Cost	$44,470	/yr
Installed Cost	$2,509,650	

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

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, the equipment changes outlined for each ECM need to be selected and installed through project implementation. One of the first considerations is if there is capital available for project implementation. Another consideration is whether to pursue individual ECMs, a group of ECMs, or a comprehensive approach wherein all ECMs are pursued, potentially in conjunction with other facility projects or improvements.

Rebates, incentives, and financing are available from the NJBPU, NJCEP, as well as some of the state's investor-owned utilities, to help reduce the costs associated with the implementation of energy efficiency projects. Please review the appropriate incentive program guidelines prior to implementing any project. This is important because in most cases you will need to submit an application for the incentives before purchasing materials and beginning installation.

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

- SmartStart
- Energy Savings Improvement Program (ESIP)
- Demand Response Aggregator

For facilities with capital available for implementation of selected individual measures or phasing implementation of selected measures over multiple years, incentives are available through the SmartStart (SS) program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to design the ECM(s), select the equipment and apply for the incentive(s). Program pre-approval is required for some SmartStart incentives, so only after receiving approval may the ECM(s) be installed.

For facilities without capital available 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 external project development, design, and implementation services as well as financing for implementing ECMs. This LGEA report is the first step for participating in ESIP and should help you determine next steps. Refer to Section 8.3 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a program (non-NJCEP) designed to reduce consumer electric load when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for the mid-Atlantic state region that is charged with maintaining electric grid reliability locally. By enabling grid operators to call upon Curtailment Service Providers and energy consumers 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 will receive payments whether or not their facility is called upon to curtail their load. Refer to Section 7 for additional information on this program.

Additional descriptions of all relevant incentive programs are located in Section 8 or: [www.njcleanenergy.com/ci.](www.njcleanenergy.com/ci)

To ensure projects are implemented such that maximum savings and incentives are achieved, bids and specifications should be reviewed by your procurement personnel and/or consultant(s) to ensure that selected equipment coincides with LGEA recommendations, as well as applicable incentive program guidelines and requirements.

2 Facility Information and Existing Conditions

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Fred J. Pocci P.E.	Authority Engineer	fpocci@nhudsonsacom	201-963-4685
Don Conger P.E.	Project Director	Don.Conger@CH2M.com	201 795 1411 x244
Designated Representative			
N/A	N/A	N/A	N/A
TRC Energy Services			
Brian Dattellas	Director	BDattellas@trcsolutions.com	<Phone #>

2.2 General Site Information

On May 04, 2016, TRC performed an energy audit at Adams Street Wastewater Treatment Plant located in Hoboken, NJ. TRC Energy Services' team met with Stephen Hudock to review the facility operations and focus the investigation on specific energy-using systems.

Adams Street Wastewater Treatment Plant is a 335,940 square foot facility comprised of six buildings, three primary clarifiers, three trickle filter tanks, and one sludge holding tank. The buildings were constructed in 1956.

2.3 Building Occupancy

Most aspects of the plant operate continuously. The typical occupancy schedule is presented in the table below. There are 46 staff members based at this site. Three people are on site from 10:00 PM to 6:00 AM.

Figure 6 – Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Preliminary Facilities Building (PFB)	Weekday	24/7
Preliminary Facilities Building (PFB)	Weekend	24/7
Admin Building (First Floor)	Weekday	24/7
Admin Building (First Floor)	Weekend	24/7
Admin Building (Second Floor)	Weekday	7AM - 7PM
Admin Building (Second Floor)	Weekend	
Sludge Blending Building	Weekday	24/7
Sludge Blending Building	Weekend	24/7
Trickling Filter Pump Station	Weekday	24/7
Trickling Filter Pump Station	Weekend	24/7
Solids Handling Building	Weekday	24/7
Solids Handling Building	Weekend	24/7
PURAC	Weekday	24/7
PURAC	Weekend	24/7

2.4 Building Envelope

The Solids Handling, Preliminary Facilities Handling, Sludge Blending, half of Administration and the east portion of the PURAC buildings are constructed out of concrete masonry units similar to large bricks. The other half of the Administration building is constructed out of brick and most of the PURAC building is constructed of tilt up concrete panels. All of the buildings generally have flat bitumen roofs with a tan top layer. The roofs generally look to be in good condition. There are very few windows in the entire facility, though most buildings have at least one metal roll-up door.

2.5 On-site Generation

Adams Street Wastewater Treatment Plant has a photovoltaic (PV) array consisting of 821 panels for a rated capacity of approximately 170 kW. The panels are located on the Administration, Preliminary Facilities, PURAC, Solids, and Trickling Filter Pump Station buildings. The system provides approximately 2% of the electricity required by the facility.

2.6 Energy-Using Systems

Please refer to Appendix A: Equipment Inventory & Recommendations for an inventory of your equipment.

Lighting System

Lighting is provided by a mix of fluorescent, high pressure sodium, and metal halide fixtures. The high pressure sodium and metal halide fixtures are used primarily in process areas or for exterior lighting. The fluorescent fixtures are used primarily in office and support areas. There are minimal number of fixtures that use light emitting diode (LED) lamps.

Approximately 20% of the light fixtures are controlled by occupancy sensors. These are primarily located in offices, labs, and restrooms.

Hot Water / Steam System

The Administration building hot water system consists of four Aerco 1,000 kBtu/hr output, condensing boilers (BR1, 2, 3 & 4). The boilers have a rated combustion efficiency of 93%, however, we assume that the heating water typically returns at 130°F which equates to a combustion efficiency of 87%. The boilers are configured in a constant flow primary distribution with two 15 hp hot water pumps (HHWP1 & 2). The boilers serve hot water radiators/convectors in the Administration building.

The boilers operate in a lead/lag configuration. The site typically operates two boilers, though three may be required during cold weather. The lead boiler is rotated regularly.

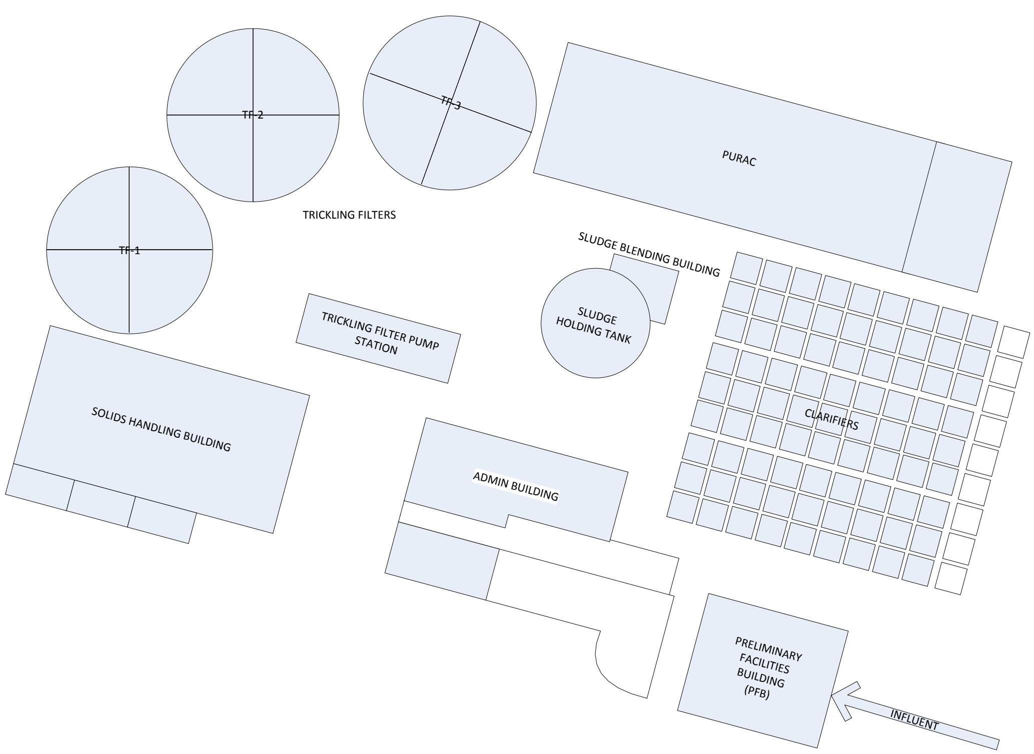
The boilers are in good condition and well maintained.

