Local Government Energy Audit:
Energy Audit Report

Plainsboro Department of Public Works

20 Woodland Drive

Cranbury, NJ 08512

Township of Plainsboro

September 7, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for the Plainsboro Department of Public Works.

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

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

1.1 Facility Summary

The Plainsboro Department of Public Works is a 33,000 square foot facility comprised of two primary space types within a single, one story building. The office area includes the front desk, staff offices, hallways, bathrooms, and a foyer. The garage bay section includes boiler room, two garage bays, wash bay, breakroom, and locker room.

Lighting at the Plainsboro Department of Public Works consists of mostly linear fluorescent fixtures which contain 32-Watt T8 lamps. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated five measures and recommends four measures which together represent an opportunity for the Plainsboro Department of Public Works to reduce annual energy costs by $5,639 and annual greenhouse gas emissions by 37,731 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 6.7 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce the Plainsboro Department of Public Works' annual energy use by 9%.

Figure 1 – Previous 12 Month Utility Costs

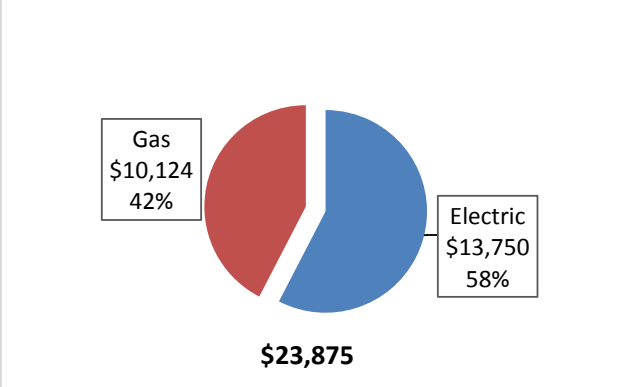
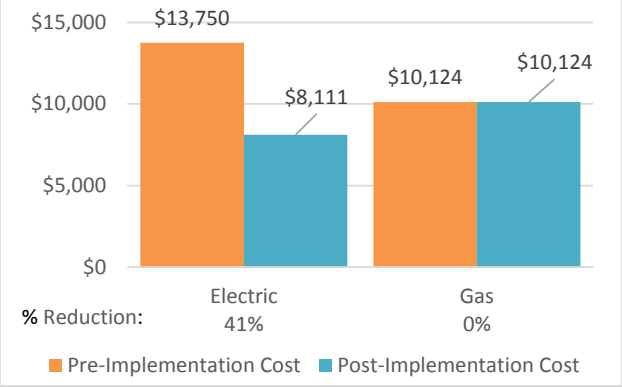


Figure 2 – Potential Post-Implementation Costs



A detailed description of the Plainsboro Department of Public Works' existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**35,857**	**8.0**	**0.0**	**$5,396.53**	**$42,190.44**	**$4,530.00**	**$37,660.44**	**7.0**	**36,108**
ECM 1	Install LED Fixtures	Yes	24,287	3.8	0.0	$3,655.25	$33,983.41	$3,100.00	$30,883.41	8.4	24,457
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	1,319	0.4	0.0	$198.57	$1,079.00	$90.00	$989.00	5.0	1,329
ECM 3	Retrofit Fixtures with LED Lamps	Yes	10,250	3.9	0.0	$1,542.71	$7,128.03	$1,340.00	$5,788.03	3.8	10,322
Electric Unitary HVAC Measures			**7,679**	**2.9**	**0.0**	**$1,155.76**	**$20,198.97**	**$1,242.00**	**$18,956.97**	**16.4**	**7,733**
	Install High Efficiency Electric AC	No	7,679	2.9	0.0	$1,155.76	$20,198.97	$1,242.00	$18,956.97	16.4	7,733
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$242.58**	**$230.00**	**$0.00**	**$230.00**	**0.9**	**1,623**
ECM 4	Vending Machine Control	Yes	1,612	0.0	0.0	$242.58	$230.00	$0.00	$230.00	0.9	1,623
TOTALS FOR ALL RECOMMENDED MEASURES			**37,469**	**8.0**	**0.0**	**$5,639.11**	**$42,420.44**	**$4,530.00**	**$37,890.44**	**6.7**	**37,731**
TOTALS FOR ALL EVALUATED MEASURES			**45,148**	**11.0**	**0.0**	**$6,794.87**	**$62,619.41**	**$5,772.00**	**$56,847.41**	**8.4**	**45,464**

* - 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 measures save energy by reducing the power used by the lighting components due to improved electrical efficiency.

