Local Government Energy Audit:
Energy Audit Report

Administration Complex

Jackson Township Municipal Utilities Authority

135 Manhattan 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.

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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 Jackson Township Municipal Utilities Authority's Administration Complex.

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

TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist 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

Jackson Township Municipal Utilities Authority's Administration Complex is a 13,900 square foot facility comprised of an administration building, field office, garage, and two wells (#3 & #8). The administration building is a single story building with a lower level partly underground. The administration building contains offices, meeting rooms, a cashier, a server room, as well as mechanical spaces. The field office is a single story building primarily consisting of office space. The garage has three bays for performing maintenance on vehicles. Also, the well pumps are located in small well houses.

The Administration Complex contains aging and inefficient lighting in need of upgrade and HVAC equipment in generally good repair. 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 six measures which represent an opportunity for the Administration Complex to reduce annual energy costs by $30,600 and annual greenhouse gas emissions by 284,323 lbs CO_2e. The measures would pay for themselves in 0.76 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 the Administration Complex's annual energy use by 36.6%.

Figure 1 – Previous 12 Month Utility Costs

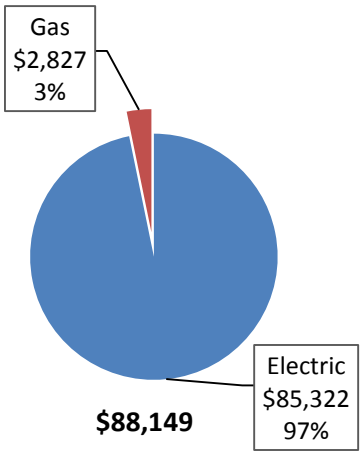
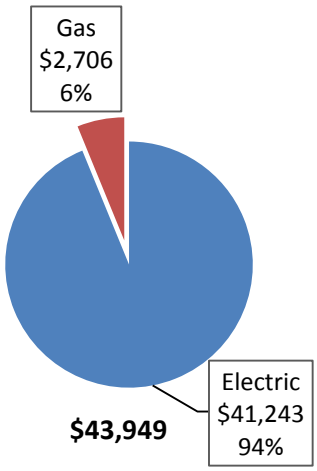


Figure 2 – Potential Post-Implementation Costs



A detailed description of the Administration Complex'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			**15,700**	**5.4**	**0.0**	**$1,708.47**	**$13,240.17**	**$980.00**	**$12,260.17**	**7.18**	**15,809**
ECM 1	Install LED Fixtures	Yes	2,023	0.4	0.0	$220.18	$4,259.33	$450.00	$3,809.33	17.30	2,037
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	5,819	2.4	0.0	$633.26	$6,084.00	$0.00	$6,084.00	9.61	5,860
ECM 3	Retrofit Fixtures with LED Lamps	Yes	7,857	2.5	0.0	$855.02	$2,896.84	$530.00	$2,366.84	2.77	7,912
Lighting Control Measures			**265**	**0.1**	**0.0**	**$28.80**	**$1,160.00**	**$200.00**	**$960.00**	**33.33**	**267**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	265	0.1	0.0	$28.80	$1,160.00	$200.00	$960.00	33.33	267
Variable Frequency Drive (VFD) Measures			**202,850**	**48.7**	**0.0**	**$22,074.61**	**$5,000.00**	**$0.00**	**$5,000.00**	**0.23**	**204,269**
ECM 5	Run Pump Slower and Longer	Yes	202,850	48.7	0.0	$22,074.61	$5,000.00	$0.00	$5,000.00	0.23	204,269
Domestic Water Heating Upgrade			**1,202**	**0.0**	**19.5**	**$251.84**	**$35.85**	**$0.00**	**$35.85**	**0.14**	**3,493**
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	1,202	0.0	19.5	$251.84	$35.85	$0.00	$35.85	0.14	3,493
TOTALS			**220,017**	**54.2**	**19.5**	**$24,063.72**	**$19,436.02**	**$1,180.00**	**$18,256.02**	**0.76**	**223,837**

* - 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.

