Local Government Energy Audit:
Energy Audit Report

Pump Stations 1-6

Landing, NJ 07850

Mt. Arlington, NJ 07856

Stanhope, NJ 07874

Musconetcong Sewerage Authority

June 7, 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 Pump Stations 1-6.

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

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

1.1 Facility Summary

Six Musconetcong pump stations are included in this study with a total enclosed area of 1,960 square feet. Pump Station 1 is the largest, comprising 800 square feet. Pump Stations 2 through 6 consist of buildings/structures that are 228 square feet, 216 square feet, 280 square feet, 280 square feet, and 156 square feet respectively. The pump stations mostly consist of submerged centrifugal pumps with associated motors and aging and inefficient lighting. All the pumps are controlled by VFDs. There is no cooling at any of the buildings, and heating is supplied by electric resistance heaters mounted to the ceilings. 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 measures and recommends one measure which represents an opportunity for Musconetcong pump stations to reduce annual energy costs by $52 and annual greenhouse gas emissions by 424 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 0.1 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Note that Figure 2 describes savings evaluated compared to savings to be implemented. Together these measures represent an opportunity to reduce Musconetcong pump stations annual energy use by <1%.

Figure 1 – Previous 12 Month Utility Costs

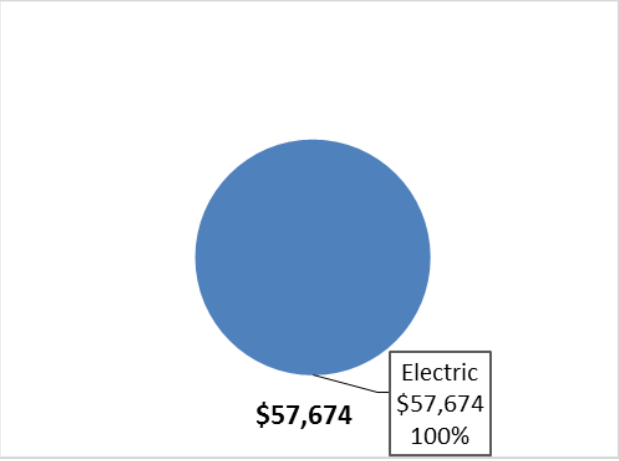
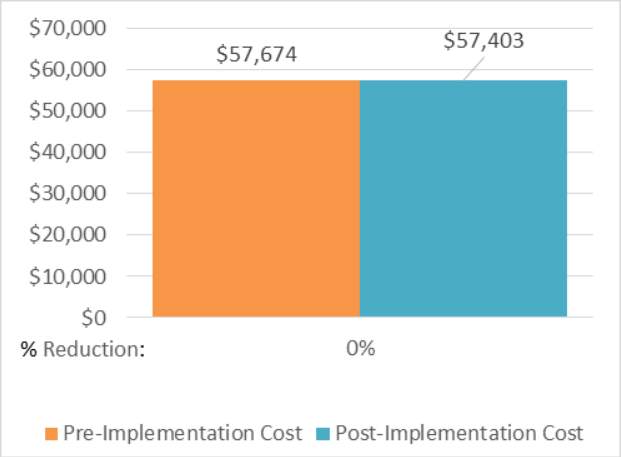


Figure 2 – Potential Post-Implementation Costs



A detailed description of Pump Stations 1-6's existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**1,655**	**3.3**	**0.0**	**$205.12**	**$10,139.85**	**$1,835.00**	**$8,304.85**	**40.5**	**1,667**
	Install LED Fixtures	No	457	0.9	0.0	$56.68	$5,469.48	$1,400.00	$4,069.48	71.8	461
	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	No	431	0.8	0.0	$53.38	$2,340.00	$200.00	$2,140.00	40.1	434
	Retrofit Fixtures with LED Lamps	No	767	1.5	0.0	$95.06	$2,330.37	$235.00	$2,095.37	22.0	772
Lighting Control Measures			**117**	**0.2**	**0.0**	**$14.47**	**$3,240.00**	**$420.00**	**$2,820.00**	**194.8**	**118**
	Install Occupancy Sensor Lighting Controls	No	117	0.2	0.0	$14.47	$3,240.00	$420.00	$2,820.00	194.8	118
Domestic Water Heating Upgrade			**421**	**0.0**	**0.0**	**$52.15**	**$7.17**	**$0.00**	**$7.17**	**0.1**	**424**
ECM 1	Install Low-Flow Domestic Hot Water Devices	Yes	421	0.0	0.0	$52.15	$7.17	$0.00	$7.17	0.1	424
TOTALS FOR ALL RECOMMENDED MEASURES			**421**	**0.0**	**0.0**	**$52.15**	**$7.17**	**$0.00**	**$7.17**	**0.1**	**424**
TOTALS FOR ALL MEASURES			**2,193**	**3.5**	**0.0**	**$271.75**	**$13,387.02**	**$2,255.00**	**$11,132.02**	**41.0**	**2,208**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