Air Conditioning (DX)

Four Engineered Air direct-expansion (DX) package units (AHU 1, 2, 3, & 4) with a gas fired furnace and outside air economizer are used to condition the Administration building. The units are located on the roof of the building. The units provide constant air volume with a single 5 hp supply fan and a 3 hp return fan. The units have a minimum outside air dampers (no outside air economizer to utilize free cooling when the outside air temperature is lower than the return air temperature). The gas fired furnace provides heating as needed. The unit is controlled by a programmable thermostat located in the zones.

Wastewater Treatment

Figure 7 – Adams Street Facility



Effluent Quality Requirements

The Plant has a design flow rate of 20.8 million gallons per day (MGD). In 2015, the plant took in 13.14 MGD of influent with a biochemical/biological oxygen demand (BOD) of approximately 150 mg/L. It produced, on average, effluent with a BOD of 16 mg/L. The plant recirculates approximately 28% of the flow back through the trickle filters so the effective flow rate is near 13.1 MGD.

Effluent standards applicable to direct discharges to surface water in New Jersey are:

1. The monthly average value shall not exceed 30 mg/L;
2. The weekly average value shall not exceed 45 mg/L; and
3. The monthly average value for percent removal shall not be less than 85 percent.

In addition, the secondary treatment must meet the following quality:

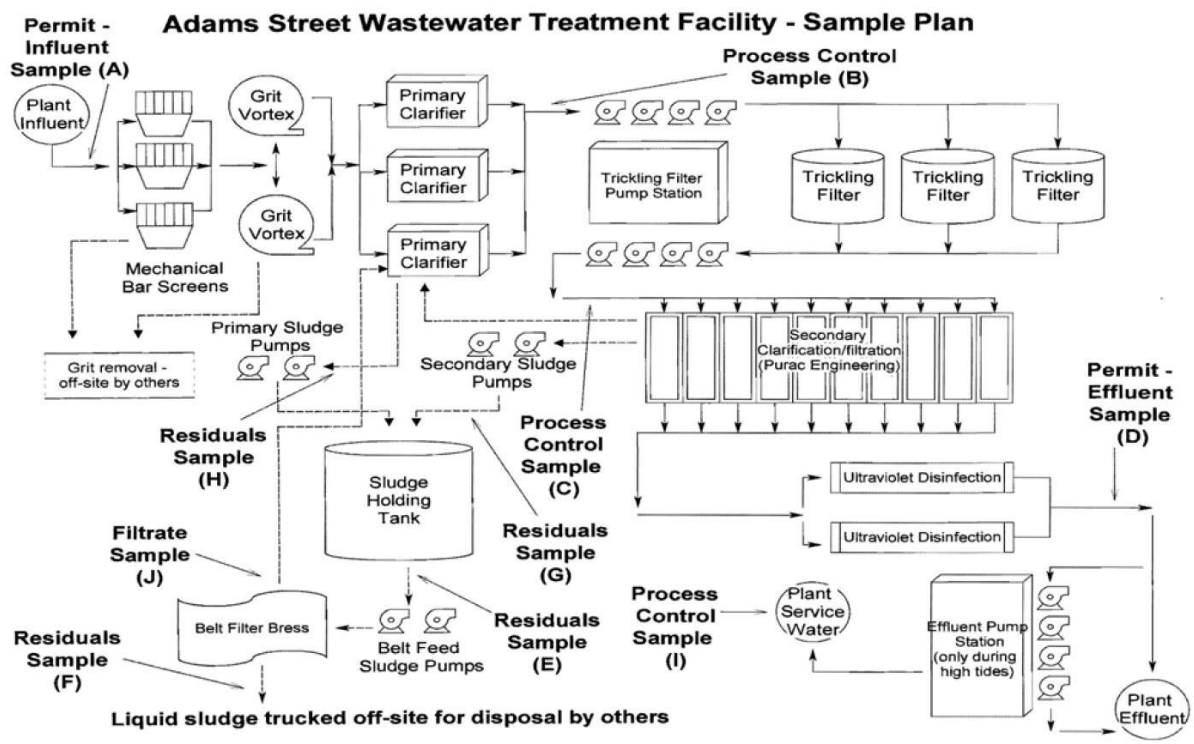
- 30 day BOD average of 20 mg/l
- 7 day BOD average of 30 mg/l
- Daily maximum of 45 mg/l

The Adams Street plant achieves a removal rate of approximately 89% which is desirable.

Plant Process

The following represents the plant process flow.

Figure 8 – Process Flow Diagram



As indicated in the diagram above, influent enters the plant at point A, the Preliminary Facilities Building (PFB). In this building, the first stage of the process occurs. The influent enters two mechanical bar screens where large, inorganic debris is extracted. The debris are then dropped onto a conveyor and transferred to a dumpster for removal to a local landfill.

Figure 9 – Bar Screens

The mechanical bar screens do not operate continuously. The site staff stated that they run once per hour for about 15 minutes. The screens, however, continually catch the inorganic debris. Once the debris builds up the mechanical bar screen elevates it to the conveyor and the debris is removed from the process. The bar screens are driven by 2 hp motors.

Figure 10 – Grit Vortex Paddle Motor

Before the raw sewage can move on to primary clarification, it must go through grit removal. Grit consists of sand, gravel, cinder, eggshells, and other inorganic matter and must be removed to protect downstream equipment. This process occurs in the PFB in the Grit Vortex.

The screened influent enters tangentially and flows around the upper chamber. Adjustable, rotating paddles, driven by a 5 hp constant speed motor, operate continuously to augment the spiraling flow to create a mechanically induced vortex which settles the grit, transports it to the center opening of the fixed floor plate for collection in the lower chamber, and lifts and returns the lighter organic particles to the main flow. The grit solids are removed from the lower chamber for further washing and dewatering.

Figure 11 – Primary Clarifiers

After leaving the Grit Vortex the sewerage enters the Primary Clarifiers.

Primary clarification is the physical treatment process of removing solids before biological treatment. Process water enters the clarifier tank and floatable solids (scum) are removed from the surface by skimmers while heavier solids (sludge) are collected on the bottom by a rake and removed via a sludge removal system. Two of the three clarifiers are in operation at all times while a third is used during periods of high volume. There are three ¾ hp motors per clarifier that drive the skimmers.

Figure 12 – Trickling Filter Tanks

The water from the primary clarifier is discharged to the trickling filter tanks while the solid waste (sludge) and floatable solids (scum) are sent to the sludge holding tank (SHT).

Figure 14 – Sludge Holding Tank

Figure 13 – Belt Presses

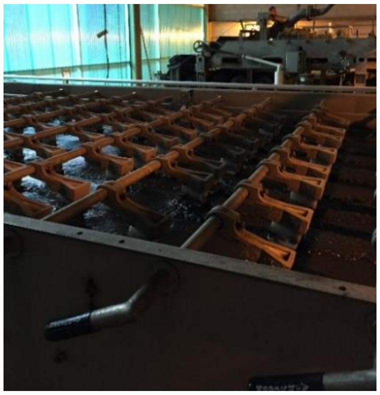


Figure 15 – PURAC

Figure 16 – UV Disinfection

Trickling filter tanks are the principal key to the efficiency of this wastewater treatment process. A trickling filter is a type of wastewater treatment system that consists of rocks, lava, gravel, slag, polyurethane foam, etc., or in this case the plastic media, shown below. The sewage or wastewater flows downward over the media causing a layer of microbial slime (biofilm) to grow, covering the media. Aerobic conditions are maintained by splashing, diffusion and by forced air flowing through the bed or natural convection of air if the filter is porous.

Sludge Holding Tanks provide storage and blending for the thickened waste activated sludge, primary sludge, and scum before further processing.

Belt filter presses further reduce the water content of sludge so that it may be efficiently burned, forming a cake of 20% to 25% solids. Polymers are also used here to enhance process performance. The extracted liquids are returned to the liquid process for treatment.

After the belt filter presses complete the process of reducing the liquid content of the sludge, the sludge is then collected and carted to a larger facility (Passaic Valley Sewerage Treatment) for disposal and/or repurposing as fertilizer or fill. No disposal of sludge is performed at the Adams Street facility.

Once the sludge is removed from the process the water that is to be introduced back into the environment is then sent to the secondary clarification process in the "Purac" building. Purac is the company that provides the technology for this secondary clarification that is similar to the primary clarification in so far as the scum is removed from the top of the water via a continuous skimming process.