Variable Frequency Drives measures generally involve controlling the speed of a motor to achieve a flow or temperature rather than using a valve, damper, or no means at all. These measures save energy by slowing a motor which is an extremely efficient method of control.

Domestic Water Heating upgrade measures generally involve replacing old inefficient domestic water heating systems with modern energy efficient systems. New domestic water heating systems can provide equivalent or greater capacity as older systems, but use less energy. These measures save energy by reducing the fuel used by the domestic water heating systems due to improved efficiency or the removal of standby losses.

Energy Efficient Practices

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

- Perform Proper Lighting Maintenance

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

On-Site Generation Measures

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

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	54	kW DC STC
Electric Generation	64,334	kWh/yr
Displaced Cost	$5,600	/yr
Installed Cost	$154,400	

For details on our evaluation and the 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, 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 Energy 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 8.3 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a program (non-NJCEP) designed to reduce consumer electric load when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for 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 5 – 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 the Jackson Township Municipal Utilities Authority's Administration Complex 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.

The Administration Complex is a 13,900 square foot facility comprised of an administration building, field office, garage, and two wells (#3 & #8). The administration building is a single story building with a lower level partly underground and contains offices, meeting rooms, a cashier, a server room and mechanical spaces. The field office is a single story building primarily consisting of office space. The garage has three bays for performing maintenance on vehicles. The well pumps are located in small well houses.

Constructed in 1992, the MUA Administration Complex contains aging and inefficient lighting in need of upgrade. Staff have indicated they are open to retrofitting the light fixtures with LED luminaries.

2.3 Building Occupancy

The administration building is open Monday through Friday, while the field office and garage are open every day. The entire facility operates year round, except holidays. During a typical weekday, the complex operates based on the schedule shown in Figure 6. On weekends, only minimal staff occupy the field office and garage.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Admistration Building	Weekday	7:00 AM - 5:00 PM
Admistration Building	Weekend	Closed
Field Office	Weekday	7:00 AM - 5:00 PM
Field Office	Weekend	8:00 AM - 5:00 PM
Garage	Weekday	8:00 AM - 5:00 PM
Garage	Weekend	8:00 AM - 5:00 PM

2.4 Building Envelope

The buildings within the Administration Complex are primarily constructed of concrete block. The administration building has a brick façade. The administration building, garage, and well house for pump #8 have pitched roofs covered with composite shingles. The buildings have double paned windows that are in good condition and show little sign of excessive infiltration. The garage has three aluminum roll-up doors.

2.5 On-site Generation

The Administration Complex does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 40-Watt linear and 34-Watt U-Tube fluorescent T12 lamps at the complex. The buildings also have some areas illuminated by 34-Watt U-tube fluorescent T8 lamps with electronic ballasts, compact fluorescent lamps (CFL), and incandescent lamps. Most of the building spaces use 2-lamp 2-foot wide by 4-foot long troffers with diffusers. The lighting system is generally old and outdated.

Manual switches provide lighting control in most spaces. TRC observed ceiling-mounted occupancy sensors in the administration building lower-level open office.

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

Air Conditioning (DX)

There are two 5-ton York cooling-only split systems and the field office has a single 6-ton cooling only split system. The units use 100% return air to condition the spaces. The fans and evaporator sit above the drop ceiling. The compressor and condensing unit are on the ground adjacent to the buildings. The units provide constant air volume. The units utilize a scroll compressor and a direct-expansion (DX) coil. Also, 140 MBh gas fired furnaces provide heat to the spaces.

The gargae uses two 85 MBh Solaronics infared heaters that provide warmth to the staff. The garage has no cooling.

Programmable thermostats located in zones control the units. The units operate on demand to maintain a space temperature setpoint around 73°F (adjustable by staff) during the day, and at night around 68°F during the winter and 78°F during the summer.

Domestic Hot Water

The administration building has a 30-gallon gas-fired domestic water heater with an input rating of 35.5 kbtu/hr and a nominal efficiency of 80%. Hot water in this space is used in the restrooms. A 50-gallon electric water heater provides hot water the restroom in the garage.

Plug load & Vending Machines

There are 26 computer workstations and three laptops used throughout the complex. Most of the desktop computers have LCD monitors. There is no centralized PC power management software installed.

