Local Government Energy Audit:
Energy Audit Report

Hyson Water Treatment Plant

Jackson Township Municipal Utilities Authority

2 Frances Street
Jackson, NJ 08527

May 25, 2018

Final Report by:
TRC Energy Services

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate 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.

Table of Contents

Table of Figures

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Hyson Water Treatment Plant.

The goal of a 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 New Jersey municipal utility authorities in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

1.1 Facility Summary

Hyson Water Treatment Plant is a 4,128 square foot facility comprised mostly of a water treatment building and three well houses (Well 13, Well 15, and Well 16). The water treatment building contains an office and small kitchen in addition to the mechanical spaces.

Hyson Water Treatment Plant contains six filter banks, three recycling water tanks, one sludge tank, and three high capacity wells. Lighting throughout the facilities is fairly old and inefficient compared to today's standards. 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 which represent an opportunity for Hyson Water Treatment Plant to reduce annual energy costs by $35,774 and annual greenhouse gas emissions by 499,522 lbs CO_2e. The measures would pay for themselves in 3.42 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 Hyson Water Treatment Plant's annual energy use by 60.7%.

Figure 1 – Previous 12 Month Utility Costs

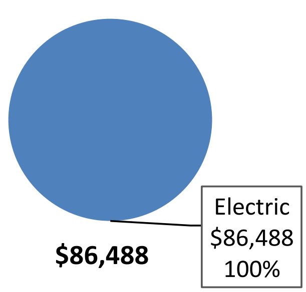
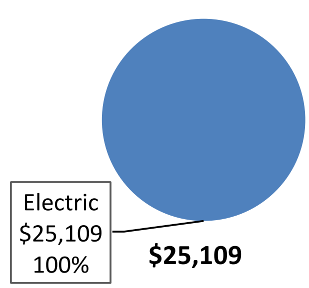


Figure 2 – Potential Post-Implementation Costs



A detailed description of Hyson Water 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		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			**19,116**	**3.5**	**0.0**	**$1,378.56**	**$9,439.01**	**$2,070.00**	**$7,369.01**	**5.35**	**19,249**
ECM 1	Install LED Fixtures	Yes	5,903	1.5	0.0	$425.72	$5,078.80	$1,300.00	$3,778.80	8.88	5,945
ECM 2	Retrofit Fixtures with LED Lamps	Yes	13,212	2.1	0.0	$952.83	$4,360.21	$770.00	$3,590.21	3.77	13,305
Lighting Control Measures			**215**	**0.1**	**0.0**	**$15.48**	**$116.00**	**$20.00**	**$96.00**	**6.20**	**216**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	215	0.1	0.0	$15.48	$116.00	$20.00	$96.00	6.20	216
Motor Upgrades			**20,120**	**5.5**	**0.0**	**$1,451.02**	**$54,258.15**	**$0.00**	**$54,258.15**	**37.39**	**20,261**
ECM 4	Premium Efficiency Motors	Yes	20,120	5.5	0.0	$1,451.02	$54,258.15	$0.00	$54,258.15	37.39	20,261
Variable Frequency Drive (VFD) Measures			**352,453**	**151.6**	**0.0**	**$25,417.58**	**$96,481.80**	**$36,000.00**	**$60,481.80**	**2.38**	**354,917**
ECM 5	Install VFDs on Well Pumps, Run Slower and Longer	Yes	352,453	151.6	0.0	$25,417.58	$96,481.80	$36,000.00	$60,481.80	2.38	354,917
TOTALS			**391,903**	**160.7**	**0.0**	**$28,262.64**	**$160,294.96**	**$38,090.00**	**$122,204.96**	**4.32**	**394,644**

* - 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.

Motor Upgrades generally involve replacing older standard efficiency motors with high efficiency standard (NEMA Premium). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Energy Efficient Practices

TRC also identified five low (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 Hyson Water Treatment Plant include:

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation sources for Hyson Water Treatment Plant. 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 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. Prior to implementing any project, please review the appropriate incentive program guidelines before proceeding. 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 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. The incentive values listed above in Figure 3 represent the SmartStart program and will be explained further in Section 8, as well as the other programs as mentioned below.

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 8.2 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 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.