After the Purac process is complete the water goes through an ultraviolet (UV) disinfection process as a final step before it is discharged to the Hudson River as effluent with acceptable levels. The UV disinfection is one of the most energy intensive aspects of the entire process. The UV system consists of 634 low pressure lamps rated at 240 W each. As energy intensive as UV disinfection is it is not recommended that it be modified at this time. It is not likely there will be a reasonable cost benefit ratio for replacing the UV disinfection with an alternate disinfection system. In addition, the criticality of maintaining the measurable disinfection level is put ahead of the energy efficiency aspect of the process and this plant is very effective in terms of the effluent produced.

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/ft^2,energy use/ft^2, and energy use per effluent flow. These energy use indices are indicative of the relative energy effectiveness of this building. There are a number of factors that could cause the energy use of this facility to vary from the "typical" energy use for other facilities identified as: Wastewater Treatment. Specific local climate conditions, variations in effluent flow, and the types of systems used to process the effluent. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

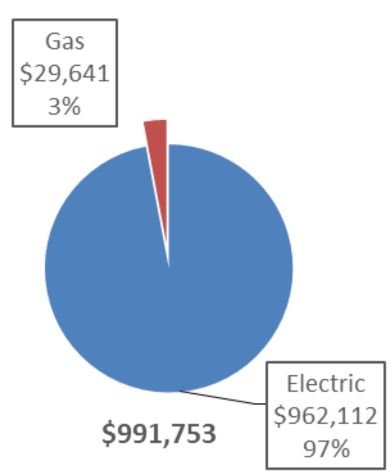
The following energy consumption and cost data are based on the last 12 month period of utility usage data that was provided for each utility. The annual consumption and cost were developed from this information.

Figure 17 – Utility Summary

Utility Summary for Adams Street Wastewater Treatment Plant		
Fuel	Usage	Cost
Electricity	8,600,592 kWh	$962,112
Natural Gas	34,034 Therms	$29,641
Total		$991,753

The current utility cost for this site is $991,753 as shown in the chart below.

Figure 18 – Energy Cost Breakdown



3.2 Electricity Usage

Electricity is supplied by Constellation and transported by PSE&G. The average electric cost (combined for commodity, transmission and distribution) for the past 12 months is $0.086/kWh, which is the blended rate used throughout the analyses in this report. The rate schedules for both utilities include a demand cost for power capacity. The electric demand costs account for 25% of the total electricity costs and 24% of the total energy costs at Adams Street. The purchased monthly electricity consumption and peak demand is represented graphically in the chart below. The site also produces approximately 169,000 kWh annually from the PV array (this is not reflected in the chart and table of purchased electricity below). The annual profile is consistent for a facility that uses electricity primarily for process equipment.

Figure 19 –Electric Usage & Demand

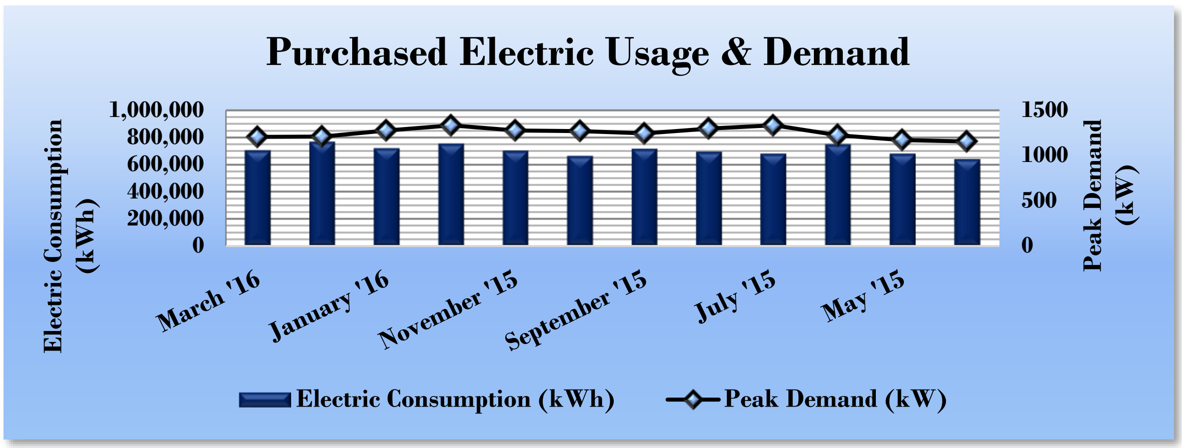


Figure 20 –Electric Usage & Demand

Electric Billing Data for Adams Street Wastewater Treatment Plant					
Period Ending	Days in Period	Purchased Electricity (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
4/13/2016	30	700,330	1,207.50	$19,446	$66,002
3/14/2016	32	764,664	1,208.20	$19,430	$112,052
2/11/2016	29	716,423	1,278.70	$20,542	$69,173
1/13/2016	33	751,012	1,334.20	$21,434	$73,812
12/11/2015	31	698,582	1,277.30	$20,520	$72,986
11/10/2015	29	659,381	1,270.90	$20,417	$71,670
10/12/2015	31	711,217	1,247.00	$20,033	$75,766
9/11/2015	30	691,326	1,298.90	$20,849	$86,448
8/12/2015	29	677,894	1,334.90	$21,417	$86,341
7/14/2015	32	746,154	1,224.00	$19,638	$90,907
6/12/2015	30	677,294	1,170.70	$18,783	$85,152
5/13/2015	29	637,332	1,155.70	$18,542	$71,803
Totals	**365**	**8,431,609**	**1334.9**	**$241,051**	**$962,112**
Annual	**365**	**8,431,609**	**1334.9**	**$241,051**	**$962,112**

*Annual purchased total does not include 169,000 kWh from the PV array.

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.871/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is represented graphically in the chart below. The annual profile is consistent with natural gas being used primarily for space heating.

Figure 21 –Natural Gas Usage

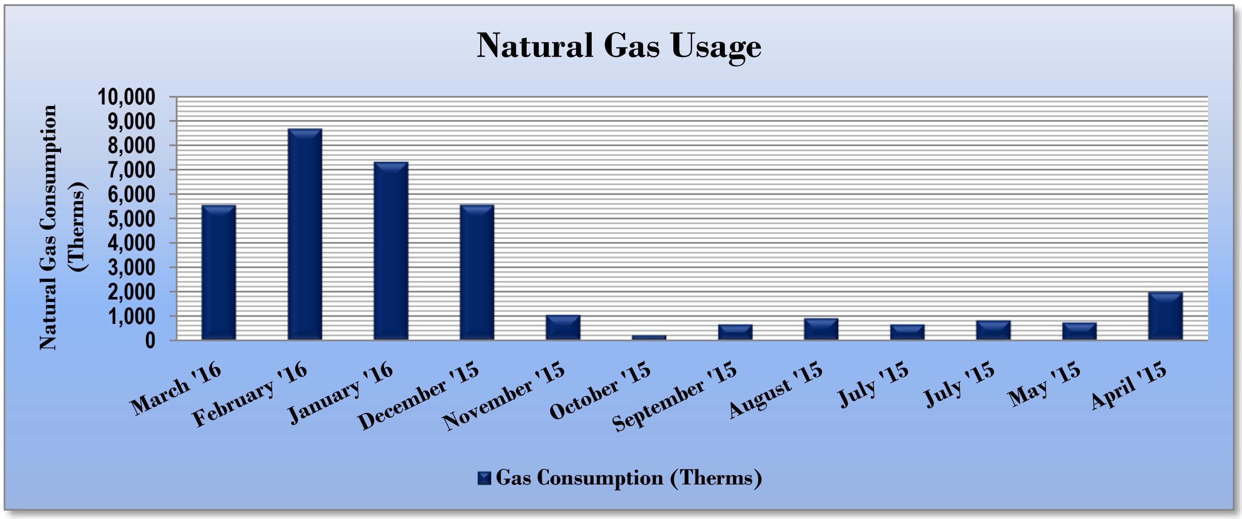


Figure 22 –Natural Gas Usage

Gas Billing Data for Adams Street Wastewater Treatment Plant			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/13/2016	30	5,538.61	$2,937
3/14/2016	32	8,669.74	$6,342
2/11/2016	29	7,318.62	$6,193
1/13/2016	33	5549.381	$5,231
12/11/2015	31	1037.844	$2,478
11/10/2015	28	203.747	$2,001
10/13/2015	29	645.705	$561
9/14/2015	33	899.565	$723
8/12/2015	27	647.304	$580
7/16/2015	34	813.969	$674
6/12/2015	28	736.496	$622
5/15/2015	31	1972.559	$1,299
Totals	**365**	**34,034**	**$29,641**
Annual	**365**	**34,034**	**$29,641**

3.4 Benchmarking

This facility was manually benchmarked with a spreadsheet as well as automatically with 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 compares its performance against a yearly baseline, national medians, or similar buildings in your portfolio. We also benchmarked the facility by comparing the energy use per influent flow against similar facilities. Metrics used in this comparison are the energy use intensity (EUI) and ENERGY STAR® score.