There are three servers located in a small server room. Cooling air is provided by the main AHUs.

Well Pumps

There are two fresh water wells, Well #3 and Well #8, located within the Administration Complex. Well #3 uses a 40 hp 150 gpm constant speed pump. Well #3 typically only operates between May and October, but during that time it operates continuously. Well #3 discharges directly into Jackson MUA's fresh water distribution system. Well #8 uses a 200 hp 1500 gpm pump. A VFD controls the pump, though the VFD is only used for soft start. Well #8 operates as needed year round to maintain system pressure and storage capacity. The discharge from Well #8 is directly to the London Drive Water Treatment Plant prior to entering Jackson MUA's fresh water distribution system.

The system of tanks throughout Jackson MUA's distribution system provides two days of storage based on average water consumption. A supervisory control and data acquisition (SCADA) system connects all pumps and tanks.

2.7 Water-Using Systems

There are five restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost/ft^2 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: Municipal. 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 3.4 for additional information.

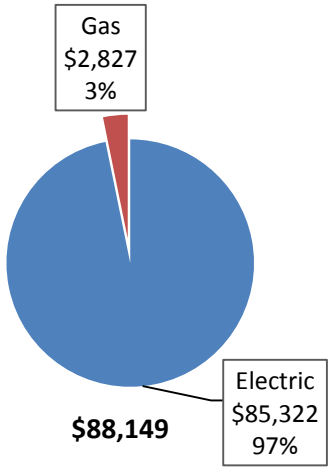
3.1 Total Cost of Energy

The following energy consumption and cost data is based on the last 12 month period of utility 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 $88,149 as shown in Figure 7 and Figure 8 below.

Figure 7 - Utility Summary

Utility Summary for Jackson MUA Administration Complex		
Fuel	**Usage**	**Cost**
Electricity	647,702 kWh	$85,322
Natural Gas	4,555 Therms	$2,827
Total		**$88,149**

Figure 8 - 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 $0.109/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 9 - Electric Usage & Demand