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 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Dave Harpell	Executive Director	dharpell@jacksonmua.com	7329282222 x 240
Carolann Weisel	Purchasing Department	cweisel@jacksonmua.com	7329282222 x 214
TRC Energy Services			
Tom Page	Auditor	tpage@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On August 18, 2016, TRC performed an energy audit at Hyson Water Treatment Plant located in Jackson, New Jersey. TRC's team met with Drew Ricciardi to review the facility operations and focus the investigation on specific energy-using systems.

Hyson Water Treatment Plant is a 4,128 square foot facility comprised of a water treatment building and three well houses (Well 13, Well 15, and Well 16). The water treatment building contains an office and small kitchen in addition to the mechanical spaces. Hyson Water Treatment Plant consists of six filter banks, three recycling water tanks, one sludge tank, and three high capacity wells.

The water treatment building was constructed in 2002, Well 13 in 1996, Well 15 in 2007 and Well 16 was built in 2010. Lighting throughout the facilities is fairly old and inefficient compared to today's standards. The site has expressed interest in installing VFDs on the well pumps to reduce flow.

2.3 Building Occupancy

The building is occupied every day throughout the year. The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately one staff person.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Water Treatment Plant	Weekday	5:00AM - 11:30 AM
Water Treatment Plant	Weekend	24 hours/day

2.4 Building Envelope

The water treatment building and the pump houses are constructed of concrete block. The buildings have pitched roofs covered with black composite shingles. The water treatment building has few windows while the pump houses have none. Windows are double pane, in good condition, and show little signs of excessive air infiltration. The exterior doors are constructed of aluminum and also found to be in good condition.

2.5 On-Site Generation

Hyson Water Treatment Plant installed a 500 kW solar energy project in 2014. The project included a ground-mounted photovoltaic (PV) array with approximately 1,600 PV panels in total. The systems provide approximately 50% of the electricity required by the facility. The array was constructed under a Power Purchase Agreement (PPA).

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided predominately by 32-Watt linear fluorescent T8 lamps with electronic ballasts. Most of the building spaces use 2-lamp, 2-foot wide by 4-foot long troffers with diffusers.

Lighting control in most spaces is provided by manual wall switches.

The building has minimal exterior lighting, which primarily consists of high-pressure sodium fixtures that are controlled with photocells.

Air Conditioning (Direct Expansion)

A 2-ton Mitsubishi cooling only split system with 100% return air conditions the office of the water treatment building. The fan and evaporator are located on the wall of the office. The compressor and condensing unit are located on the ground adjacent to the front door. The unit is manually controlled and operates on demand to maintain a space temperature setpoint around 75°F (adjustable by staff).

A small fume hood and make-up air unit is used during water testing.

Ceiling mounted electrical resistance unit heaters provide heat to the office and the well houses.

Domestic Hot Water

The water treatment building has a 10-gallon electrical resistance domestic water heater with an input rating of 2,000 W. Hot water is used in the restrooms and kitchen.

Plug load & Vending Machines

There facility has a single computer and equipment for a small, non-commercial kitchen.

Well Pumps

There are three fresh water wells (Well #13, Well #15, and Well #16) located at the Hyson Water Treatment Plant. Each well uses a 200 hp, 3000 gpm constant speed pump. The wells operate as needed year-round to maintain system pressure and storage capacity. Two wells typically run to satisfy demand in summer, but only one may be needed every few days during the winter. The system is configured and operated so that one well is maintained as a backup.

The system of tanks throughout Jackson Municipal Utilities Authority (MUA)'s distribution system provides two days of storage based on average water consumption. All pumps and tanks are connected through a supervisory control and data acquisition (SCADA) system.

Wells and Water Treatment

The water treatment plant is comprised of six green sand filters, chemical treatment, and a backwash water recovery system.

From Jackson MUA's website: "Influent is injected with a combination of Chlorine and Potassium Permanganate, which are used to oxidize the iron and manganese that are in solution. Once the oxidation (chemical reaction) process is completed, it makes the iron and manganese particles clump together so that it can be filtered out of the water by specially designed sand filters. This treatment process is commonly known as greensand or Ferro sand filtration. Once the water passes through the sand filtration bed it exits the plant. Then pH adjustment and chlorine to prevent biological growth in the distribution system are added to the finished water. The water then travels through two chlorine contact tanks to provide the proper mixing time for the chlorine to react with the water and is then delivered to the distribution system for consumption by our customers."