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlet when not in use.

Energy Efficient Practices

TRC also identified 13 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at the Plainsboro Department of Public Works include:

- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Perform Proper Boiler Maintenance
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance
- Perform Maintenance on Compressed Air Systems

- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for the Plainsboro Department of Public Works. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- Energy Savings Improvement Program (ESIP)

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

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

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

Additional information on relevant incentive programs is located in Section 8. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Neil Blitz	Superintendent of Public Works	nblitz@plainsboronj.com	(609) 799-0099
TRC Energy Services			
Alex Klieverik	Auditor	AKlieverik@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On February 16, 2018, TRC performed an energy audit at the Plainsboro Department of Public Works located in Cranbury, New Jersey. TRC's team met with Albert Ortiz to review the facility operations and help focus our investigation on specific energy-using systems.

The Plainsboro Department of Public Works is a 33,000 square foot facility comprised of two primary space types within a single, one story building. The office area includes the front desk, staff offices, hallways, bathrooms, and a foyer. The garage bay section includes a boiler room, two garage bays, wash bay, breakroom, and locker room.

The building was constructed in 1994. The equipment, including lighting, mechanical systems, and office equipment, has been replaced at different rates. The facility has replaced most of its existing T12 fluorescent fixtures with T8 fluorescent fixtures. The hot water boiler and infrared unit heaters were installed in the last five years, while the split-system air conditioning units are original to the facility.

2.3 Building Occupancy

The building is open Monday through Friday. The typical schedule is presented in the table below. The entire facility is used year round. During a typical day, the facility is occupied by 16 staff.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Plainsboro Department of Public Works	Weekday	7:00 AM - 3:30 PM
Plainsboro Department of Public Works	Weekend	Unoccupied

2.4 Building Envelope

The building is constructed of composite walls with a brick façade and corrugated metal siding. The building has a flat roof with a white membrane, which appears to be in good condition. The building has double pane operable windows with metal frames. The exterior doors in the office area are typically metal with glass panes and metal frames. The doors in the garage bay area are metal garage doors.

Building Facade

2.5 On-Site Generation

The Plainsboro Department of Public Works does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Lighting at the facility is provided mostly by linear fluorescent fixtures which contain 32-Watt T8 lamps. Fixtures throughout the building include surface mounted continuous row wrap fixtures, indirect/direct fixtures and industrial fixtures. The garage bay is lit by pendant mounted fixtures which contain 54-Watt T5HO lamps. These are in good condition.

There are also fixtures in the boiler room, garage bay, wash bay areas which contain the original 40-Watt T12 lamps and magnetic ballasts.

There is an opportunity for energy savings by replacing these lamps with LED lamps. The T8 fixtures are in good condition, providing a great opportunity for energy savings by retrofitting to LED technology. Upgrading the T12 fixtures would require additional components. Other light fixtures were evaluated for replacement with new LED fixtures. This is more costly in wash bay areas which require vapor proof fixtures.

Lighting control in the office spaces is provided by occupancy based sensors. The mechanical spaces and some of the garage bays are controlled by wall switches. There is no lighting controls in the wash bays.

The building's exterior lighting is minimal and consists primarily of metal halide building mounted wall pack fixtures and pole mounted fixtures that are controlled by photocells. The lights were off at the time of the audit. There is an opportunity for energy savings by upgrading the remaining fixtures to LED technology and maintaining photocell controls to ensure operation is limited to dusk to dawn hours.


Garage Bay Lighting consists of T8 and T5HO fixtures


Office Area lighting consists of T8 fixtures. There are LED exit signs throughout

Hot Water Heating System

Hot water space heating is provided by one Weil McLain Ultra 230 CT 230MBh output, natural draft condensing hot water boiler (BR1). The boiler has a nominal combustion efficiency of 94%. Hot water distribution is configured in a constant flow primary distribution loop with one dedicated 0.3 HP hot water pump (HHWP1. Hot water is supplied at 180°F when the outside air temperature is below 50°F and the setpoint is reset to 155°F when the outside air is above 65°F. The boiler provides hot water to the perimeter baseboard heaters in the office area.