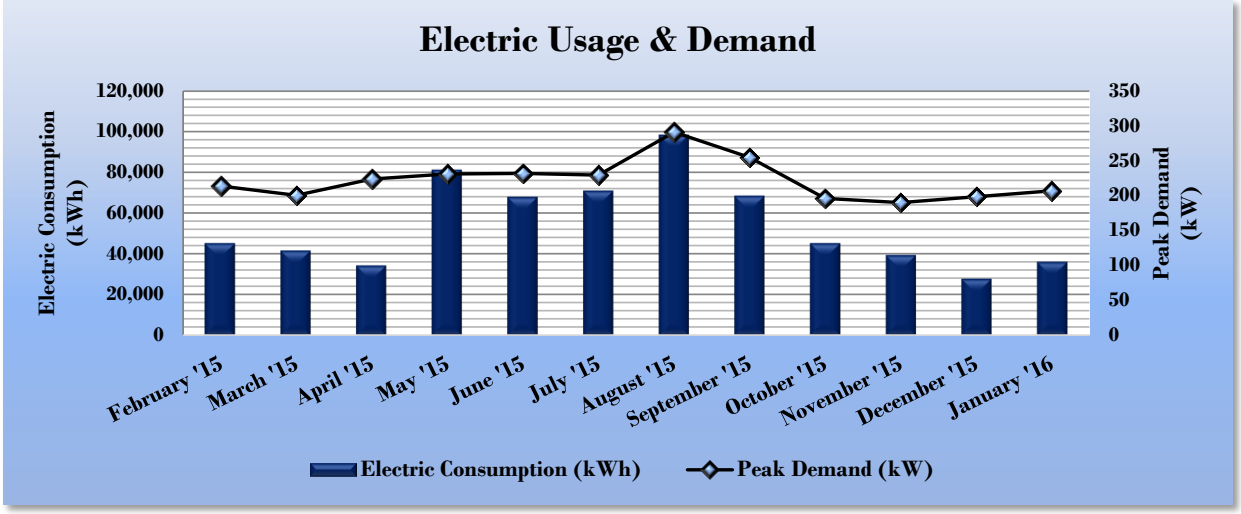


Figure 10 - Electric Usage & Demand

Electric Billing Data for Jackson MUA Administration Complex					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
3/3/15	33	45,080	214	$1,317	$6,043
4/1/15	29	41,440	200	$1,225	$5,580
5/1/15	30	34,240	224	$1,200	$4,854
6/2/15	32	81,040	231	$1,329	$9,906
7/1/15	29	67,760	232	$1,334	$8,780
7/31/15	30	70,800	230	$1,319	$9,095
9/2/15	33	98,120	291	$1,689	$12,434
10/2/15	30	68,240	255	$1,374	$8,873
11/2/15	31	45,120	196	$1,043	$6,040
12/3/15	31	39,240	190	$1,010	$5,371
1/4/16	32	27,720	198	$1,056	$4,163
2/2/16	29	36,000	207	$1,103	$5,119
Totals	**369**	**654,800**	**291.1**	**$15,000**	**$86,257**
Annual	**365**	**647,702**	**291.1**	**$14,837**	**$85,322**

3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $0.621/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is represented graphically in the chart below.

Figure 11 - Natural Gas Usage

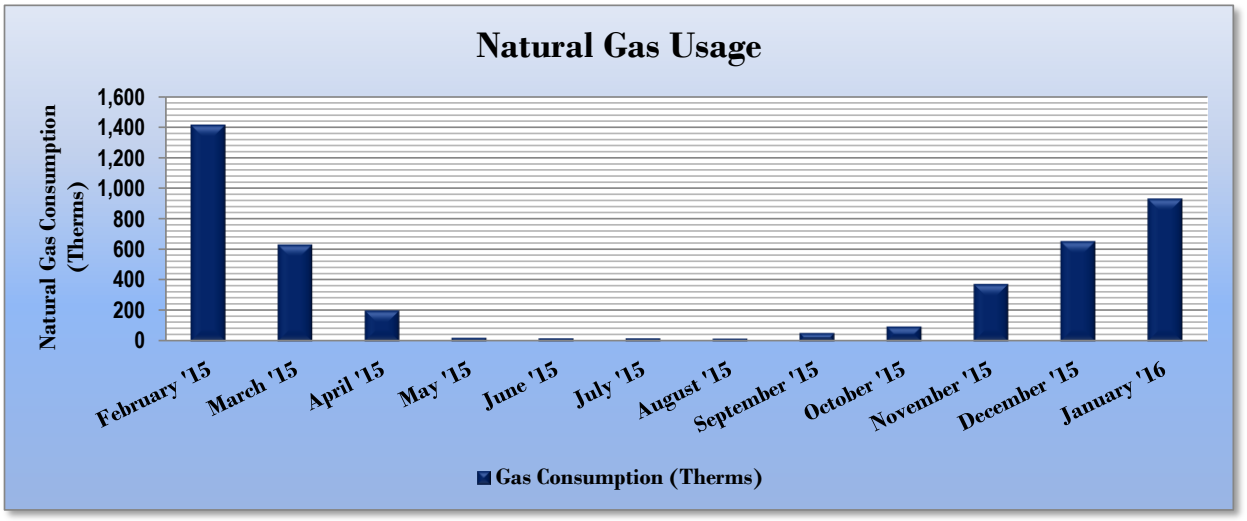


Figure 12 - Natural Gas Usage

Gas Billing Data for Jackson MUA Administration Complex				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
3/10/15	32	1,416	$764	No
4/8/15	28	633	$369	No
5/5/15	26	202	$152	No
6/9/15	34	23	$36	No
7/9/15	29	19	$59	No
8/7/15	28	19	$59	No
9/3/15	26	17	$58	No
10/5/15	31	54	$75	No
11/3/15	28	97	$107	No
12/5/15	31	376	$218	Yes
1/8/16	33	654	$380	Yes
2/8/16	30	933	$480	No
Totals	**356**	**4,442**	**$2,758**	2
Annual	**365**	**4,555**	**$2,827**	

3.4 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 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 energy than similar buildings on a square foot basis or if that building performs better than the median. EUI is presented in both site energy and source energy. Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy is the raw fuel consumed to generate the energy consumed at the site, factoring in energy production and distribution losses.