The EUI is a measure of a facility's energy consumption relative to another standard metric of the facility, typically building area in square feet, 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 the specific building uses more energy than similar buildings on an indexed basis or if that building performs better than the median. EUI is presented in both 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 is the raw fuel consumed to generate the energy consumed at the site, factoring in energy production and distribution losses. The EPA uses source energy divided the average plant flow in gallons per day as the EUI for wastewater treatment plants.

Figure 23 – Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Adams Street Wastewater Treatment Plant	National Median Building Type: Wastewater Treatment
Source Energy Use Intensity (kBtu/ft^2)	281.3	283.4
Site Energy Use Intensity (kBtu/ft^2)	97.5	98.5
Source Energy Use Intensity (kBtu/gal/day)	5.6	5.7

The wastewater median EUI is the EPA Energy Star portfolio manager median.

By implementing all recommended measures covered in this reporting, the project's estimated post-implementation EUI improves as shown in the table below:

Figure 24 – Energy Use Intensity Comparison – Following Installation of Recommended Measures

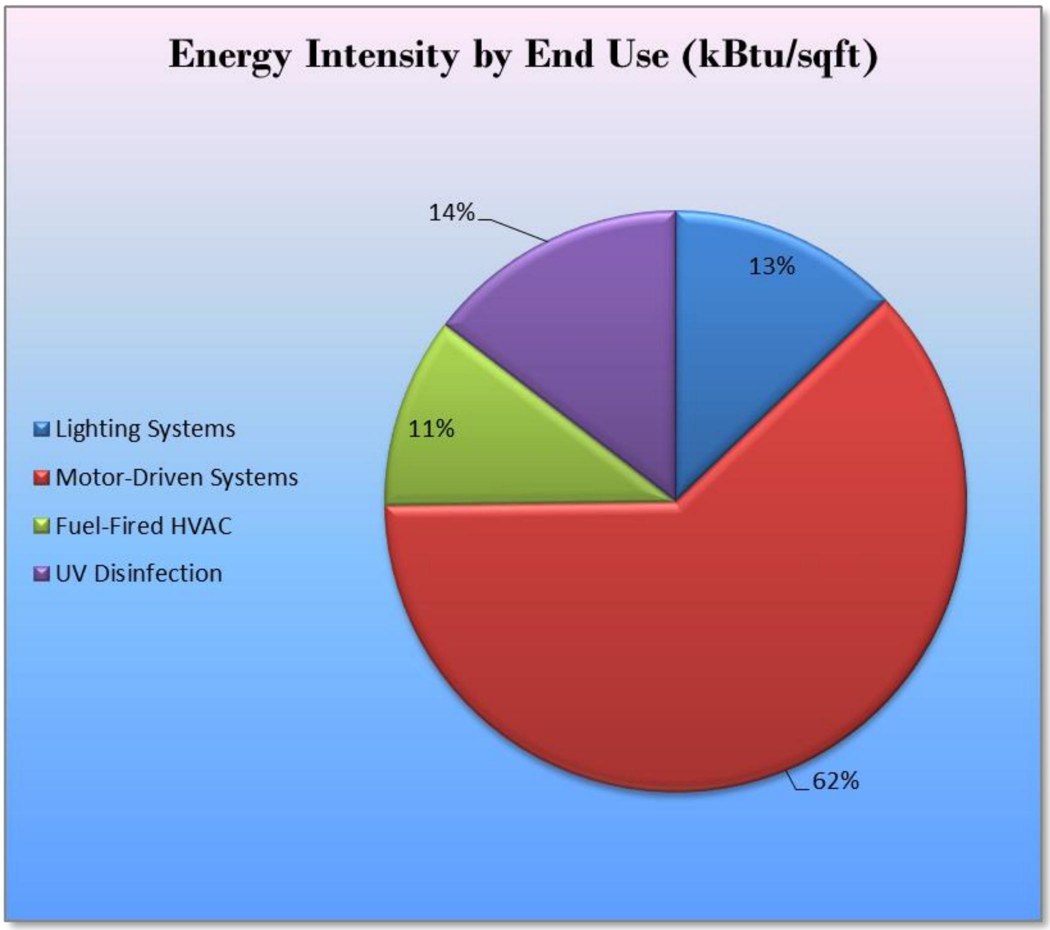
Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Adams Street Wastewater Treatment Plant	National Median Building Type: Wastewater Treatment
Source Energy Use Intensity (kBtu/ft^2)	252.9	283.4
Site Energy Use Intensity (kBtu/ft^2)	88.5	98.5
Source Energy Use Intensity (kBtu/gal/day)	5.4	5.7

Many buildings can also receive a 1 – 100 ENERGY STAR® score. This score 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. Although the facility compares slightly better than the national median of wastewater treatment plants it has a very low ENERGY STAR® score. This is due to other non-EUI factors considered by ENERGY STAR® as well as a very steep scoring curve (i.e. small changes have large effects on the score).

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 and determine their proportional contribution to overall building energy usage. This visual representation of energy end uses highlights systems that may benefit most from energy efficiency projects.

Figure 25 – Energy Balance (%)



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 Adams Street Wastewater 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.

Figure 26 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated NJCEP Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**887,191**	**86.8**	**0.0**	**$75,871.48**	**$319,076.03**	**$15,700.00**	**$303,376.03**	**4.00**	**893,394**
ECM 1	Install LED Fixtures	830,462	73.3	0.0	$71,020.13	$276,798.26	$14,000.00	$262,798.26	3.70	836,269
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	38,336	10.1	0.0	$3,278.44	$34,545.24	$1,190.00	$33,355.24	10.17	38,604
ECM 3	Retrofit Fixtures with LED Lamps	2,667	0.9	0.0	$228.10	$3,335.04	$380.00	$2,955.04	12.96	2,686
Lighting Control Measures		**1,854**	**0.7**	**0.0**	**$158.58**	**$2,308.00**	**$1,345.00**	**$963.00**	**6.07**	**1,867**
ECM 4	Install Occupancy Sensor Lighting Controls	1,090	0.4	0.0	$93.25	$1,508.00	$260.00	$1,248.00	13.38	1,098
ECM 5	Install High/Low Lighitng Controls	764	0.3	0.0	$65.33	$800.00	$800.00	$0.00	0.00	769
TOTALS		**889,045**	**87.5**	**0.0**	**$76,030.06**	**$321,384.03**	**$17,045.00**	**$304,339.03**	**4.00**	**895,261**

* - 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 Lighting Upgrades

Our recommendations for upgrades lighting upgrades include several *submeasures,* as outlined in Figure 27 below.

Figure 27 – 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 NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**887,191**	**86.8**	**0.0**	**$75,871.48**	**$319,076.03**	**$15,700.00**	**$303,376.03**	**4.00**	**893,394**
ECM 1	Install LED Fixtures	830,462	73.3	0.0	$71,020.13	$276,798.26	$14,000.00	$262,798.26	3.70	836,269
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	38,336	10.1	0.0	$3,278.44	$34,545.24	$1,190.00	$33,355.24	10.17	38,604
ECM 3	Retrofit Fixtures with LED Lamps	2,667	0.9	0.0	$228.10	$3,335.04	$380.00	$2,955.04	12.96	2,686

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 NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	769,654	63.3	0.0	$65,819.84	$245,548.80	$10,800.00	$234,748.80	3.57	775,035
Exterior	60,809	10.0	0.0	$5,200.29	$31,249.46	$3,200.00	$28,049.46	5.39	61,234

Measure Description

This measure evaluates replacing existing fixtures containing fluorescent, HID, and incandescent lamps with new high performance LED light fixtures. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output.

Maintenance savings are anticipated since LED sources have burn hours which are generally more than twice that of a fluorescent source and more than 10 times incandescent sources. Maintenance savings may be partially offset by the higher material costs associated with LED sources.

During planning and design for the installation of new fixtures, we recommend a holistic approach that considers both the technology of the lighting sources and how they are controlled.

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 NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	38,336	10.1	0.0	$3,278.44	$34,545.24	$1,190.00	$33,355.24	10.17	38,604
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

This measure evaluates replacing linear fluorescent lamps, ballasts, and reflectors with LED tube lamps, reflectors, and drivers specifically designed for existing linear fluorescent fixtures. The retrofit uses the existing fixture housing but replaces the rest of the components with an efficient source and reflectors designed for LEDs. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output and efficiently projects the light into the space.