The boiler is in good condition and well maintained.

Bay Area 2 is heated by five new low intensity gas-fired pressurized infrared unit heaters. The other bay area, wash bay, and boiler room are heated by gas powered furnaces that are at the end of their useful life.

Weil McLain Ultra 230 CT boiler

Infrared unit heater and gas furnace

Direct Expansion Air Conditioning System (DX)

Four Carrier split system air conditioning units (AC1, 2, 3, and 4) of various capacities and efficiencies are used to condition the building. All condenser units are located on the ground level of the building. All are in fair condition but are operating toward the end of their useful life. The outdoor condensing units that serve split AC systems are in fair condition as well. All equipment operating toward the end of it useful life was evaluated for replacement. Replacement of the split-systems would not be cost effective on the basis of the potential energy savings.

The units are controlled by individual thermostats located in the zones. The AC units operate as needed during occupied hours to maintain the building space temperature setpoint around 72°F.

Four Carrier split system AC units of various capacities and efficiencies

Domestic Water Heating System

The domestic hot water heating system for the facility consists of one Bradford White gas-fired hot water heater with an input rating of 85 MBH and a nominal efficiency of 80%. The water heater has a 100 gallon storage tank. One 0.1 HP recirculation pumps distributes 120°F water to the entire site. The recirculation pump operates continuously. The hot water heater is fairly new, highly efficient, and in good condition.

Bradford White gas fired hot water heater

Building Plug Load

There are six computer work stations throughout the facility. All of the computers are desktop units with LCD monitors. There is no centralized PC power management software installed. Some of these were noted to be in idle mode or left on while not in use. This provides a potential for implementing computer power management software. The facility also has peripheral office equipment throughout the area, including a photo copier and desk top printers, as well as kitchen equipment, including a refrigerator and microwave.

Office Equipment

Kitchen Equipment

The facility has a refrigerated beverage vending machine which currently operates 24 hours a day seven days a week. There is an opportunity for energy savings by installing vending machine controls on the refrigerated drink machine.

The facility also has multiple pieces of shop equipment throughout the garage bay area.



Shop Equipment

2.7 Water-Using Systems

There are two restrooms at this facility. The sink aerators throughout the building were already converted to low flow. There is no opportunity for energy savings by replacing the high flow aerators with low flow devices.

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 per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 0 for additional information.

3.1 Total Cost of Energy

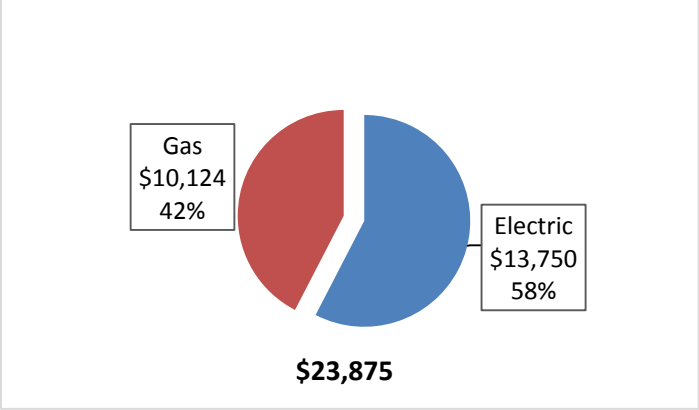
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Plainsboro Department of Public Works		
Fuel	**Usage**	**Cost**
Electricity	91,364 kWh	$13,750
Natural Gas	10,715 Therms	$10,124
Total		**$23,875**

The current annual energy cost for this facility is $23,875 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.151/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