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Jackson MUA Administration Complex	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/sq.ft)	532.3	148.1
Source Energy Use Intensity (kBtu/sq.ft)	189.7	52.7

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

Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Jackson MUA Administration Complex	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/sq.ft)	362.6	148.1
Source Energy Use Intensity (kBtu/sq.ft)	136.3	52.7

Many buildings can also receive a 1 – 100 ENERGY STAR® score. This score compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide — and may be eligible for ENERGY STAR® certification. This facility does not currently qualify to receive a score because it contains multiple buildings of different function which are not scored as a "campus."

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

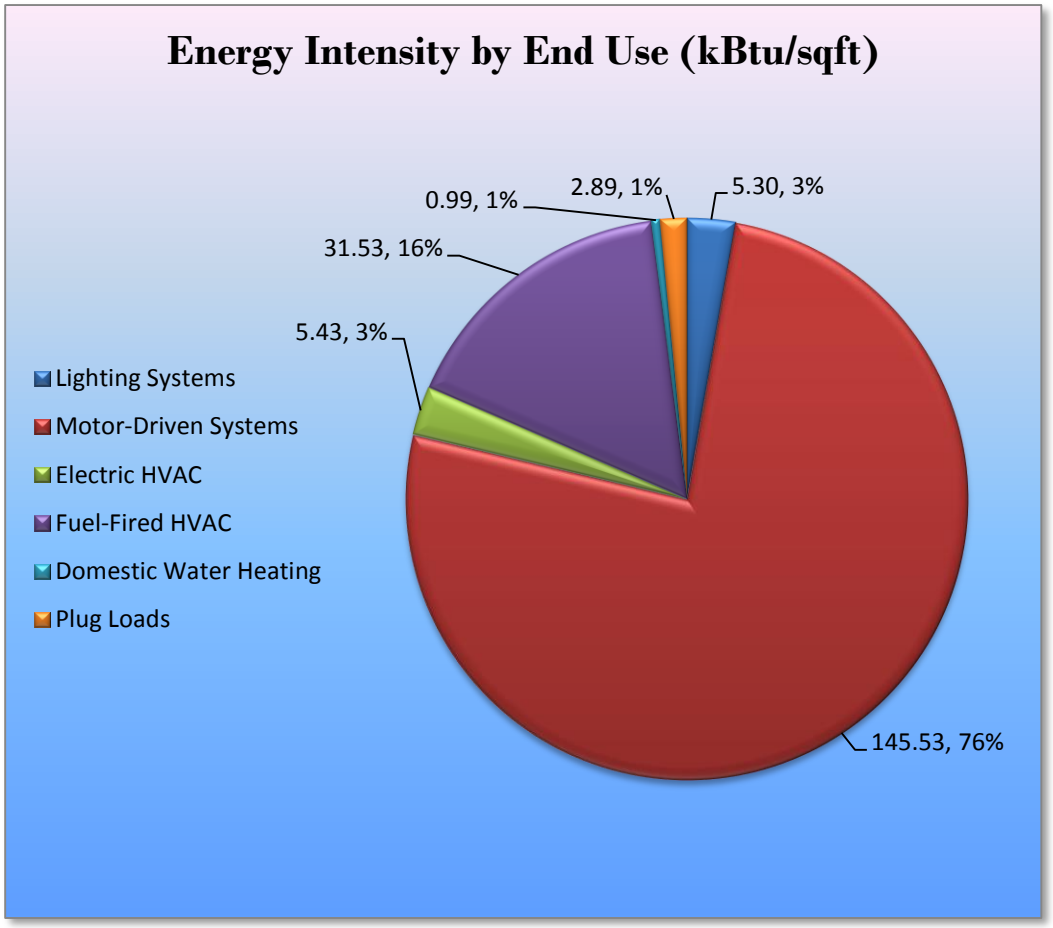
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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.

3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building and determine their proportional contribution to overall building energy usage. This visual representation of energy end uses highlights systems that may benefit most from energy efficiency projects.