Maintenance savings are anticipated since LED sources have burn hours which are more than twice that of a fluorescent source. Maintenance savings may be partially offset by the higher material costs associated with LED sources.

During retrofit planning and design, we recommend a holistic approach that considers both the technology of the lighting sources and how they are controlled.

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 NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	2,667	0.9	0.0	$228.10	$3,335.04	$380.00	$2,955.04	12.96	2,686
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

This measure evaluates replacing linear fluorescent lamps with LED tube lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed although there is a fluorescent fixture ballast in place. Other tube lamps require that fluorescent fixture ballasts be removed or replaced with LED drivers. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output.

Maintenance savings are anticipated since LED sources have burn hours which are more than twice that of a fluorescent source. LED lamps that use the existing fluorescent fixture ballast will be constrained by the remaining hours of the ballast. Maintenance savings may be partially offset by the higher material costs associated with LED sources.

During retrofit planning and design, we recommend a holistic approach that considers both the technology of the lighting sources and how they are controlled.

4.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 28 below.

Figure 28 – 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 NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**1,854**	**0.7**	**0.0**	**$158.58**	**$2,308.00**	**$1,345.00**	**$963.00**	**6.07**	**1,867**
ECM 4	Install Occupancy Sensor Lighting Controls	1,090	0.4	0.0	$93.25	$1,508.00	$260.00	$1,248.00	13.38	1,098
ECM 5	Install High/Low Lighitng Controls	764	0.3	0.0	$65.33	$800.00	$800.00	$0.00	0.00	769

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,090	0.4	0.0	$93.25	$1,508.00	$260.00	$1,248.00	13.38	1,098

Measure Description

This measure evaluates installing occupancy sensors to control light fixtures that are currently manually controlled in a few areas throughout the facility. Sensors detect occupancy using ultrasonic and/or infrared wave technologies. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Occupants will also be able to manually turn off fixtures. Energy savings result 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. Ceiling-mounted or remote-mounted sensors require the use of low voltage switching relays or a wireless signal to the switch. In general, use wall switch replacement sensors for single occupant offices and other small rooms. Install ceiling-mounted or remote mounted sensors in locations without local switching, in situations where the existing wall switches are not in the line-of-sight of the main work area, and in large spaces. We recommend a holistic design approach that considers both the technology of the lighting sources and how they are controlled.

Maintenance savings are anticipated due to reduced lamp operation, however, additional maintenance costs may be incurred because the occupancy sensors may require periodic adjustment; it is anticipated that the net effect on maintenance costs will be negligible.

ECM 5: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated NJCEP Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
764	0.3	0.0	$65.33	$800.00	$800.00	$0.00	0.00	769

Measure Description

This measure evaluates installing occupancy sensors to provide dual level lighting control for light fixtures in spaces that are infrequently occupied but require continuous or night lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots and parking garages.

The light fixtures 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 wave technologies. The lighting systems are switched to the high level setting when an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period.

For this application the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage should be provided to turn lights on in an area as an occupant approaches the area.

Maintenance savings are anticipated due to reduced lamp operation, however, additional maintenance costs may be incurred because the occupancy sensors may require periodic adjustment; it is anticipated that the net effect on maintenance costs will be negligible.

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 low or no-cost efficiency strategies. By employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance 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 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.

Ensure Lighting Controls Are Operating Properly

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

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.

Check for and Seal Duct Leakage

Duct leakage in commercial buildings typically accounts for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building, significantly increasing cooling and heating costs. By sealing sources of leakage, cooling, heating, and ventilation energy use can be reduced significantly, depending on the severity of air leakage.

Perform Maintenance on Compressed Air Systems

Like all electro-mechanical equipment, compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan should be developed for process related compressed air systems to include inspection, cleaning, and replacement of inlet filter cartridges, cleaning of drain traps, daily inspection of lubricant levels to reduce unwanted friction, inspection of belt condition and tension, checking for system leaks and adjustment of loose connections, and overall system cleaning. Contact a qualified technician for help with setting up periodic maintenance schedule.

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

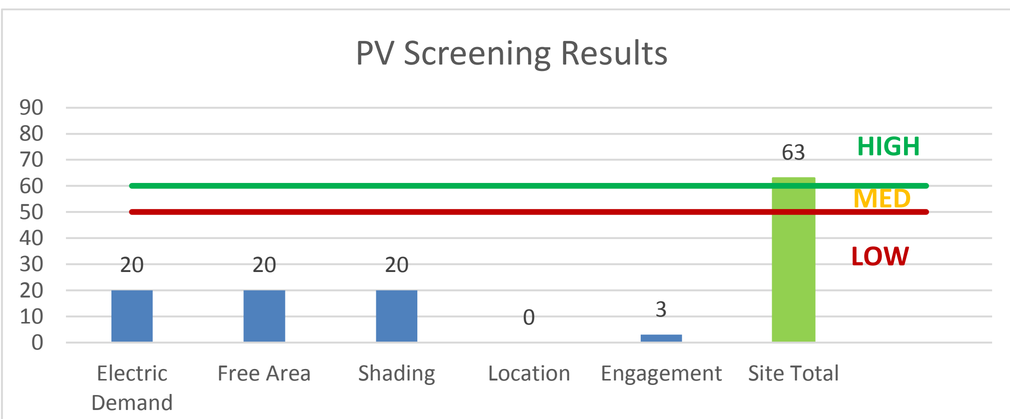
Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical 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.

The Adams Street plant has numerous photovoltaic arrays, located on the rooftops of some of the buildings on site. The rated capacity is as follows:

	Rated Power kW (STC)	Approximate kW (AC)	Number of Sharp 208 W Modules
Administration Building	20.60	16.47	99
Preliminary Facilities Building	9.20	7.30	44
PURAC Building	116.48	93.18	560
Solids Building	18.30	14.60	88
Trickling Filter Pump Station	6.24	5.00	30
TOTALS	***170.82***	***136.55***	***821***

The site staff expressed an interest in expanding the PV capacity at Adams Street by adding PV arrays over the trickle filter tanks and primary clarifiers. A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that there is still high potential for installing a PV arrays. This is moderated by the complexity of the solution and the associated costs, lowering the potential to Medium. Adding panels to the roof of the two trickle filter tanks would more than double the current annual PV output at the site - which is currently about 2% of the annual usage. There appears to be room for an additional 264 kW of PV capacity by adding panels over the primary clarifiers. Installing PV arrays over either of these systems, especially the clarifiers, would be more difficult and hence more expensive than installing a ground based PV array or installing PV on a typical building. It is recommended that the site staff consult with a PV installer to determine what would be required to install PV arrays at either of the locations.

Figure 29 – Photovoltaic Screening



Potential	Medium	
System Potential	429	kW DC STC
Electric Generation	511,098	kWh/yr
Displaced Cost	$44,470	/yr
Installed Cost	$2,509,650	

Rebates are not available for solar projects, but owners of 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 the pipeline of anticipated new solar capacity and insight into future SREC pricing. Refer to Section 8.6 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

In non-industrial settings, combined heat and power (CHP) is the on-site generation of electricity and recovery of heat which is put to beneficial use. Common prime movers in CHP applications include reciprocating engines, microturbines, fuel cells, and (at large facilities) gas turbines. Electricity is typically interconnected to the site's local distribution system. Heat is recovered from the exhaust stream and the ancillary cooling system and interconnected to the existing hot water (or steam) distribution system.

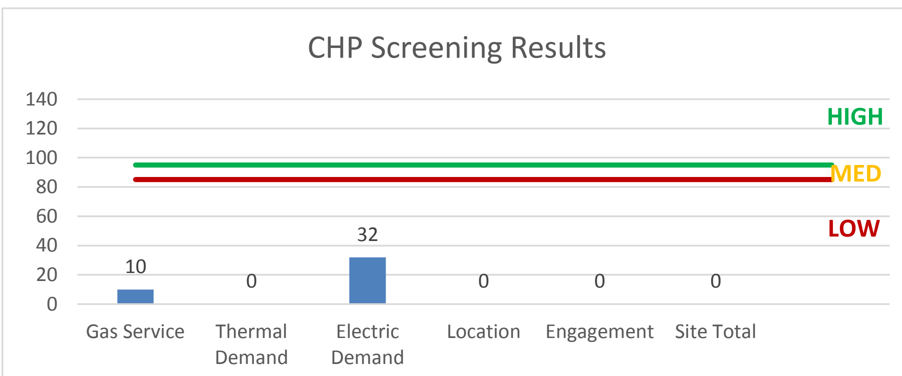
CHP systems are typically used to produce a portion of the electricity needed by a facility, with the balance of electric needs satisfied by purchase from the grid. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

Figure 30 – Combined Heat and Power Screening



7 Demand Response

Demand Response (DR) is a program designed to reduce consumer electric load when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. 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 locally.