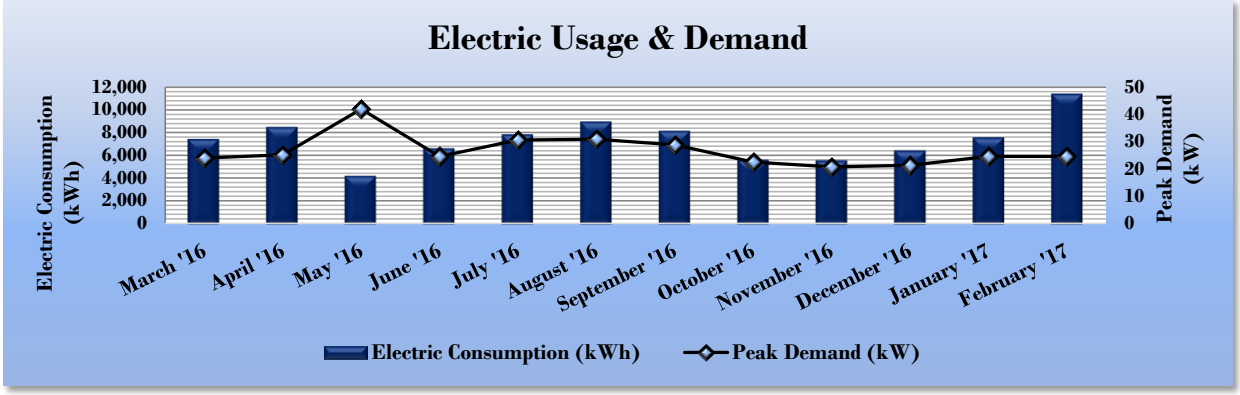


Figure 9 - Electric Usage & Demand

Electric Billing Data for Plainsboro Department of Public Works						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
3/18/16	28	7,410	24	$105	$1,017	No
4/19/16	31	8,460	25	$111	$1,152	No
5/18/16	28	4,230	42	$185	$597	No
6/17/16	29	6,600	25	$108	$1,167	Yes
7/18/16	30	7,830	31	$135	$1,401	Yes
8/17/16	29	8,940	31	$136	$1,549	No
9/16/16	29	8,130	29	$128	$1,421	No
10/17/16	30	5,610	23	$101	$785	No
11/15/16	28	5,580	21	$92	$767	No
12/16/16	30	6,420	21	$95	$876	No
1/19/17	33	7,560	25	$110	$1,035	No
2/16/17	27	11,340	25	$110	$1,495	No
Totals	**352**	**88,110**	**42**	**$1,416**	**$13,261**	2
Annual	**365**	**91,364**	**42**	**$1,468**	**$13,750**	

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.945/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

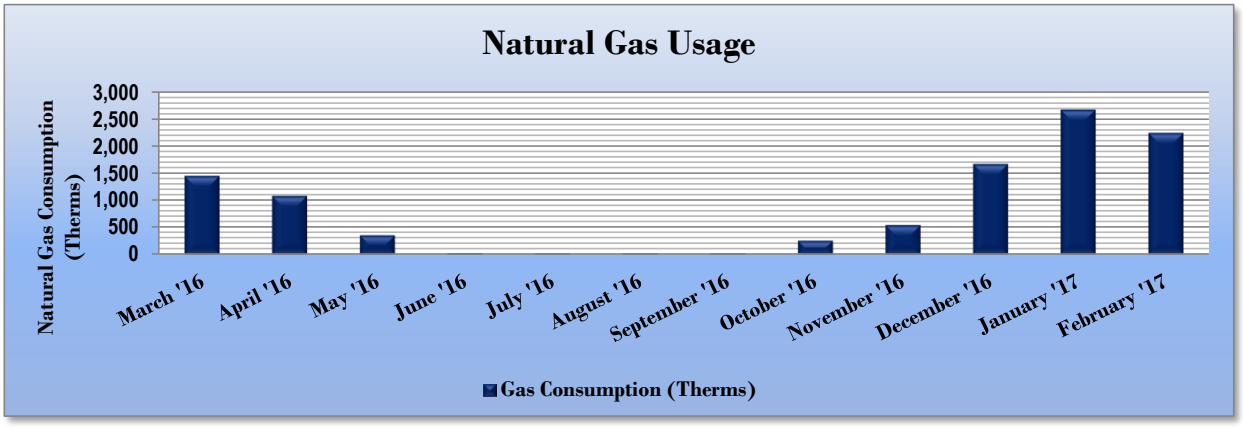


Figure 11 - Natural Gas Usage

Gas Billing Data for Plainsboro Department of Public Works				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
3/18/16	28	1,449	$1,137	No
4/19/16	31	1,078	$780	No
5/18/16	28	351	$267	No
6/17/16	29	23	$28	Yes
7/18/16	30	21	$28	Yes
8/17/16	29	21	$29	No
9/16/16	29	21	$29	No
10/17/16	30	252	$223	No
11/15/16	28	542	$524	No
12/16/16	30	1,670	$1,622	No
1/19/17	33	2,669	$2,768	No
2/16/17	27	2,239	$2,329	No
Totals	**352**	**10,334**	**$9,764**	2
Annual	**365**	**10,715**	**$10,124**	