Figure 15 - 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 Administration Complex 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 16 – 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			**15,700**	**5.4**	**0.0**	**$1,708.47**	**$13,240.17**	**$980.00**	**$12,260.17**	**7.18**	**15,809**
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Variable Frequency Drive (VFD) Measures			**202,850**	**48.7**	**0.0**	**$22,074.61**	**$5,000.00**	**$0.00**	**$5,000.00**	**0.23**	**204,269**
ECM 5	Run Pump Slower and Longer	Yes	202,850	48.7	0.0	$22,074.61	$5,000.00	$0.00	$5,000.00	0.23	204,269
Domestic Water Heating Upgrade			**1,202**	**0.0**	**19.5**	**$251.84**	**$35.85**	**$0.00**	**$35.85**	**0.14**	**3,493**
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	1,202	0.0	19.5	$251.84	$35.85	$0.00	$35.85	0.14	3,493
TOTALS			**220,017**	**54.2**	**19.5**	**$24,063.72**	**$19,436.02**	**$1,180.00**	**$18,256.02**	**0.76**	**223,837**

* - 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 Figure 17 below.

Figure 17 – 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		**15,700**	**5.4**	**0.0**	**$1,708.47**	**$13,240.17**	**$980.00**	**$12,260.17**	**7.18**	**15,809**
ECM 1	Install LED Fixtures	2,023	0.4	0.0	$220.18	$4,259.33	$450.00	$3,809.33	17.30	2,037
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	5,819	2.4	0.0	$633.26	$6,084.00	$0.00	$6,084.00	9.61	5,860
ECM 3	Retrofit Fixtures with LED Lamps	7,857	2.5	0.0	$855.02	$2,896.84	$530.00	$2,366.84	2.77	7,912

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	2,023	0.4	0.0	$220.18	$4,259.33	$450.00	$3,809.33	17.30	2,037
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

This measure evaluates replacing existing low bay fixtures in the garage containing T5 lamps with new high performance LED light fixtures. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output.

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

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	5,819	2.4	0.0	$633.26	$6,084.00	$0.00	$6,084.00	9.61	5,860
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

This measure evaluates replacing T12 linear fluorescent lamps, ballasts, and reflectors with LED tube lamps, reflectors, and drivers specifically designed for existing linear fluorescent fixtures. The retrofit uses the existing fixture housing but replaces the rest of the components with an efficient source and reflectors designed for LEDs. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output and efficiently projects the light into the space.

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	7,857	2.5	0.0	$855.02	$2,896.84	$530.00	$2,366.84	2.77	7,912
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

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

Maintenance savings likely, since LED sources have burn hours which are more than twice that of a fluorescent source. Higher material costs associated with LED sources may partially offset maintenance savings.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 18 below.

Figure 18 – 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		**265**	**0.1**	**0.0**	**$28.80**	**$1,160.00**	**$200.00**	**$960.00**	**33.33**	**267**
ECM 4	Install Occupancy Sensor Lighting Controls	265	0.1	0.0	$28.80	$1,160.00	$200.00	$960.00	33.33	267

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 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
265	0.1	0.0	$28.80	$1,160.00	$200.00	$960.00	33.33	267

Measure Description

This measure evaluates installing occupancy sensors to control light fixtures that are currently manually controlled in private offices. 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 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 19 below.

Figure 19 – 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		**202,850**	**48.7**	**0.0**	**$22,074.61**	**$5,000.00**	**$0.00**	**$5,000.00**	**0.23**	**204,269**
ECM 5	Run Pump Slower and Longer	202,850	48.7	0.0	$22,074.61	$5,000.00	$0.00	$5,000.00	0.23	204,269

ECM 5: Run Pump 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)
202,850	48.7	0.0	$22,074.61	$5,000.00	$0.00	$5,000.00	0.23	204,269

Measure Description

This measure evaluates modifying the operation of the existing variable frequency drive (VFD) that controls well pump #8. The pump operates as needed to supply fresh water. Based on historical electric data we estimate that the pump operates about 40% of the year. The existing VFD is primarily used only for soft start.