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

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

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

Energy Efficient Practices

TRC also identified seven low cost (or no cost energy) efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Pump Stations 1-6 include:

- Reduce Air Leakage
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Perform Proper Water Heater Maintenance
- Water Conservation

For details on these Energy Efficient Practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Pump Stations 1-6. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install

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

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.2 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
James Schilling	Director	jschilling@msa-nj-org	973-347-1525
Designated Representative			
James Schilling	Director	jschilling@msa-nj-org	973-347-1525
TRC Energy Services			
Alexander Klieverik	Auditor	aklieverik@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On December 6, 2017, TRC performed an energy audit at Musconetcong Pump Stations 1 through 6 located in Stanhope, Landing, and Mt. Arlington, New Jersey. TRC's team met with James Schilling to review the facility operations and help focus our investigation on specific energy-using systems.

Six Musconetcong pump stations are included in this study with a total enclosed area of 1,960 square feet. Pump Station 1 is the largest, comprising 800 square feet. Pump Stations 2 through 6 are 228 square feet, 216 square feet, 280 square feet, 280 square feet, and 156 square feet respectively. The pump stations mostly consist of centrifugal pumps and associated motors and aging and inefficient lighting. All the pumps are controlled by variable frequency drive (VFD). There is no cooling at any of the buildings, and heating is supplied by electric resistance heaters mounted to the ceilings. The buildings were constructed in 1990.

2.3 Building Occupancy

The pump stations are rarely occupied, with occupancy generally limited to routine maintenance and unplanned outages. Based on a conversation with the facility director and staff, the pump stations are occupied only three hours per week. The pumps however are continually available to handle sewage and/or storm water.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Pump Station 1	Weekday	12:00 AM - 12:00 AM
Pump Station 1	Weekend	12:00 AM - 12:00 AM
Pump Station 2	Weekday	12:00 AM - 12:00 AM
Pump Station 2	Weekend	12:00 AM - 12:00 AM
Pump Station 3	Weekday	12:00 AM - 12:00 AM
Pump Station 3	Weekend	12:00 AM - 12:00 AM
Pump Station 4	Weekday	12:00 AM - 12:00 AM
Pump Station 4	Weekend	12:00 AM - 12:00 AM
Pump Station 5	Weekday	12:00 AM - 12:00 AM
Pump Station 5	Weekend	12:00 AM - 12:00 AM
Pump Station 6	Weekday	12:00 AM - 12:00 AM
Pump Station 6	Weekend	12:00 AM - 12:00 AM

2.4 Building Envelope

The pump stations are constructed of concrete block and structural steel. The buildings have flat rooves covered with black membrane that is in fair condition. The pump stations do not contain windows. The exterior doors are constructed of aluminum and in good condition except that the door seals have worn out, which increases the level of outside air infiltration.

2.5 On-Site Generation

Each pump station has an emergency backup generator.

2.6 Pump Stations

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

Pump Station 1 (Houdaille Rd)

Pump Station 1 is located at the end of Houdaille Rd in Stanhope, New Jersey. The building is a single story brick building with a sublevel for the pumps.

Image 1 - Building Exterior

Interior lighting at the building is provided by 60-Watt incandescent screw-in lamps. Exterior lighting consists mostly of high pressure sodium lamps. All lighting is operated by manual switch and is only turned on when the building is occupied.

The building has three 10 kW electric heaters mounted to the ceiling, which are controlled by thermostats. The thermostats are set to 55°F to prevent freezing during the winter months. There is no cooling equipment at this building.

Pump Station 1 is the only pump station with a sink and 2 kW water heater. The water heater has a capacity of 6 gallons and is rarely used.

The pumping system at this building consists of four 84 HP submerged sewage pumps controlled by VFDs. According to runtime hours collected at the Administration Building, all four pumps are used throughout the year, and pumping hours are distributed evenly between the four pumps (+/- 4%).

The building is equipped with a 300 kW emergency backup generator.

Image 2, 3, 4 - Electric Water Heater, Backup Generator, Thermostats

Pump Station 2 (170 Mt. Arlington Blvd.)