3.4 Benchmarking

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

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

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Plainsboro Department of Public Works	National Median Building Type: Office
Source Energy Use Intensity (kBtu/ft^2)	63.8	148.1
Site Energy Use Intensity (kBtu/ft^2)	41.9	67.3

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

Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Plainsboro Department of Public Works	National Median Building Type: Office
Source Energy Use Intensity (kBtu/ft^2)	51.6	148.1
Site Energy Use Intensity (kBtu/ft^2)	38.0	67.3

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

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

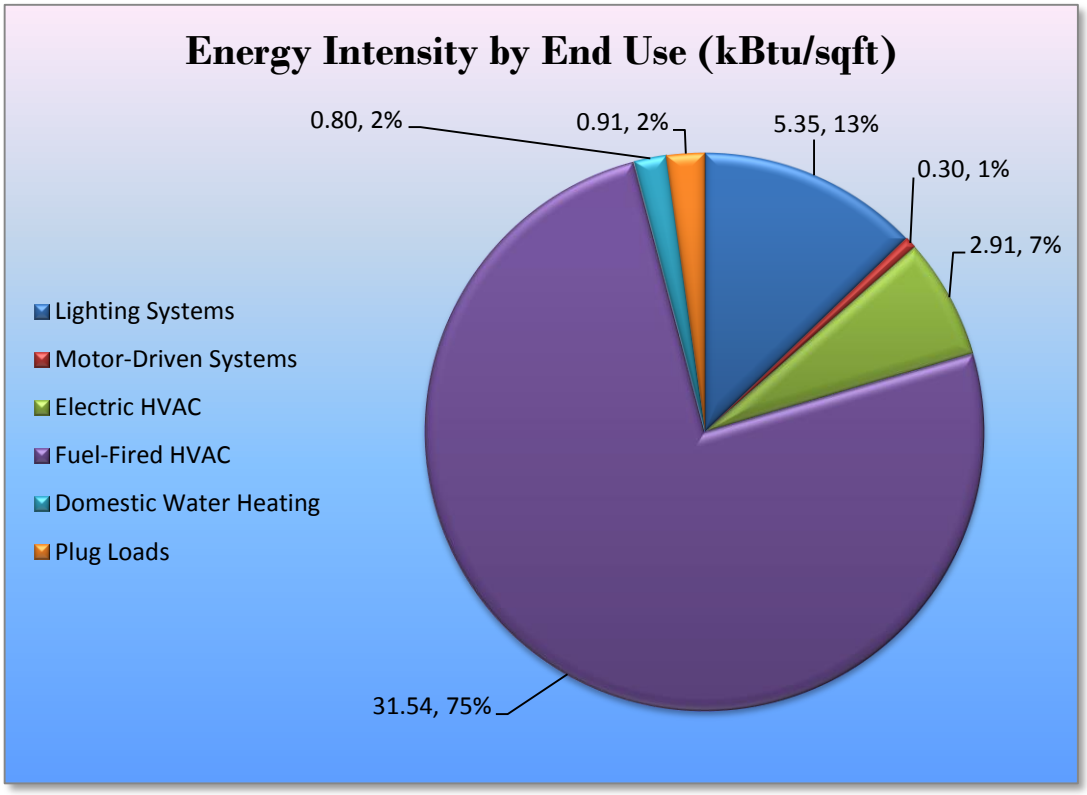
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 14 - Energy Balance (kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Plainsboro Department of Public Works 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 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**35,857**	**8.0**	**0.0**	**$5,396.53**	**$42,190.44**	**$4,530.00**	**$37,660.44**	**7.0**	**36,108**
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ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,319	0.4	0.0	$198.57	$1,079.00	$90.00	$989.00	5.0	1,329
ECM 3	Retrofit Fixtures with LED Lamps	10,250	3.9	0.0	$1,542.71	$7,128.03	$1,340.00	$5,788.03	3.8	10,322
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$242.58**	**$230.00**	**$0.00**	**$230.00**	**0.9**	**1,623**
ECM 4	Vending Machine Control	1,612	0.0	0.0	$242.58	$230.00	$0.00	$230.00	0.9	1,623
TOTALS		**37,469**	**8.0**	**0.0**	**$5,639.11**	**$42,420.44**	**$4,530.00**	**$37,890.44**	**6.7**	**37,731**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.
** - Simple Payback Period is based on net measure costs (i.e. after incentives).