After 24 hours of run time, each filter is backwashed by system distribution pressure. The backwash water is discharged into three recycle tanks where sediment drops to the bottom and 90% of the water is pumped back into the plant as influent. Sediment from the three recycle tanks is pumped into a sludge tank for disposal off site. The use of the filters is staggered for even wear.

2.7 Water-Using Systems

There is one restroom at this facility and a small non-commercial kitchen. The faucets are rated for under 2.2 gallons per minute (gpm)

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/ft^2 and energy use/ft^2. 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 building to vary from the "typical" energy use for other facilities identified as: Water/Wastewater Treatment/Pumping. Specific local climate conditions, daily occupancy hours of the facility, seasonal fluctuations in occupancy, daily operating hours of energy use systems, and the behavior of the occupants with regard to operating systems that impact energy use such as turning off appliances and leaving windows open. Please refer to the Benchmarking section within Section 3.3 for additional information.

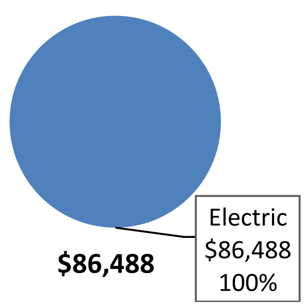
3.1 Total Cost of Energy

The following energy consumption and cost data is based on the last 12 month period of utility usage data that was provided for each utility. The annual consumption and cost was developed from this information. The current utility cost for this site is $86,488 as shown in Figure 6 and Figure 7 below.

Figure 6 - Utility Summary

Utility Summary for Hyson Water Treatment Plant		
Fuel	**Usage**	**Cost**
Electricity	816,809 kWh	$86,488
Total		**$86,488**

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost (combined for commodity, transmission and distribution) for the past 12 months is $0.072/kWh, which is the blended rate used throughout the analyses in this report. The monthly electricity consumption and peak demand is represented graphically in the chart below.

Figure 8 - Electric Usage & Demand

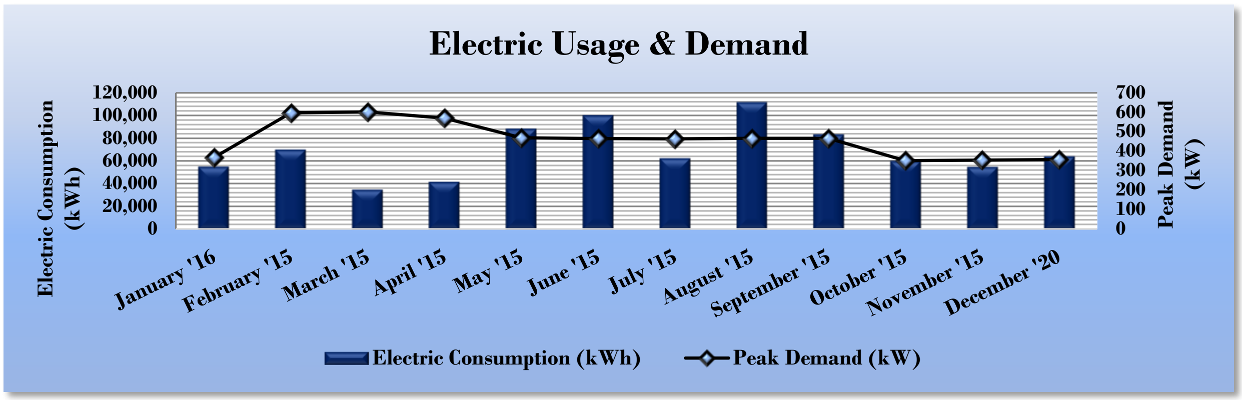


Figure 9 - Electric Usage & Demand

Electric Billing Data for Hyson Water Treatment Plant					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
2/2/16	29	55,040	368	1,951	6,362
3/3/15	33	69,880	597	2,521	7,438
3/31/15	28	34,800	602	2,551	2,805
4/30/15	30	41,840	570	2,031	3,265
6/1/15	32	88,240	469	2,696	8,651
7/1/15	30	100,040	464	2,671	8,292
7/31/15	30	62,480	464	2,667	8,775
9/1/15	32	111,400	466	2,681	8,201
10/1/15	30	83,160	466	2,499	13,297
11/2/15	32	60,000	352	1,860	4,210
12/3/15	31	54,800	354	1,871	8,158
1/4/26	32	64,080	356	1,886	7,982
Totals	**369**	**825,760**	**601.6**	**$27,885**	**$87,435**
Annual	**365**	**816,809**	**601.6**	**$27,582**	**$86,488**

3.3 Benchmarking

This facility was benchmarked through 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. 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 per average gallon per day, and it is the standard metric for comparing water treatment plant energy performance. Comparing the EUI of a facility with the national median EUI for that facility type illustrates whether that facility uses more energy than similar facilities on a production basis or if that facility 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 facility 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.