Pump Station 2 is located at 170 Mt. Arlington Blvd. in Landing, New Jersey. The building is a single story brick building with a sublevel for the pumps.

Image 5 - Building Exterior

Interior lighting at the building is provided by 60-Watt incandescent screw-in lamps and 4 foot fluorescent T12 fixtures. Exterior lighting consist mostly of high pressure sodium lamps. All lighting is operated by manual switch and is only turned on when the building is occupied.

The building has two 10 kW electric heaters mounted to the ceiling, which are controlled by thermostats. The thermostats are set to 55°F to prevent freezing during the winter months. There is no cooling equipment at this building.

The pumping system at this building consists of three 25 HP submerged sewage pumps controlled by VFDs. According to runtime hours collected at the Administration Building, Pump 1 operates as the lead with 70% of the total run hours. Pumps 2 and 3 contribute to 5% and 25% of the recorded run hours. There is also a 25 HP well pump at this building.

The building is equipped with a 50 kW emergency backup generator.



Image 6, 7 - VFDs, Electric Heater

Pump Station 3 (Mt. Arlington Blvd.)

Image 8 - Building Exterior

Pump Station 3 is located on Mt. Arlington Blvd. between Singac Ave and Succasunna Rd in Landing, New Jersey. The building is a single story brick building with a sublevel for the pumps.

Interior lighting at the building is provided by 60-Watt incandescent screw-in lamps and 4 foot fluorescent T12 fixtures. Exterior lighting consist of high pressure sodium lamps. All lighting is operated by manual switch and is only turned on when the building is occupied.

The building has two 5 kW electric heaters mounted to the ceiling, which are controlled by thermostats. The thermostats are set to 55°F to prevent freezing during the winter months. There is no cooling equipment at this building.

The pumping system at this building consists of two 25 HP submerged sewage pumps controlled by VFDs. According to runtime hours collected at the Administration Building, Pump 1 operates as the lead with 56% of the total run hours. There is also a 25 HP well pump at this building.

The building is equipped with a 55 kW emergency backup generator.

Image 9, 10 - Interior Lighting, VFDs

Pump Station 4 (Alterbrand Ave.)

Pump Station 4 is located on Alterbrand Ave in Mt. Arlington, New Jersey. The building is a single story brick building with a sublevel for the pumps.

Image 11 - Building Exterior

Interior lighting at the building is provided by 60-Watt incandescent screw-in lamps and 4 foot fluorescent T12 fixtures. Exterior lighting consist of high pressure sodium lamps. All lighting is operated by manual switch and is only turned on when the building is occupied.

The building has two 10 kW electric heaters mounted to the ceiling, which are controlled by thermostats. The thermostats are set to 55°F to prevent freezing during the winter months. There is no cooling equipment at this building.

The pumping system at this building consists of two 28 HP submerged sewage pumps controlled by VFDs. According to runtime hours collected at the administration building, both Pump 1 and 2 operate throughout the year, with run hours distributed evenly between them.

The building is equipped with a 60 kW emergency backup generator.

Image 12, 13, 14 - VFDs, Exterior Lights

Pump Station 5 (Howard Blvd.)

Pump Station 5 is located on Howard Blvd in Mt. Arlington, New Jersey. The building is a single story brick building with a sublevel for the pumps.

Image 15 - Building Exterior

Interior lighting at the building is provided by 60-Watt incandescent screw-in lamps and 4 foot fluorescent T12 fixtures. Exterior lighting consist of high pressure sodium lamps. All lighting is operated by manual switch and is only turned on when the building is occupied.

The building has two 10 kW electric heaters mounted to the ceiling which are controlled by thermostats. The thermostats are set to 55°F to prevent freezing during the winter months. There is no cooling equipment at this building.

The pumping system at this building consists of two 10 HP submerged sewage pumps controlled by VFDs. According to runtime hours collected at the Administration Building, both Pumps 1 and 2 operate throughout the year, with run hours distributed evenly between them.

The building is equipped with a 60 kW emergency backup generator.

Image 16, 17 - Electric Heaters, Interior Lighting

Pump Station 6 (Acorn St.)

Pump Station 6 is located on Acorn St. in Stanhope, New Jersey. The station is a single room, lowered area, with a sublevel for the pumps, and a pre-fabricated cover.

Image 18 - Exterior

Interior lighting at the station is provided by 4 foot fluorescent T12 fixtures. There is no exterior lighting at this pump station. All lighting is operated by manual switch and is only turned on when the building is occupied.

The station has no electric heaters, but does contain a small de-humidifier. There is no cooling equipment at this building.