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 16 below.

Figure 16 – 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		**35,857**	**8.0**	**0.0**	**$5,396.53**	**$42,190.44**	**$4,530.00**	**$37,660.44**	**7.0**	**36,108**
ECM 1	Install LED Fixtures	24,287	3.8	0.0	$3,655.25	$33,983.41	$3,100.00	$30,883.41	8.4	24,457
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,319	0.4	0.0	$198.57	$1,079.00	$90.00	$989.00	5.0	1,329
ECM 3	Retrofit Fixtures with LED Lamps	10,250	3.9	0.0	$1,542.71	$7,128.03	$1,340.00	$5,788.03	3.8	10,322

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	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	24,287	3.8	0.0	$3,655.25	$33,983.41	$3,100.00	$30,883.41	8.4	24,457

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of metal halide lamps.

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	1,319	0.4	0.0	$198.57	$1,079.00	$90.00	$989.00	5.0	1,329
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

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

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	10,250	3.9	0.0	$1,542.71	$7,128.03	$1,340.00	$5,788.03	3.8	10,322
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T5 and T8 fluorescent lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Plug Load Equipment Control - Vending Machines

Our recommendations for upgrades to plug load equipment controls are summarized in Figure 17 below.

Figure 17 – Summary of Plug Load Equipment 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)
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$242.58**	**$230.00**	**$0.00**	**$230.00**	**0.9**	**1,623**
ECM 4	Vending Machine Control	1,612	0.0	0.0	$242.58	$230.00	$0.00	$230.00	0.9	1,623

ECM 4: Vending Machine Control

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)
1,612	0.0	0.0	$242.58	$230.00	$0.00	$230.00	0.9	1,623

Measure Description

Vending machines operate continuously, even during non-business hours. We recommend installing occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

4.2 ECMs Evaluated But Not Recommended

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

Figure 18 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures	**7,679**	**2.9**	**0.0**	**$1,155.76**	**$20,198.97**	**$1,242.00**	**$18,956.97**	**16.4**	**7,733**
Install High Efficiency Electric AC	7,679	2.9	0.0	$1,155.76	$20,198.97	$1,242.00	$18,956.97	16.4	7,733
TOTALS	**7,679**	**2.9**	**0.0**	**$1,155.76**	**$20,198.97**	**$1,242.00**	**$18,956.97**	**16.4**	**7,733**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.
** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Install High Efficiency Air Conditioning Units

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)
7,679	2.9	0.0	$1,155.76	$20,198.97	$1,242.00	$18,956.97	16.4	7,733

Measure Description

We typically recommend replacing standard efficiency split system air conditioning units with high efficiency split system air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

Reasons for not Recommending

Replacement of the split-systems would not be cost effective on the basis of the potential energy savings. We recommend that when the existing split system air conditioning units are ready for replacement, they are replaced with high efficiency units.

5 ENERGY EFFICIENT PRACTICES

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

Close Doors and Windows

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

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°F-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.

Clean Evaporator/Condenser Coils on AC Systems

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

Perform Proper Boiler Maintenance

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

Perform Proper Furnace Maintenance

Preventative furnace maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should include tasks such as checking for gas/carbon monoxide leaks; changing the air and fuel filters; checking components for cracks, corrosion, dirt, or debris build-up; ensuring the ignition system is working properly; testing and adjusting operation and safety controls; inspecting the electrical connections; and ensuring proper lubrication for motors and bearings.