Figure 10 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Hyson Water Treatment Plant	National Median Building Type: Water Treatment
Site Energy Use Intensity (kBtu/sq.ft)	2142.6	N/A
Site Energy Use Intensity (kBtu/sq.ft)	682.4	N/A

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

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

Energy Use Intensity Comparison - Existing Conditions		
	Hyson Water Treatment Plant	National Median Building Type: Water Treatment
Site Energy Use Intensity (kBtu/sq.ft)	2142.6	N/A
Site Energy Use Intensity (kBtu/sq.ft)	682.4	N/A

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. Water treatment plants do 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.

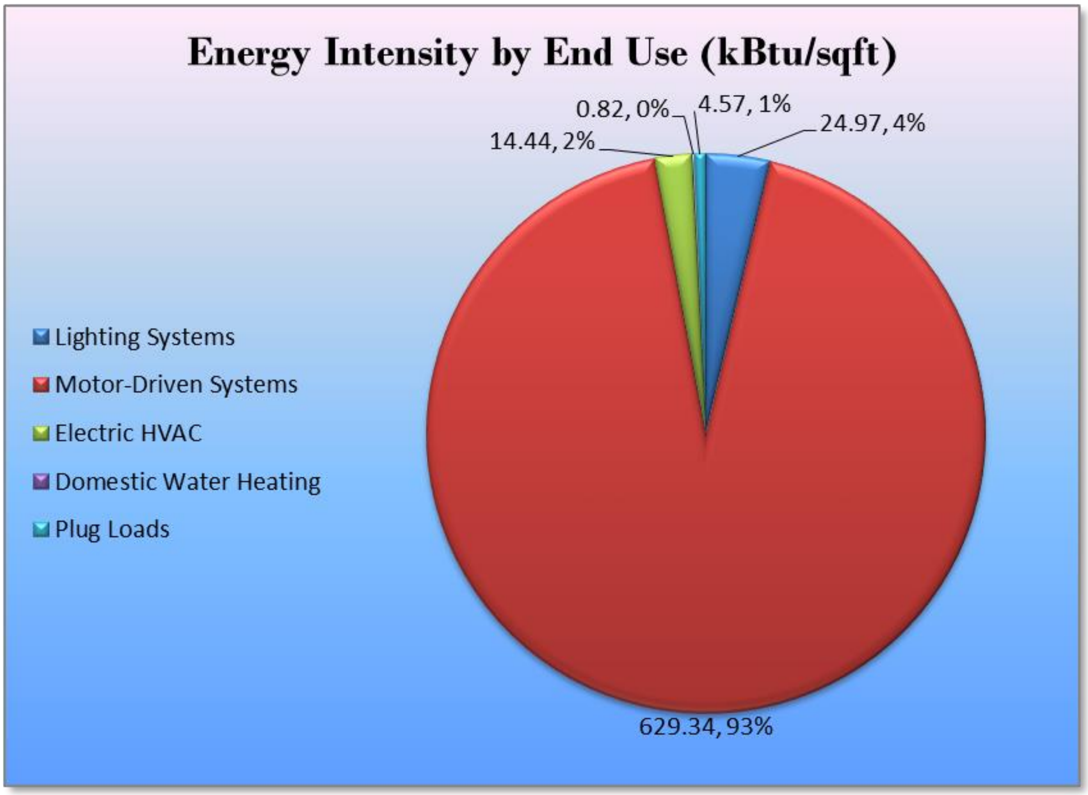
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.4 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building 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 12 - Energy Balance (% and kBtu/sqft)



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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 13 – Summary of Recommended ECMs