The pumping system at this station consists of two 14 HP submerged sewage pumps controlled by VFDs. According to runtime hours collected at the Administration Building, both Pumps 1 and 2 operate throughout year, with run hours distributed evenly between them.

The building is equipped with a 60 kW emergency backup generator.

Image 19, 20 – Interior Lighting, Generator

3 SITE ENERGY USE AND COSTS

Utility data for electricity was analyzed to identify opportunities for savings. In addition, data for Electricity was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.3 for additional information.

3.1 Total Cost of Energy

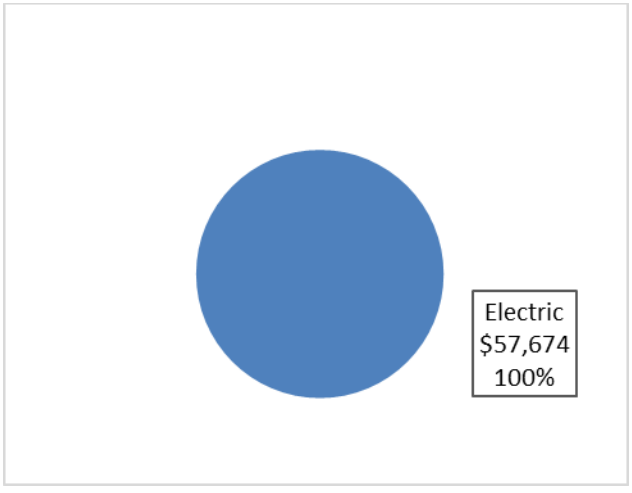
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Pump Stations 1-6		
Fuel	**Usage**	**Cost**
Electricity	465,370 kWh	$57,674
Total		**$57,674**

The current annual energy cost for this facility is $57,674 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Total Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.124/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

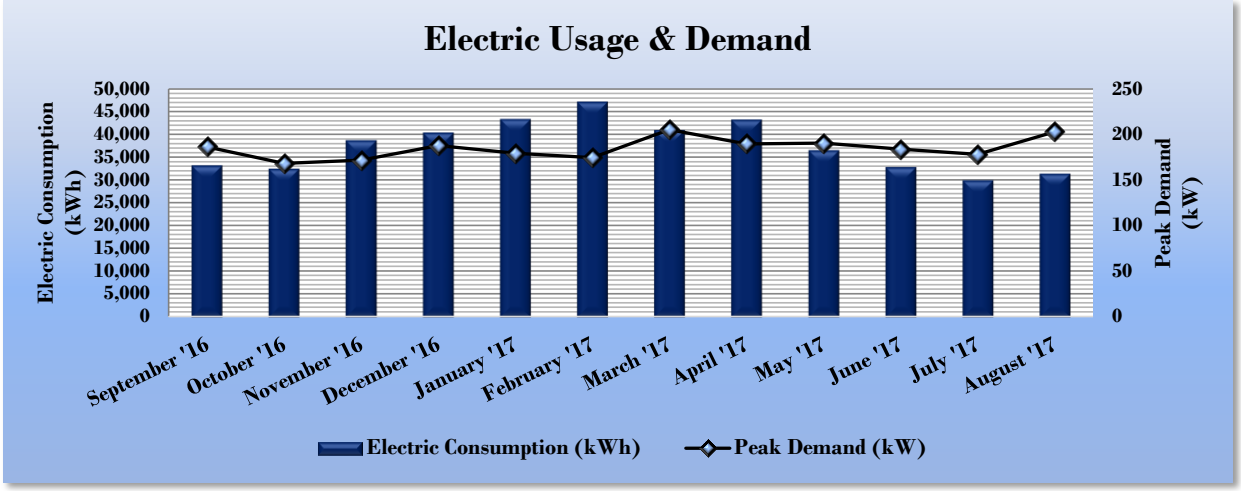


Figure 9 - Electric Usage & Demand

Electric Billing Data for Pump Stations 1-6					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/30/16	29	33,198	186	$0	$4,028
10/31/16	30	32,462	168	$0	$3,955
11/30/16	29	38,684	172	$0	$4,605
12/31/16	30	40,404	188	$0	$4,791
1/31/17	30	43,329	179	$0	$5,196
2/28/17	27	47,140	174	$0	$5,640
3/31/17	30	40,953	205	$0	$5,281
4/30/17	29	43,242	190	$0	$5,395
5/31/17	30	36,495	190	$0	$4,621
6/30/17	29	32,831	184	$0	$4,200
7/31/17	30	29,951	178	$0	$4,114
8/31/17	30	31,381	203	$0	$3,952
Totals	**353**	**450,070**	**205.1**	**$0**	**$55,778**
Annual	**365**	**465,370**	**205.1**	**$0**	**$57,674**

3.3 Benchmarking

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

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of "site energy" and "source energy." Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

Figure 10 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Pump Stations 1-6	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/ft^2)	2543.8	148.1
Site Energy Use Intensity (kBtu/ft^2)	810.1	67.3

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

Figure 11 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Pump Stations 1-6	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/ft^2)	2541.5	148.1
Site Energy Use Intensity (kBtu/ft^2)	809.4	67.3

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This building type does not currently qualify to receive a score.