We recommend operating this large pump at reduced speed 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 would be achieved if the pump could operate slower.

4.1.4 Domestic Water Heating Upgrade

Our recommendations for domestic water heating measures are summarized in Figure 20 below.

Figure 20 - 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		**1,202**	**0.0**	**19.5**	**$251.84**	**$35.85**	**$0.00**	**$35.85**	**0.14**	**3,493**
ECM 6	Install Low-Flow Domestic Hot Water Devices	1,202	0.0	19.5	$251.84	$35.85	$0.00	$35.85	0.14	3,493

ECM 6: 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)
1,202	0.0	19.5	$251.84	$35.85	$0.00	$35.85	0.14	3,493

Measure Description

This measure evaluates the savings from installing low flow domestic water devices to reduce overall water flow in general and hot water flow in particular. Low flow showerheads and faucet aerators reduce the water flow, relative to standard showerheads and aerators, from the fixture. Pre-rinse spray valves—often used in commercial and institutional kitchens—are designed to remove food waste from dishes prior to dishwashing. Replacing standard pre-rinse spray valves with low flow valves will reduce water use.

All of the low flow devices reduce the overall water flow from the fixture which generally reduces the amount of hot water used resulting in energy and water savings.

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.

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.

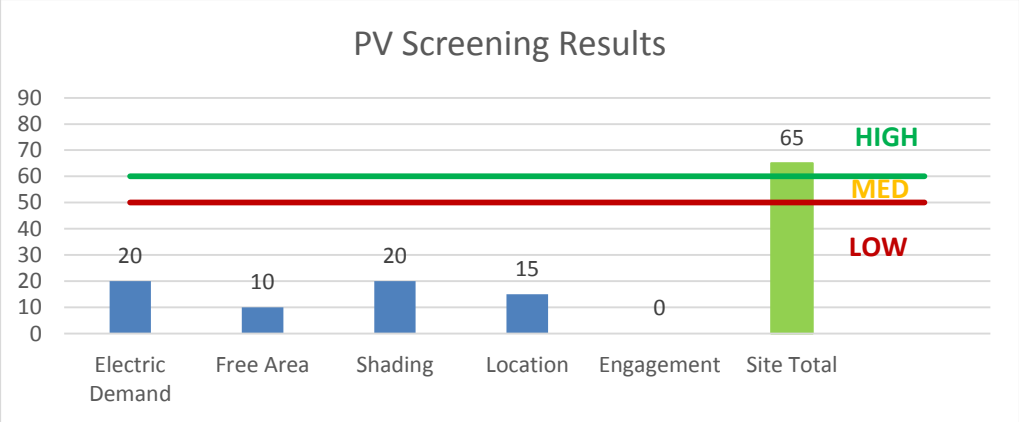
6.1 Photovoltaic

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

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

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

Figure 21 - Photovoltaic Screening



Potential	High	
System Potential	54	kW DC STC
Electric Generation	64,334	kWh/yr
Displaced Cost	$5,600	/yr
Installed Cost	$154,400	

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing. Refer to Section 8.2 for additional information.

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

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

6.2 Combined Heat and Power

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

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

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

The lack thermal load is the most significant factors contributing to the low potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

For a list of qualified firms in 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/.

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 DR program information.

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

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 22 for a list of the eligible programs identified for each recommended ECM.

Figure 22 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
ECM 1	Install LED Fixtures	x			
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers				
ECM 3	Retrofit Fixtures with LED Lamps	x			
ECM 4	Install Occupancy Sensor Lighting Controls	x			
ECM 5	Run Pump Slower and Longer				
ECM 6	Install Low-Flow Domestic Hot Water Devices				

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.

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 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 the lesser of 50% of the total installed incremental project cost, or a buy down to a one year payback. Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

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

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

8.2 SREC Registration Program

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

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

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

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

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

8.3 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter 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.