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			**19,116**	**3.5**	**0.0**	**$1,378.56**	**$9,439.01**	**$2,070.00**	**$7,369.01**	**5.35**	**19,249**
ECM 1	Install LED Fixtures	Yes	5,903	1.5	0.0	$425.72	$5,078.80	$1,300.00	$3,778.80	8.88	5,945
ECM 2	Retrofit Fixtures with LED Lamps	Yes	13,212	2.1	0.0	$952.83	$4,360.21	$770.00	$3,590.21	3.77	13,305
Lighting Control Measures			**215**	**0.1**	**0.0**	**$15.48**	**$116.00**	**$20.00**	**$96.00**	**6.20**	**216**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	215	0.1	0.0	$15.48	$116.00	$20.00	$96.00	6.20	216
Motor Upgrades			**20,120**	**5.5**	**0.0**	**$1,451.02**	**$54,258.15**	**$0.00**	**$54,258.15**	**37.39**	**20,261**
ECM 4	Premium Efficiency Motors	Yes	20,120	5.5	0.0	$1,451.02	$54,258.15	$0.00	$54,258.15	37.39	20,261
Variable Frequency Drive (VFD) Measures			**352,453**	**151.6**	**0.0**	**$25,417.58**	**$96,481.80**	**$36,000.00**	**$60,481.80**	**2.38**	**354,917**
ECM 5	Install VFDs on Well Pumps, Run Slower and Longer	Yes	352,453	151.6	0.0	$25,417.58	$96,481.80	$36,000.00	$60,481.80	2.38	354,917
TOTALS			**391,903**	**160.7**	**0.0**	**$28,262.64**	**$160,294.96**	**$38,090.00**	**$122,204.96**	**4.32**	**394,644**

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

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

4.1.1 Lighting Upgrades

Our recommended upgrades to existing lighting fixtures are summarized in Figure 14 below.

Figure 14 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**19,116**	**3.5**	**0.0**	**$1,378.56**	**$9,439.01**	**$2,070.00**	**$7,369.01**	**5.35**	**19,249**
ECM 1	Install LED Fixtures	5,903	1.5	0.0	$425.72	$5,078.80	$1,300.00	$3,778.80	8.88	5,945
ECM 2	Retrofit Fixtures with LED Lamps	13,212	2.1	0.0	$952.83	$4,360.21	$770.00	$3,590.21	3.77	13,305

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	454	0.1	0.0	$32.75	$390.68	$100.00	$290.68	8.88	457
Exterior	5,449	1.3	0.0	$392.97	$4,688.12	$1,200.00	$3,488.12	8.88	5,487

Measure Description

This measure evaluates replacing existing fixtures containing high-pressure sodium 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. LEDs also have better color rendering than high-pressure sodium lamps.

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.

ECM 2: 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	12,611	1.8	0.0	$909.44	$3,910.90	$760.00	$3,150.90	3.46	12,699
Exterior	602	0.2	0.0	$43.39	$449.31	$10.00	$439.31	10.12	606

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.

4.1.2 Lighting Control Measures

Our recommended lighting control measures are summarized in Figure 15 below.

Figure 15 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**215**	**0.1**	**0.0**	**$15.48**	**$116.00**	**$20.00**	**$96.00**	**6.20**	**216**
ECM 3	Install Occupancy Sensor Lighting Controls	215	0.1	0.0	$15.48	$116.00	$20.00	$96.00	6.20	216

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

ECM 3: 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)
215	0.1	0.0	$15.48	$116.00	$20.00	$96.00	6.20	216

Measure Description

This measure evaluates installing an occupancy sensor to control light fixtures that are currently manually controlled in the entry lobby. 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.

4.1.3 Motor Upgrades

Our recommended motor upgrades are summarized in Figure 16 below.

Figure 16 – Summary of Motor Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**20,120**	**5.5**	**0.0**	**$1,451.02**	**$54,258.15**	**$0.00**	**$54,258.15**	**37.39**	**20,261**
ECM 4	Premium Efficiency Motors	20,120	5.5	0.0	$1,451.02	$54,258.15	$0.00	$54,258.15	37.39	20,261

ECM 4: Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
20,120	5.5	0.0	$1,451.02	$54,258.15	$0.00	$54,258.15	37.39	20,261

Measure Description

This measure evaluates replacing standard efficiency motors with IHP 2014 efficiency motors. The evaluation assumes existing motors will be replaced with the same size motors. It is important that the speed of each new motor match the speed of the motor it replaces as closely as possible. The base case motor efficiencies are obtained from nameplate information. Proposed case premium motor efficiencies are obtained from the New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016). Savings are based on the difference between baseline and proposed efficiencies and the annual operating hours.