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

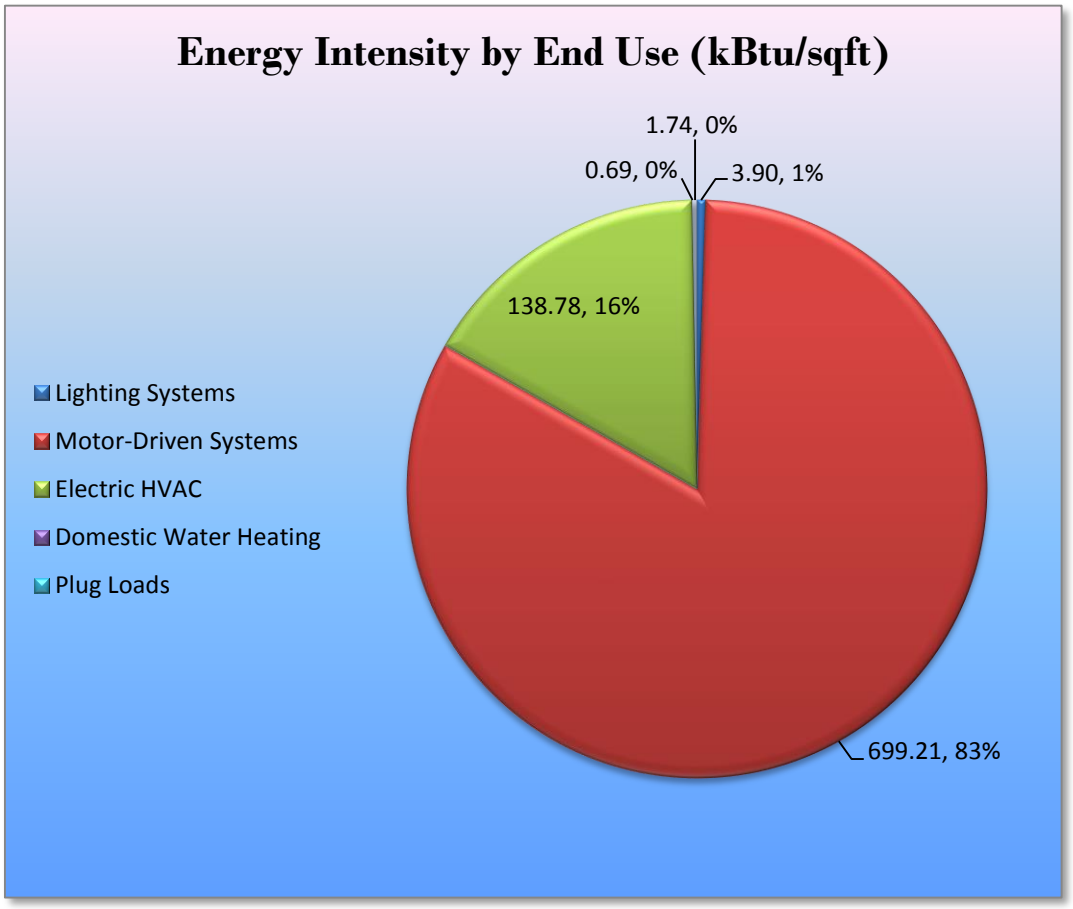
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager.

3.4 Energy End-Use Breakdown

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

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



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Pump Stations 1-6 regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 13 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**421**	**0.0**	**0.0**	**$52.15**	**$7.17**	**$0.00**	**$7.17**	**0.1**	**424**
ECM 1	Install Low-Flow Domestic Hot Water Devices	421	0.0	0.0	$52.15	$7.17	$0.00	$7.17	0.1	424
TOTALS		**421**	**0.0**	**0.0**	**$52.15**	**$7.17**	**$0.00**	**$7.17**	**0.1**	**424**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

4.1.1 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 14 below.