Perform Proper Water Heater Maintenance

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

Perform Maintenance on Compressed Air Systems

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

Plug Load Controls

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

Water Conservation

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

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

6 On-Site Generation Measures

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

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

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

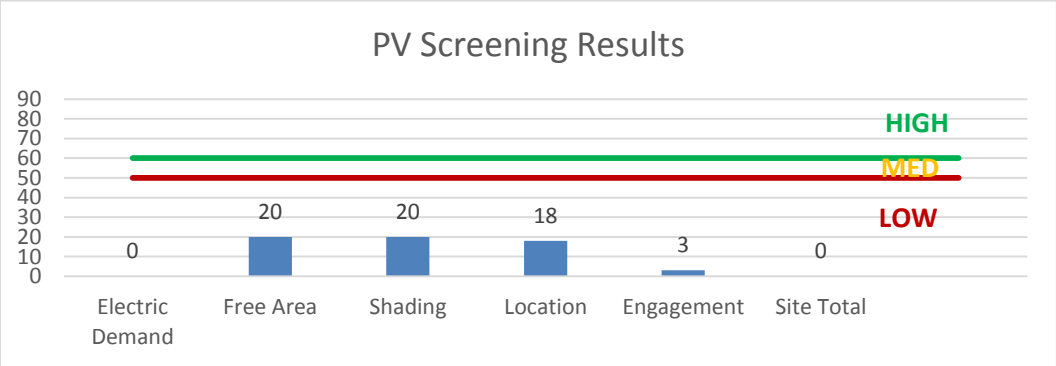
6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the potential for PV at the site. A PV array located on the roof of the main building/ground next to the building/over the main parking lot may be feasible. If the Plainsboro Department of Public Works is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 19 - Photovoltaic Screening



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

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

6.2 Combined Heat and Power

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

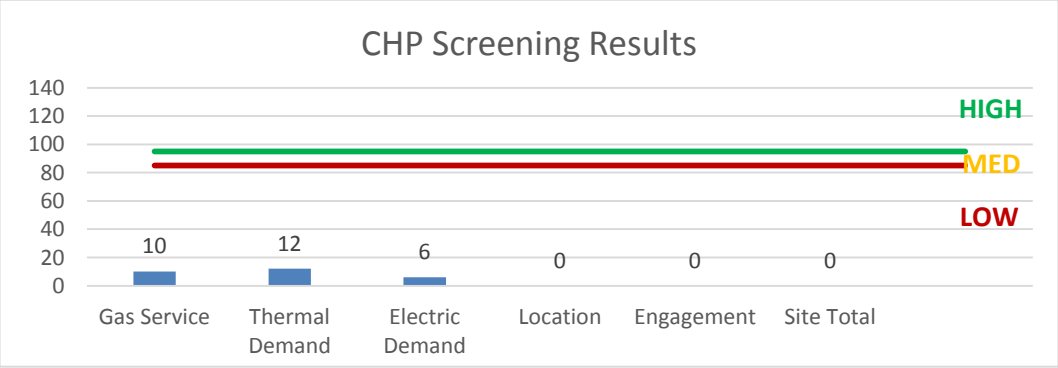
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

Figure 20 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

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 21 for a list of the eligible programs identified for each recommended ECM.

Figure 21 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	X		X			
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X		X			
ECM 3	Retrofit Fixtures with LED Lamps	X		X			
ECM 4	Vending Machine Control			X			

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

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

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

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 description and application can be found at: www.njcleanenergy.com/ESIP