By enabling grid operators to call upon Curtailment Service Providers and energy consumers 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 will receive payments whether or not their facility is called upon to curtail their load.

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 program often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual utility 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 event cycle. DR program participants often have to install smart meters and 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 the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

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.

8.1 SmartStart

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 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.

8.3 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 into 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 the incentive programs to help further reduce costs when compiling the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

8.4 Demand Response Energy Aggregator

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

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

See Section 7 for additional information.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Basement	9	Linear Fluorescent - T12HO: 8' T12HO (110W) - 2L	Wall Switch	252	2,184	Relamp & Reballast	Yes	9	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	80	1,529	1.27	3,853	0.0	$329.47	$2,315.04	$495.00	5.52
Basement	2	Linear Fluorescent - T8HO: 8' T8HO (86W) - 2L	Wall Switch	160	2,184	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	80	1,529	0.15	454	0.0	$38.85	$586.01	$60.00	13.54
Basement	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,184	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	40	1,529	0.15	446	0.0	$38.10	$821.01	$80.00	19.45
Maintenance Office	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	1,529	None	No	5	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	1,529	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Corridor outside Maintenance Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	8,760	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Wall Switch	34	8,760	0.08	981	0.0	$83.90	$470.00	$0.00	5.60
Phil Reeve's Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	62	1,529	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.08	171	0.0	$14.64	$470.00	$0.00	32.10
Maintenance Holding Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,184	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	80	1,529	0.13	380	0.0	$32.50	$821.01	$80.00	22.80
Maintenance Bull Pen	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,184	Relamp & Reballast	No	3	LED - Linear Tubes: U LED -2L	Wall Switch	34	2,184	0.06	183	0.0	$15.69	$352.50	$0.00	22.47
West Side Foyer	2	Incandescent: 4" round high hat fixtures, (40 W)	Wall Switch	40	8,760	Relamp	No	2	LED Screw-In Lamps: Hi hat	Wall Switch	6	8,760	0.05	596	0.0	$50.94	$107.51	$20.00	1.72
Entrance Corridor	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	8,760	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Wall Switch	34	8,760	0.11	1,332	0.0	$113.87	$470.00	$0.00	4.13
Men's Locker/Restroom	5	CFL Screw-In Lamps: 4" round high hat fixtures, (15 W)	Wall Switch	15	2,184	Relamp	No	5	LED Screw-In Lamps: Hi hat	Wall Switch	6	2,184	0.03	98	0.0	$8.40	$268.77	$50.00	26.03
Men's Locker/Restroom	2	Incandescent: 4" round high hat fixtures, (40W)	Wall Switch	40	1,000	Relamp	No	2	LED Screw-In Lamps: Hi hat	Wall Switch	6	1,000	0.05	68	0.0	$5.82	$107.51	$20.00	15.05
Men's Locker/Restroom	1	Linear Fluorescent - T12: 3' T12 (30W) - 2L	None	79	2,184	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 3' lamps	High/Low Control	26	1,529	0.04	133	0.0	$11.36	$317.50	$35.00	24.88
Lobby North Wall	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	8,760	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	40	8,760	0.21	2,523	0.0	$215.75	$705.01	$60.00	2.99
Lobby North Wall	12	Linear Fluorescent - T12: 3' T12 (30W) - 2L	Wall Switch	79	8,760	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 3' lamps	Wall Switch	26	8,760	0.46	5,571	0.0	$476.46	$1,410.00	$0.00	2.96
Entrance Lobby Ceiling	20	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	8,760	Relamp & Reballast	No	20	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	20	8,760	0.37	4,555	0.0	$389.56	$1,175.02	$100.00	2.76
Entrance Lobby Walls	7	Halogen: Wall Sconces	Wall Switch	150	2,184	Fixture Replacement	No	7	LED Fixture: Decorative Wall Mount	Wall Switch	20	2,184	0.66	1,987	0.0	$169.96	$1,050.00	$0.00	6.18
Lecture Hall	16	Incandescent: Decorative Globe Lamp 40G40 Clear	High/Low Control	40	500	Relamp	No	16	LED Screw-In Lamps: Globe	High/Low Control	6	500	0.39	272	0.0	$23.26	$860.05	$160.00	30.10
Lecture Hall	18	LED Screw-In Lamps: 4" round PAR Recessed fixture	Wall Switch	18	500	None	Yes	18	LED Screw-In Lamps: 4" round PAR Recessed fixture	Occupancy Sensor	18	350	0.07	49	0.0	$4.16	$116.00	$20.00	23.10
Lecture Hall	23	Halogen: MR-16 lamps	Wall Switch	40	500	Relamp	No	23	LED Plug-in Lamps: plug in MR 16	Wall Switch	8	500	0.53	368	0.0	$31.47	$1,236.25	$115.00	35.63
Lecture Hall	5	Incandescent: Spots	Wall Switch	80	100	Relamp	No	5	LED Screw-In Lamps: Spots	Wall Switch	6	100	0.27	37	0.0	$3.16	$268.77	$50.00	69.14

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Wrap-Around Corridor	11	Halogen: Wall Sconces	Wall Switch	150	8,760	Fixture Replacement	No	11	LED Fixture: Decorative Wall Mount	Wall Switch	20	8,760	1.03	12,527	0.0	$1,071.28	$1,650.00	$0.00	1.54
Wrap-Around Corridor	9	CFL Screw-In Lamps: 6" recessed PAR fixtures	Wall Switch	23	8,760	Relamp	No	9	LED Screw-In Lamps: Recessed Par	Wall Switch	15	8,760	0.05	631	0.0	$53.94	$968.88	$45.00	17.13
Wrap-Around Corridor	4	Incandescent: 6" recessed PAR fixtures	Wall Switch	40	8,760	Relamp	No	4	LED Screw-In Lamps: Recessed Par	Wall Switch	15	8,760	0.07	876	0.0	$74.91	$430.61	$20.00	5.48
Control Room	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	40	8,760	None	No	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	40	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Elevator Machine Room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	50	Relamp & Reballast	No	1	LED - Linear Tubes: U LED -2L	Wall Switch	34	50	0.03	2	0.0	$0.16	$117.50	$0.00	723.14
North Entrance Vestibule	2	CFL Screw-In Lamps: 6" recessed PAR fixtures	Wall Switch	23	2,184	Relamp	No	2	LED Screw-In Lamps: Recessed Par	Wall Switch	15	2,184	0.01	35	0.0	$2.99	$215.31	$10.00	68.70
North Entrance Vestibule	1	Incandescent: 6" recessed PAR fixtures	Wall Switch	40	2,184	Relamp	No	1	LED Screw-In Lamps: Recessed Par	Wall Switch	15	2,184	0.02	55	0.0	$4.67	$107.65	$5.00	21.98
North Entrance Vestibule	1	LED Screw-In Lamps: 6" recessed PAR fixtures	Wall Switch	18	2,184	None	No	1	LED Screw-In Lamps: 6" recessed PAR fixtures	Wall Switch	18	2,184	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Open Lab Area	22	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	22	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.60	1,278	0.0	$109.30	$2,585.00	$0.00	23.65
Bio Lab	6	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	6	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.16	349	0.0	$29.81	$705.00	$0.00	23.65
Bio Office 1	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.11	232	0.0	$19.87	$470.00	$0.00	23.65
Bio Office 2	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	2	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.05	116	0.0	$9.94	$235.00	$0.00	23.65
Chemical Storage	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	2	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.05	116	0.0	$9.94	$235.00	$0.00	23.65
Steve Hudock's office	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.11	232	0.0	$19.87	$470.00	$0.00	23.65
First Aid Room	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	2	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.05	116	0.0	$9.94	$235.00	$0.00	23.65
Janitor's Closet	1	Linear Fluorescent - T12: 3' T12 (30W) - 2L	Wall Switch	79	100	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 3' lamps	Wall Switch	26	100	0.04	5	0.0	$0.45	$117.50	$0.00	259.24