Figure 14 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**421**	**0.0**	**0.0**	**$52.15**	**$7.17**	**$0.00**	**$7.17**	**0.1**	**424**
ECM 1	Install Low-Flow Domestic Hot Water Devices	421	0.0	0.0	$52.15	$7.17	$0.00	$7.17	0.1	424

ECM 1: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
421	0.0	0.0	$52.15	$7.17	$0.00	$7.17	0.1	424

Measure Description

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

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

4.2 ECMs Evaluated But Not Recommended

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

Figure 15 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades	**1,655**	**3.3**	**0.0**	**$205.12**	**$10,139.85**	**$1,835.00**	**$8,304.85**	**40.5**	**1,667**
Install LED Fixtures	457	0.9	0.0	$56.68	$5,469.48	$1,400.00	$4,069.48	71.8	461
Retrofit Fluorescent Fixtures with LED Lamps and Drivers	431	0.8	0.0	$53.38	$2,340.00	$200.00	$2,140.00	40.1	434
Retrofit Fixtures with LED Lamps	767	1.5	0.0	$95.06	$2,330.37	$235.00	$2,095.37	22.0	772
Lighting Control Measures	**117**	**0.2**	**0.0**	**$14.47**	**$3,240.00**	**$420.00**	**$2,820.00**	**194.8**	**118**
Install Occupancy Sensor Lighting Controls	117	0.2	0.0	$14.47	$3,240.00	$420.00	$2,820.00	194.8	118
TOTALS	**1,772**	**3.5**	**0.0**	**$219.59**	**$13,379.85**	**$2,255.00**	**$11,124.85**	**50.7**	**1,784**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	457	0.9	0.0	$56.68	$5,469.48	$1,400.00	$4,069.48	71.8	461

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

Reasons for not Recommending

We are currently not recommending the installation of exterior LED fixtures due to the limited usage and therefore long payback period associated with the measure.

Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	431	0.8	0.0	$53.38	$2,340.00	$200.00	$2,140.00	40.1	434
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

Reasons for not Recommending

We are currently not recommending the retrofitting fixtures with LED lamps due to the limited usage and therefore a long payback period associated with the measure.

Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	767	1.5	0.0	$95.06	$2,330.37	$235.00	$2,095.37	22.0	772
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We usually recommend retrofitting existing incandescent, fluorescent, and HID or other lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

Reasons for not Recommending

We are currently not recommending retrofitting fixtures with LED lamps due to the limited usage and therefore a long payback period associated with the measure.

Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
117	0.2	0.0	$14.47	$3,240.00	$420.00	$2,820.00	194.8	118

Measure Description

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

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

Reasons for not Recommending

We are currently not recommending the installation of occupancy sensors due to the limited lighting usage and therefore a long payback period associated with the measure.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

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.

Perform Routine Motor Maintenance

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

Perform Proper Water Heater Maintenance

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

Water Conservation

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

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

Refer to Section 4.1.1 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

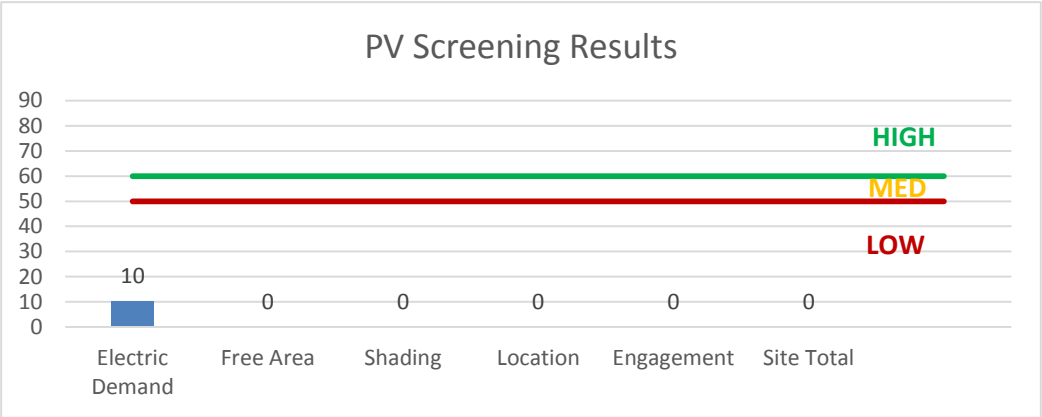
6.1 Photovoltaic

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

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

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear not meet these minimum criteria for cost-effective PV installation.