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,210	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,210	0.12	391	0.0	$58.87	$351.00	$30.00	5.45
Garage Bay	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	234	1,547	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,547	0.14	319	0.0	$47.94	$95.13	$20.00	1.57
Garage Bay	12	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	2,210	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,210	1.68	5,461	0.0	$821.89	$1,141.60	$240.00	1.10
Garage Bay	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage Bay	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,210	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	2,210	0.07	222	0.0	$33.47	$202.00	$0.00	6.04
Wall Mount	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,210	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,210	0.00	16	0.0	$2.33	$117.00	$20.00	41.54
2nd Garage Bay-Bay Area	34	Linear Fluorescent - T5: 4' T5 (28W) - 3L	Occupancy Sensor	90	1,547	Relamp	No	34	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,547	1.26	2,862	0.0	$430.67	$2,556.80	$510.00	4.75
2nd Garage Bay-Bay Area	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wash Bay	4	Linear Fluorescent - T12: 4' T12 (40W) - 3L	None	127	2,210	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	None	44	2,210	0.27	864	0.0	$129.98	$526.00	$60.00	3.59
Wash Bay	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Head Mechanic's Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.05	119	0.0	$17.98	$117.00	$20.00	5.40
Break Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.16	358	0.0	$53.94	$351.00	$60.00	5.40
Men's Restroom + Lockers	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.29	657	0.0	$98.88	$643.50	$110.00	5.40
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,210	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,210	0.03	85	0.0	$12.84	$58.50	$10.00	3.78
Janitor Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,210	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,210	0.03	85	0.0	$12.84	$58.50	$10.00	3.78
Women's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.11	239	0.0	$35.96	$234.00	$40.00	5.40
Forman's Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.16	358	0.0	$53.94	$351.00	$60.00	5.40
Neil's Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.11	239	0.0	$35.96	$234.00	$40.00	5.40
Front Desk Area	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.32	717	0.0	$107.87	$702.00	$120.00	5.40
Front Desk Area	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Foyer	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.03	60	0.0	$8.99	$58.50	$10.00	5.40
Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,547	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,547	0.18	418	0.0	$62.93	$409.50	$70.00	5.40
Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	17	Metal Halide: (1) 150W Lamp	Daylight Dimming	190	4,380	Fixture Replacement	No	17	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	45	4,380	1.96	12,632	0.0	$1,901.16	$6,641.51	$1,700.00	2.60
Exterior	14	Metal Halide: (1) 250W Lamp	Daylight Dimming	295	4,380	Fixture Replacement	No	14	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	75	4,380	2.45	15,784	0.0	$2,375.48	$27,341.90	$1,400.00	10.92

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
Boiler Room	Whole Building Heat	1	Heating Hot Water Pump	0.3	85.5%	No	2,745	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building DHW	1	Water Supply Pump	0.1	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Garage Bay-Bay Area	2nd Garage Bay-Bay Area	4	Exhaust Fan	0.3	85.5%	No	2,745	No	85.5%	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
Outside	Various	1	Split-System AC	3.50		Yes	1	Split-System AC	3.50		14.00		No	0.86	2,266	0.0	$340.98	$5,236.77	$322.00	14.41
Outside	Various	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.37	968	0.0	$145.66	$2,992.44	$184.00	19.28
Outside	Various	1	Split-System AC	3.00		Yes	1	Split-System AC	3.00		14.00		No	0.45	1,182	0.0	$177.92	$4,488.66	$276.00	23.68
Outside	Various	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.24	3,264	0.0	$491.21	$7,481.10	$460.00	14.29

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
Boiler Room	Whole Building	1	Condensing Hot Water Boiler	230.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Bay Area 2	4	Infrared Unit Heater	75.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Bay Area 2	1	Infrared Unit Heater	125.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Boiler Room	1	Furnace	400.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Bay Area	4	Furnace	400.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Wash Bay	1	Furnace	400.00	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
Boiler Room	Various	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?
Offices	6	Desktop Computer	109.0	Yes
Kitchen	2	Refrigerator	400.0	No
Kitchen	3	Microwave	800.0	Yes
Kitchen	1	Toaster Oven	800.0	Yes
Offices	2	Desk Printer	192.0	Yes
Offices	1	Photocopier	240.0	Yes
Kitchen	1	Ice Machine	350.0	No
Bays	1	Misc. Shop Equipment	1,000.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	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
Bay 2	1	Refrigerated	Yes	0.00	1,612	0.0	$242.58	$230.00	$0.00	0.95

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]

Plainsboro Department of Public Works

Primary Property Type: Repair Services (Vehicle, Shoe, Locksmith, etc.)
Gross Floor Area (ft²): 28,000
Built: 1994

For Year Ending: January 31, 2017
Date Generated: March 28, 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
Plainsboro Department of Public Works 20 Woodland Drive Cranbury, New Jersey 08512	Township of Plainsboro 641 Plainsboro Road Plainsboro, NJ 08536 (____)____-_____	Neil Blitz 641 Plainsboro Road Plainsboro, NJ 08536 609-799-0099 nblitz@plainsboronj.com

Property ID: 6258278

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
49.6 kBtu/ft²

Source EUI
74.4 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	1,089,265 (78%)
Electric - Grid (kBtu)	298,852 (22%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	66.9
National Median Source EUI (kBtu/ft²)	100.4
% Diff from National Median Source EUI	-26%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	91

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)