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Administrative area	12	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,184	Relamp & Reballast	No	12	LED - Linear Tubes: U LED -2L	Wall Switch	34	2,184	0.33	996	0.0	$85.17	$1,410.00	$0.00	16.56
Don Conger's office	5	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,184	Relamp & Reballast	Yes	5	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.17	526	0.0	$45.01	$703.50	$20.00	15.18
Men's Room	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	3	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.08	174	0.0	$14.90	$352.50	$0.00	23.65
Men's Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Occupancy Sensor	88	1,529	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	40	1,529	0.03	73	0.0	$6.28	$117.50	$10.00	17.13
Ladies' room	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	3	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.08	174	0.0	$14.90	$352.50	$0.00	23.65
Ladies' room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Occupancy Sensor	88	1,529	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	40	1,529	0.03	73	0.0	$6.28	$117.50	$10.00	17.13
Main Kitchen	6	LED Screw-In Lamps: 4" recessed HH fixtures	Wall Switch	15	2,184	None	No	6	LED Screw-In Lamps: 4" recessed HH fixtures	Wall Switch	15	2,184	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Kitchen	3	Halogen: MR-16 lamps	Wall Switch	50	2,184	Relamp	No	3	LED Plug-in Lamps: plug in MR 16	Wall Switch	8	2,184	0.09	275	0.0	$23.53	$161.25	$15.00	6.21
Cafeteria	8	LED Screw-In Lamps: 4" recessed HH fixtures	Wall Switch	15	2,184	None	Yes	8	LED Screw-In Lamps: 4" recessed HH fixtures	Occupancy Sensor	15	1,529	0.03	79	0.0	$6.72	$116.00	$20.00	14.28
Cafeteria	3	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,184	Relamp & Reballast	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	20	1,529	0.07	210	0.0	$17.93	$292.25	$35.00	14.35
Garage/Storage	9	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	9	LED - Fixtures: Other	Wall Switch	40	8,760	0.96	11,668	0.0	$997.86	$2,540.16	$0.00	2.55
Library (off Garage)	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,184	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	80	1,529	0.15	446	0.0	$38.10	$586.01	$60.00	13.81
2n Floor Computer Room	6	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	6	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.16	349	0.0	$29.81	$705.00	$0.00	23.65
Billing Area	10	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	10	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.27	581	0.0	$49.68	$1,175.00	$0.00	23.65
Elevator Lobby	8	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,184	Relamp & Reballast	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	20	2,184	0.15	454	0.0	$38.85	$470.01	$40.00	11.07
Elevator Lobby	2	Halogen: Wall Sconces	Wall Switch	150	2,184	Fixture Replacement	No	2	LED Fixture: Decorative Wall Mount	Wall Switch	20	2,184	0.19	568	0.0	$48.56	$300.00	$0.00	6.18
Office (Karen)	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.11	232	0.0	$19.87	$470.00	$0.00	23.65
Office (Melissa)	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	2	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.05	116	0.0	$9.94	$235.00	$0.00	23.65
Office (Fred)	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	4	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.11	232	0.0	$19.87	$470.00	$0.00	23.65
Open Space (Bullpen)	9	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	9	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.25	523	0.0	$44.71	$1,057.50	$0.00	23.65
File Closet	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	250	Relamp & Reballast	No	1	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	250	0.03	10	0.0	$0.81	$117.50	$0.00	144.63

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Attorney's Office	7	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	7	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.19	407	0.0	$34.78	$822.50	$0.00	23.65
Closet	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	50	Relamp & Reballast	No	1	LED - Linear Tubes: U LED -2L	Wall Switch	34	50	0.03	2	0.0	$0.16	$117.50	$0.00	723.14
Ladies' room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,184	Relamp & Reballast	Yes	1	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.03	105	0.0	$9.00	$233.50	$20.00	23.72
Ladies' room	1	Linear Fluorescent - T12: 3' T12 (30W) - 2L	Wall Switch	79	2,184	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 3' lamps	Occupancy Sensor	26	1,529	0.04	133	0.0	$11.36	$233.50	$20.00	18.80
Men's Room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,184	Relamp & Reballast	Yes	1	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.03	105	0.0	$9.00	$233.50	$20.00	23.72
Men's Room	1	Linear Fluorescent - T12: 3' T12 (30W) - 2L	Wall Switch	79	2,184	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 3' lamps	Occupancy Sensor	26	1,529	0.04	133	0.0	$11.36	$233.50	$20.00	18.80
Kitchenette	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	2	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.05	116	0.0	$9.94	$235.00	$0.00	23.65
Exec Director's Office	8	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	8	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.22	465	0.0	$39.75	$940.00	$0.00	23.65
Conference Room	9	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	9	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.25	523	0.0	$44.71	$1,057.50	$0.00	23.65
Engineer's Room	12	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	12	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.33	697	0.0	$59.62	$1,410.00	$0.00	23.65
Stairwell Corridor	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Occupancy Sensor	72	1,529	Relamp & Reballast	No	1	LED - Linear Tubes: U LED -2L	Occupancy Sensor	34	1,529	0.03	58	0.0	$4.97	$117.50	$0.00	23.65
Back Corridor	21	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,184	Relamp & Reballast	Yes	21	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	20	1,529	0.48	1,468	0.0	$125.51	$1,633.77	$840.00	6.32
2 - Stairwells	6	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,184	Relamp & Reballast	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	20	2,184	0.11	341	0.0	$29.14	$352.51	$30.00	11.07
Trickling Filter Pump Station Bldg	10	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	10	LED - Fixtures: Other	Wall Switch	40	8,760	1.07	12,965	0.0	$1,108.73	$2,822.40	$0.00	2.55
Preliminary Facilities Building (PFB)	28	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	28	LED - Fixtures: Other	Wall Switch	40	8,760	2.98	36,301	0.0	$3,104.46	$7,902.72	$0.00	2.55
Preliminary Facilities Building (PFB)	10	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	10	LED - Fixtures: High-Bay	Wall Switch	240	8,760	6.05	73,584	0.0	$6,292.81	$26,852.00	$1,500.00	4.03
Solids Handling Building (SHB)	22	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	22	LED - Fixtures: High-Bay	Wall Switch	240	8,760	13.31	161,885	0.0	$13,844.19	$59,074.40	$3,300.00	4.03
Solids Handling Building (SHB)	2	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	2	LED - Fixtures: Other	Wall Switch	40	8,760	0.21	2,593	0.0	$221.75	$564.48	$0.00	2.55