Figure 16 - Photovoltaic Screening



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

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

6.2 Combined Heat and Power

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

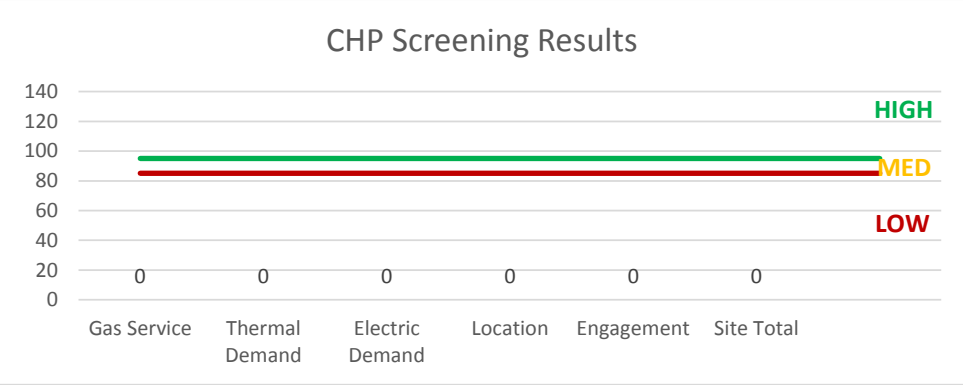
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

Lack of gas service is the most significant factor contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

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

Figure 17 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion, the facility has a low potential for demand curtailment.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 18 for a list of the eligible programs identified for each recommended ECM.

Figure 18 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install Low-Flow Domestic Hot Water Devices	X					

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

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

Incentives

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

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

How to Participate

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

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

8.2 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Station 1 Whole Building	23	Incandescent: Screw-In (60W) 1L	Wall Switch	60	365	Relamp	Yes	23	LED Screw-In Lamps: LED: Screw-In (9.5W) 1L	Occupancy Sensor	10	256	0.88	448	0.0	$55.51	$2,046.32	$220.00	32.90
Station 1 Exterior Wall Packs	2	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	365	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	29	365	0.11	55	0.0	$6.80	$781.35	$200.00	85.51
Station 1 Exterior Building Lights	2	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	365	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	56	365	0.21	109	0.0	$13.45	$781.35	$200.00	43.21
Station 2 Upstairs	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	365	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	256	0.22	112	0.0	$13.84	$738.00	$75.00	47.90
Station 2 Downstairs	4	Incandescent: Screw-In (60W) 1L	Wall Switch	60	365	Relamp	Yes	4	LED Screw-In Lamps: LED: Screw-In (9.5W) 1L	Occupancy Sensor	10	256	0.17	88	0.0	$10.91	$485.01	$55.00	39.42
Station 2 Exterior	1	High-Pressure Sodium: (1) 35W Lamp	Wall Switch	46	365	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	14	365	0.03	13	0.0	$1.65	$390.68	$100.00	176.60
Station 2 Exterior	1	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	365	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	56	365	0.11	54	0.0	$6.73	$390.68	$100.00	43.21
Station 3 Pump Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	365	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	256	0.22	112	0.0	$13.84	$738.00	$75.00	47.90
Station 3 Pump Room	4	Incandescent: Screw-In (60W) 1L	Wall Switch	60	365	Relamp	Yes	4	LED Screw-In Lamps: LED: Screw-In (9.5W) 1L	Occupancy Sensor	10	256	0.17	88	0.0	$10.91	$485.01	$55.00	39.42
Station 3 Exterior	1	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	365	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	56	365	0.11	54	0.0	$6.73	$390.68	$100.00	43.21
Station 3 Exterior	1	High-Pressure Sodium: (1) 35W Lamp	Wall Switch	46	365	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	14	365	0.03	13	0.0	$1.65	$390.68	$100.00	176.60
Station 4 Pump Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	365	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	256	0.33	168	0.0	$20.76	$972.00	$95.00	42.24
Station 4 Pump Room	4	Incandescent: Screw-In (60W) 1L	Wall Switch	60	365	Relamp	Yes	4	LED Screw-In Lamps: LED: Screw-In (9.5W) 1L	Occupancy Sensor	10	256	0.17	88	0.0	$10.91	$485.01	$55.00	39.42
Station 4 Exterior	2	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	365	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	29	365	0.11	55	0.0	$6.80	$781.35	$200.00	85.51
Station 4 Exterior	1	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	365	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	56	365	0.11	54	0.0	$6.73	$390.68	$100.00	43.21
Station 5 Pump Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	365	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	256	0.33	168	0.0	$20.76	$972.00	$95.00	42.24
Station 5 Pump Room	4	Incandescent: Screw-In (60W) 1L	Wall Switch	60	365	Relamp	Yes	4	LED Screw-In Lamps: LED: Screw-In (9.5W) 1L	Occupancy Sensor	10	256	0.17	88	0.0	$10.91	$485.01	$55.00	39.42
Station 5 Exterior	2	High-Pressure Sodium: (1) 70W Lamp	Wall Switch	95	365	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	29	365	0.11	55	0.0	$6.80	$781.35	$200.00	85.51
Station 5 Exterior	1	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	365	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	56	365	0.11	54	0.0	$6.73	$390.68	$100.00	43.21
Station 6	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	365	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	256	0.14	69	0.0	$8.53	$504.00	$75.00	50.32