8.4 Demand Response Energy Aggregator

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

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

See Section 7 for additional information.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Entry Lobby	4	Incandescent: 300W incan	None	300	2,600	Relamp	No	4	LED Screw-In Lamps: LED for 300W bulbs	None	45	2,600	0.81	3,103	0.0	$337.66	$175.81	$40.00	0.40
Entry Lobby	6	Compact Fluorescent: 18W CFLs	None	18	2,600	None	No	6	Compact Fluorescent: 18W CFLs	None	18	2,600	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Cashier	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,600	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	None	29	2,600	0.05	201	0.0	$21.85	$117.00	$20.00	4.44
Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	None	29	2,600	0.11	402	0.0	$43.70	$234.00	$40.00	4.44
File Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	1,300	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	None	29	1,300	0.19	359	0.0	$39.06	$468.00	$40.00	10.96
Private Office	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	2,600	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,820	0.22	824	0.0	$89.64	$932.00	$120.00	9.06
Meeting Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,600	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	None	29	2,600	0.16	602	0.0	$65.55	$351.00	$60.00	4.44
Meeting Room	11	Compact Fluorescent: 18W CFLs	None	18	2,600	None	No	11	Compact Fluorescent: 18W CFLs	None	18	2,600	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lower Level Open Office	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,820	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,820	0.53	1,405	0.0	$152.94	$1,170.00	$200.00	6.34
Server Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	1,300	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	None	29	1,300	0.28	538	0.0	$58.59	$702.00	$60.00	10.96
Stock Rm	20	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	1,300	Relamp & Reballast	No	20	LED - Linear Tubes: (2) 4' Lamps	None	29	1,300	0.94	1,795	0.0	$195.31	$2,340.00	$200.00	10.96
Office	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	2,600	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,820	0.32	1,236	0.0	$134.47	$1,398.00	$180.00	9.06
Mechanical Rms	10	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	1,300	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	None	29	1,300	0.47	897	0.0	$97.66	$1,170.00	$100.00	10.96
Mechanical Rms	10	Incandescent: 100W incan	None	100	1,300	Relamp	No	10	LED Screw-In Lamps: LED for 100W bulbs	None	15	1,300	0.68	1,293	0.0	$140.69	$439.53	$100.00	2.41
Garage	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,150	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	None	29	3,150	0.18	851	0.0	$92.65	$409.50	$70.00	3.66
Garage	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	88	3,150	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	None	29	3,150	0.09	435	0.0	$47.33	$234.00	$20.00	4.52
Garage	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 6L	None	358	3,150	Fixture Replacement	No	3	LED - Fixtures: Low-Bay	None	175	3,150	0.44	2,023	0.0	$220.18	$4,259.33	$450.00	17.30

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
Well #3	Well pump	1	Process Pump	40.0	94.1%	No	4,335	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Well #8	Well pump	1	Process Pump	200.0	95.8%	No	3,330	No	95.8%	Yes	0	31.30	300,798	0.0	$32,733.56	$13,143.09	$12,000.00	0.03
Admin	Supply Fan	4	Supply Fan	3.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	Exhaust Fan	2	Exhaust Fan	1.0	82.5%	No	2,745	No	82.5%	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
Admin	Offices	2	Split-System AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Field Office	Offices	1	Split-System AC	6.30		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Admin	Offices	1	Furnace	140.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Field Office	Offices	1	Furnace	140.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	Garage	2	Infrared Unit Heater	85.00	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
Admin	DHW	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	DHW	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
Admin	4	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	19.5	$121.00	$28.68	$0.00	0.24
Garage	1	Faucet Aerator (Lavatory)	2.20	1.00	0.00	1,202	0.0	$130.84	$7.17	$0.00	0.05

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Admin	26	Desktop Computers	100.0	Yes
Admin	3	Laptop Computers	100.0	Yes
Admin	4	Servers (MUA and SCADA)	150.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Jackson MUA Administration Complex

Primary Property Type: Office
Gross Floor Area (ft²): 13,900
Built: 1992

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
Jackson MUA Administration Complex 135 Manhattan St 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: 5821654

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
189.7 kBtu/ft²

Source EUI
532.3 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	420,223 (16%)
Electric - Grid (kBtu)	2,215,959 (84%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	52.7
National Median Source EUI (kBtu/ft²)	148.1
% Diff from National Median Source EUI	260%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	268

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)