4.1.4 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 17 below.

Figure 17 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**352,453**	**151.6**	**0.0**	**$25,417.58**	**$96,481.80**	**$36,000.00**	**$60,481.80**	**2.38**	**354,917**
ECM 5	Install VFDs on Well Pumps, Run Slower and Longer	352,453	151.6	0.0	$25,417.58	$96,481.80	$36,000.00	$60,481.80	2.38	354,917

ECM 5: Install VFDs on Well Pumps, Run Slower and Longer

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)
352,453	151.6	0.0	$25,417.58	$96,481.80	$36,000.00	$60,481.80	2.38	354,917

Measure Description

This measure evaluates installing VFDs on the pumps for Wells 13, 15, and 16 and then modifying their operation strategy. The pumps operate as needed to supply fresh water. Based on historical electric data we estimate that these pumps operates about 20% of the year.

We recommend operating these large pumps at reduced speeds for a longer period to provide the same volume of water. Any short term shortfalls in well capacity can be accommodated using the storage capacity of the system. MUA staff indicated they were considering converting their well pumps to variable flow, with reductions of speed up to 50%.

Energy savings result from reducing pump motor speed (and power). The magnitude of energy savings is based on the amount of time at reduced loads. The calculations assume the pump speed and flow will be reduced 20% and the pumps will operate 20% longer. This is a conservative estimate and additional savings can be achieved if the pumps speed can be further reduced.

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 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.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Plug Load Controls

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

Water Conservation

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

Hyson Water Treatment Plant installed a 500 kW solar energy project in 2014. The project included ground-mounted PV array. There are approximately 1,600 PV panels in total. The systems provide approximately 50% of the electricity required by the facility. The array was constructed under a power purchase agreement. TRC Energy Services evaluated the existing PV array at Hyson Water Treatment Plant. Based on the configuration of the site and its loads **we do not currently recommend any significant expansion**.

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.

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 lack of thermal load is the most significant factor 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/.

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(ies) 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 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. 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 LED Fixtures	x					
ECM 2	Retrofit Fixtures with LED Lamps	x					
ECM 3	Install Occupancy Sensor Lighting Controls	x					
ECM 4	Premium Efficiency Motors		x				
ECM 5	Install VFDs on Well Pumps, Run Slower and Longer						

SmartStart is generally well suited for implementation of individual or small sets of measures, with the flexibility to install projects at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities to bundle measures and simplify participation, but requires the use of pre-approved contractors.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent comparison of available incentives.

Brief descriptions of all relevant alternative financing and incentive programs are located in the sections below. You may also check the following website for further information, including most current program availability, requirements, and incentive levels: 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.

Prescriptive Equipment Incentives 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 SmartStart custom program provides incentives for new and innovative technologies, or process improvements not defined through one of the prescriptive incentives listed above.

Although your facility is an existing building, and only the prescriptive incentives have been applied in the calculations, the SmartStart custom measure path is recommended for ECM 4 (Premium Efficiency Motors) and ECM 5 (Install VFDs on Well Pumps, Run Slower and Longer). These incentives are calculated utilizing a number of factors, including project cost, energy savings and comparison to existing conditions or a defined standard. To qualify, the proposed measure(s) must be at least 2% more efficient than current energy code or recognized industry standard, and save at least 75,000 kWh or 1,500 therms annually.

SmartStart 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 in the SmartStart program (inclusive of prescriptive and custom) 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 prescriptive program you will need to submit an application for the specific equipment installed or 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. Please note that SmartStart custom application requirements are different from the prescriptive applications and will most likely require additional effort to complete.