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Station 1 Pump Room	Whole Building	1	Process Pump	84.0	95.0%	Yes	2,241	No	95.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 1 Pump Room	Whole Building	1	Process Pump	84.0	95.0%	Yes	2,178	No	95.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 1 Pump Room	Whole Building	1	Process Pump	84.0	95.0%	Yes	0	No	95.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 1 Pump Room	Whole Building	1	Process Pump	84.0	95.0%	Yes	0	No	95.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 1 Pump Room	Whole Building	1	Other	3.0	87.5%	No	2,178	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 1 Pump Room	Whole Building	3	Supply Fan	0.5	75.0%	No	400	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 2 Pump Room	Whole Building	1	Process Pump	25.0	94.0%	Yes	1,546	No	94.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 2 Pump Room	Whole Building	1	Process Pump	25.0	94.0%	Yes	1,546	No	94.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 2 Pump Room	Whole Building	1	Process Pump	25.0	94.0%	Yes	0	No	94.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 2 Upstairs	Whole Building	2	Supply Fan	0.5	80.0%	No	200	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 2 Well	Well Pump	1	Water Supply Pump	25.0	94.0%	No	28	No	94.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 3 Pump Room	Whole Building	1	Process Pump	25.0	93.6%	Yes	1,953	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 3 Pump Room	Whole Building	1	Process Pump	25.0	93.6%	Yes	0	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 3 Pump Room	Whole Building	2	Supply Fan	0.3	75.0%	No	200	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 3 Well	Well Pump	1	Water Supply Pump	25.0	93.6%	No	36	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 4 Pump Room	Whole Building	1	Process Pump	28.0	93.6%	Yes	1,512	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 4 Pump Room	Whole Building	1	Process Pump	28.0	93.6%	Yes	1,420	No	93.6%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 4 Pump Room	Whole Building	2	Supply Fan	0.3	75.0%	No	800	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 4 Pump Room	Whole Building	1	Exhaust Fan	0.8	75.0%	No	800	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 5 Pump Room	Whole Building	1	Process Pump	10.0	91.7%	Yes	2,462	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Station 5 Pump Room	Whole Building	1	Process Pump	10.0	91.7%	Yes	2,712	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 5 Pump Room	Whole Building	2	Supply Fan	0.5	75.0%	No	800	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 6 Pump Room	Whole Building	1	Process Pump	14.0	93.0%	Yes	1,254	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 6 Pump Room	Whole Building	1	Process Pump	14.0	93.0%	Yes	1,099	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 6 Pump Room	Whole Building	1	Exhaust Fan	0.1	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Station 1	Whole Building	3	Electric Resistance Heat		34.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 2	Whole Building	2	Electric Resistance Heat		34.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 3	Whole Building	1	Electric Resistance Heat		17.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 3	Whole Building	1	Electric Resistance Heat		17.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 4	Whole Building	1	Electric Resistance Heat		34.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 4	Whole Building	1	Electric Resistance Heat		34.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Station 5	Whole Building	2	Electric Resistance Heat		34.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

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

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Station 1	1	Faucet Aerator (Lavatory)	2.00	1.00	0.00	421	0.0	$52.15	$7.17	$0.00	0.14

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Station 6	1	Dehumidifier	240.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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N/A

ENERGY STAR® Score[1]

MSA Pump Stations 1 - 6

Primary Property Type: Other - Utility
Gross Floor Area (ft²): 1,960
Built: 1992

For Year Ending: August 31, 2017
Date Generated: February 23, 2018

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
MSA Pump Stations 1 - 6 Houdaille Rd Musconetcong, New Jersey 07828	_____ , (___)___-____	___ _____ , (___)___-____ _____

Property ID: 6233827

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
783.5 kBtu/ft²

Source EUI
2,460.2 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	1,535,639 (100%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	39.2
National Median Source EUI (kBtu/ft²)	123.1
% Diff from National Median Source EUI	1898%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	170