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Solids Handling Building (SHB)	1	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	1	LED - Fixtures: Other	Wall Switch	40	8,760	0.11	1,296	0.0	$110.87	$282.24	$0.00	2.55
SHB Maintenance Shop	5	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	5	LED - Fixtures: High-Bay	Wall Switch	240	8,760	3.02	36,792	0.0	$3,146.41	$13,426.00	$750.00	4.03
SHB Maintenance Shop	8	Linear Fluorescent - T12HO: 8' T12HO (110W) - 2L	Wall Switch	252	2,184	Relamp & Reballast	No	8	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	80	2,184	0.99	3,005	0.0	$257.00	$1,880.03	$160.00	6.69
SHB Maintenance Shop	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,184	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	40	2,184	0.07	210	0.0	$17.93	$235.00	$20.00	11.99
Fraq Tank for Sludge	2	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	2	LED - Fixtures: High-Bay	Wall Switch	240	8,760	1.21	14,717	0.0	$1,258.56	$5,370.40	$300.00	4.03
Fraq Tank for Sludge	4	Linear Fluorescent - T12HO: 8' T12HO (110W) - 2L	Wall Switch	252	2,184	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	80	2,184	0.50	1,503	0.0	$128.50	$940.02	$80.00	6.69
Fraq Tank for Sludge	2	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	2	LED - Fixtures: Other	Wall Switch	40	8,760	0.21	2,593	0.0	$221.75	$564.48	$0.00	2.55
SHB Gasifier	20	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	20	LED - Fixtures: Other	Wall Switch	40	8,760	2.13	25,930	0.0	$2,217.47	$5,644.80	$0.00	2.55
SHB Gasifier	12	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	12	LED - Fixtures: Other	Wall Switch	40	8,760	1.28	15,558	0.0	$1,330.48	$3,386.88	$0.00	2.55
SHB Truck Bay	4	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	4	LED - Fixtures: Other	Wall Switch	40	8,760	0.43	5,186	0.0	$443.49	$1,128.96	$0.00	2.55
SHB Truck Bay	3	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	3	LED - Fixtures: High-Bay	Wall Switch	240	8,760	1.81	22,075	0.0	$1,887.84	$8,055.60	$450.00	4.03
SHB Generator Room	6	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	6	LED - Fixtures: Other	Wall Switch	40	8,760	0.64	7,779	0.0	$665.24	$1,693.44	$0.00	2.55
SHB Generator Room	3	Linear Fluorescent - T12HO: 8' T12HO (110W) - 2L	Wall Switch	252	2,184	Relamp & Reballast	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	80	2,184	0.37	1,127	0.0	$96.37	$705.01	$60.00	6.69
Purac (Top Level)	17	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	17	LED - Fixtures: Other	Wall Switch	40	8,760	1.81	22,040	0.0	$1,884.85	$4,798.08	$0.00	2.55
Purac (Top Level)	27	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	27	LED - Fixtures: High-Bay	Wall Switch	240	8,760	16.33	198,677	0.0	$16,990.60	$72,500.40	$4,050.00	4.03
Purac (Office)	8	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,184	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	40	1,529	0.35	1,048	0.0	$89.65	$1,056.02	$100.00	10.66
Purac (2nd Level)	26	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	26	LED - Fixtures: Other	Wall Switch	40	8,760	2.77	33,708	0.0	$2,882.71	$7,338.24	$0.00	2.55
Purac (UV Room)	24	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	24	LED - Fixtures: Other	Wall Switch	40	8,760	2.56	31,116	0.0	$2,660.96	$6,773.76	$0.00	2.55
Sludge Blending Bldg (SBB)	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,184	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	40	2,184	0.14	419	0.0	$35.86	$470.01	$40.00	11.99
Sludge Blending Bldg (SBB)	7	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	7	LED - Fixtures: Other	Wall Switch	40	8,760	0.75	9,075	0.0	$776.11	$1,975.68	$0.00	2.55
Sludge Blending Bldg (SBB)	3	Metal Halide: (1) 1000W Lamp	Wall Switch	1,080	8,760	Fixture Replacement	No	3	LED - Fixtures: High-Bay	Wall Switch	240	8,760	1.81	22,075	0.0	$1,887.84	$8,055.60	$450.00	4.03
SBB - Tunnel	17	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	8,760	Fixture Replacement	No	17	LED - Fixtures: Other	Wall Switch	40	8,760	1.81	22,040	0.0	$1,884.85	$4,798.08	$0.00	2.55

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Preliminary Facilities Building (PFB)	5	Halogen: 150W Lamp	Wall Switch	150	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	43	4,380	0.39	2,343	0.0	$200.40	$1,953.39	$500.00	7.25
Solids Handling Building (SHB)	5	Halogen: 150W Lamp	Wall Switch	150	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	43	4,380	0.39	2,343	0.0	$200.40	$1,953.39	$500.00	7.25
Sludge Blending Bldg (SBB)	5	Halogen: 150W Lamp	Wall Switch	150	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	43	4,380	0.39	2,343	0.0	$200.40	$1,953.39	$500.00	7.25
Poles around PC Tank	12	Metal Halide: (2) 400W Lamps	None	916	4,368	Fixture Replacement	No	12	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	240	4,368	5.84	35,433	0.0	$3,030.21	$23,435.92	$1,200.00	7.34
Loading Dock	3	Metal Halide: (1) 1000W Lamp	None	1,080	4,368	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	240	4,368	1.81	11,007	0.0	$941.34	$1,172.03	$300.00	0.93
Side of Loading Dock	2	Metal Halide: (1) 1000W Lamp	None	1,080	4,368	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	240	4,368	1.21	7,338	0.0	$627.56	$781.35	$200.00	0.93

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/ System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Preliminary Facilities Building	1st	1	Other	2.0	86.5%	No	2,190	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	2.0	86.5%	No	2,190	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	2.0	86.5%	No	2,190	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	15.0	92.4%	Yes	8,760	No	92.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	15.0	92.4%	Yes	8,760	No	92.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	15.0	92.4%	Yes	8,760	No	92.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	15.0	92.4%	Yes	8,760	No	92.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	5.0	89.5%	Yes	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	5.0	89.5%	Yes	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	1.0	85.5%	No	8,760	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	1	Other	1.0	85.5%	No	8,760	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	3	Other	0.8	81.1%	No	8,760	No	81.1%	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 NJCEP Incentives	Simple Payback w/ Incentives in Years
Preliminary Facilities Building	1st	3	Other	0.8	81.1%	No	8,760	No	81.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Preliminary Facilities Building	1st	3	Other	0.8	81.1%	No	1,460	No	81.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Administration Building	Basement	1	Heating Hot Water Pump	15.0	93.0%	No	3,391	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Administration Building	Basement	1	Heating Hot Water Pump	15.0	93.0%	No	3,391	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	215.0	95.8%	Yes	8,760	No	95.8%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	214.0	95.8%	Yes	8,760	No	95.8%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	215.0	95.8%	Yes	8,760	No	95.8%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	215.0	95.8%	Yes	8,760	No	95.8%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	130.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	130.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	130.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Trickling Filter Pump Station	Wet Well	1	Other	134.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	1st	1	Other	5.0	89.5%	Yes	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/ System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total NJCEP Incentives	Simple Payback w/ Incentives in Years
Solids Building	1st	1	Other	5.0	89.5%	Yes	2,745	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	1st	1	Other	15.0	93.0%	No	2,920	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	1st	1	Other	15.0	93.0%	No	2,920	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	Basement	1	Other	15.0	93.0%	Yes	3,391	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	Basement	1	Other	15.0	93.0%	Yes	3,391	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	Basement	1	Other	10.0	91.7%	Yes	12	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	3rd	1	Other	7.5	91.0%	Yes	3,391	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	3rd	1	Other	10.0	91.7%	Yes	3,391	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	3rd	1	Other	7.5	91.0%	Yes	4,015	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	3rd	1	Other	10.0	91.7%	Yes	4,015	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Solids Building	Outside	1	Other	20.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	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 NJCEP Incentives	Simple Payback w/ Incentives in Years
PURAC	Basement	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	40.0	94.1%	Yes	8,760	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	50.0	94.5%	Yes	8,760	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	50.0	94.5%	Yes	8,760	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	50.0	94.5%	Yes	8,760	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	50.0	94.5%	Yes	8,760	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	50.0	94.5%	Yes	8,760	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	Basement	1	Other	50.0	94.5%	Yes	8,760	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	16.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	16.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	16.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	0.5	78.2%	No	8,760	No	78.2%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	2nd	1	Other	25.0	93.6%	No	4,380	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	2nd	1	Other	25.0	93.6%	No	4,380	No	93.6%	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 NJCEP Incentives	Simple Payback w/ Incentives in Years
PURAC	2nd	1	Other	10.0	91.7%	No	4,380	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	2nd	1	Other	10.0	91.7%	No	4,380	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	5.0	89.5%	Yes	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PURAC	1st	1	Other	5.0	89.5%	Yes	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	10.0	91.7%	Yes	8,760	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	10.0	91.7%	Yes	8,760	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	20.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	20.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	20.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	20.0	93.0%	Yes	8,760	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	5.0	89.5%	Yes	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Basement	1	Other	3.0	89.5%	Yes	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sludge Blending	Outside	1	Other	5.0	89.5%	No	8,760	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	Outside	1	Other	100.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	Outside	1	Other	100.0	95.4%	Yes	8,760	No	95.4%	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 NJCEP Incentives	Simple Payback w/ Incentives in Years
Effluent Pump Station	Outside	1	Other	100.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	Outside	1	Other	100.0	95.4%	Yes	8,760	No	95.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	1st	1	Other	10.0	91.7%	Yes	8,760	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	1st	1	Other	10.0	91.7%	Yes	8,760	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	Basement	1	Water Supply Pump	7.5	91.0%	Yes	8,760	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Effluent Pump Station	Basement	1	Water Supply Pump	7.5	91.0%	Yes	8,760	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory

Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Cooling Mode Efficiency (SEER/EER)	Manufacturer	Model Number	Equipment Age (Years)
Administration Roof	Administration Building	4	Packaged AC	10.00	12.00	Engineered Air	DJE40/CO	10
Administration Roof	Administration Building	1	Split-System AC	10.00	12.00	Engineered Air	DJE40/CO	10
Solids Handling Roof	Solids Handling Makeup Air	2	Packaged AC	0.00	n/a	McQuay	R08708BY	10

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 NJCEP Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Admin Bldg	4	Condensing Hot Water Boiler	1,000.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Process Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
UV Disinfection	634	UV Disinfection LPS lamps	240.0	