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

8.3 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 Incentives	Simple Payback w/ Incentives in Years
Exterior	7	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	2,912	Fixture Replacement	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	50	2,912	0.79	3,179	0.0	$229.23	$2,734.74	$700.00	8.88
Exterior	2	Incandescent: Focus lights	Wall Switch	100	2,912	Relamp	No	2	LED Screw-In Lamps: Focus fixture	Wall Switch	18	2,912	0.13	540	0.0	$38.92	$215.31	$10.00	5.28
Reception	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,184	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,184	0.23	691	0.0	$49.83	$591.67	$120.00	9.46
Well Room	19	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	8,000	Relamp	No	19	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,000	0.87	9,619	0.0	$693.66	$1,807.53	$380.00	2.06
Well Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,000	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,000	0.08	895	0.0	$64.54	$175.50	$30.00	2.25
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,092	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,092	0.03	41	0.0	$2.94	$58.50	$10.00	16.52
Chlorine Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	5,000	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,000	0.16	1,119	0.0	$80.68	$351.00	$60.00	3.61
Lab Hood	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,354	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,354	0.01	61	0.0	$4.37	$48.20	$10.00	8.74
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.03	8	0.0	$0.56	$58.50	$10.00	86.71
Electrical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.08	23	0.0	$1.68	$175.50	$30.00	86.71
Generator Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.11	31	0.0	$2.24	$234.00	$40.00	86.71
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.05	16	0.0	$1.12	$117.00	$20.00	86.71
Chemical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	416	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	416	0.05	31	0.0	$2.24	$117.00	$20.00	43.35
Well #13	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	416	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	416	0.03	16	0.0	$1.12	$58.50	$10.00	43.35
Well #13	1	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	2,912	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	50	2,912	0.11	454	0.0	$32.75	$390.68	$100.00	8.88
Well#15	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	416	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	416	0.11	62	0.0	$4.47	$234.00	$40.00	43.35
Well#15	2	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	2,912	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	50	2,912	0.22	908	0.0	$65.50	$781.35	$200.00	8.88
Well#16	3	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	188	2,912	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	50	2,912	0.34	1,362	0.0	$98.24	$1,172.03	$300.00	8.88
Well #16	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	416	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	416	0.11	62	0.0	$4.47	$234.00	$0.00	52.29

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
Hyson WT	Reclying pump	2	Process Pump	25.0	91.0%	No	624	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson WT	Fume Hood	1	Exhaust Fan	2.0	84.0%	No	500	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson WT	Caustic Rm	1	Exhaust Fan	0.5	84.0%	No	500	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson WT	Caustic Rm	1	Process Pump	0.3	84.0%	No	500	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson WT	Well Pump #13	1	Process Pump	200.0	93.6%	No	1,860	Yes	96.2%	Yes	1	34.04	173,806	0.0	$12,534.22	$50,246.65	$12,000.00	3.05
Hyson WT	Well Pump #15	1	Process Pump	200.0	95.0%	No	1,860	Yes	96.2%	Yes	1	32.48	170,266	0.0	$12,278.99	$50,246.65	$12,000.00	3.11
Hyson WT	Well Pump #16	1	Process Pump	200.0	95.0%	No	1,860	Yes	96.2%	Yes	1	32.48	170,266	0.0	$12,278.99	$50,246.65	$12,000.00	3.11

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
Hyson	Office	1	Split-System Air-Source HP	2.00	12.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson	Caustic Rm	1	Electric Resistance Heat		17.06	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson	Well #13	1	Electric Resistance Heat		17.06	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hyson	Well #16	2	Electric Resistance Heat		17.06	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
Hyson WT	Domestic Hot Water	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	**Quantity**	**Equipment Description**	**Energy Rate (W)**	**ENERGY STAR Qualified?**
Kitchen	1	Refrigerator - Big	600.0	No
Kitchen	1	Microwave	1,000.0	No
Kitchen	1	Toaster	850.0	No
Kitchen	1	Coffee Machine	400.0	No
Office	1	Computer	130.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

Hyson Water Treatment Plant

Primary Property Type: Drinking Water Treatment & Distribution
Gross Floor Area (ft²): 4,128
Built: 2002

For Year Ending: January 31, 2016
Date Generated: May 07, 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
Hyson Water Treatment Plant Novack Avenue Jackson, New Jersey 08527	Jackson Township Municipal Utilities Authority 135 Manhattan Street Jackson, NJ 08527 (732) 928-2222	David Harpell 135 Manhattan Street Jackson, NJ 08527 (732) 928-2222 Ext. 240 dharpell@jacksonmua.com

Property ID: 5823169

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
682.4 kBtu/ft²

Annual Energy by Fuel	
Electric - Solar (kBtu)	1,001,698 (36%)
Electric - Grid (kBtu)	1,815,076 (64%)

Source EUI
2,142.6 kBtu/ft²

National Median Comparison	
National Median Site EUI ()	N/A
National Median Source EUI ()	N/A
% Diff from National Median Source EUI	N/A%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	312

Signature & Stamp of Verifying Professional

I ________________ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: ______________________ Date: __________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer Stamp
(if applicable)