Local Government Energy Audit:
Energy Audit Report

Plainsboro Public Library

9 Van Doren Street

Plainsboro, NJ 08536

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 Public Library.

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 Public Library is a 47,000 square foot, four-story that includes public spaces, office space, and storage and mechanical rooms. The public spaces include the front entryway, the main library stacks, community rooms, restrooms, and stairwells. The office area includes the staff offices, hallways, a break room, and a kitchenette. The storage and mechanical rooms include various storage rooms and supply closets, and mechanical and maintenance rooms. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated five measures which together represent an opportunity for the Plainsboro Public Library to reduce annual energy costs by $23,827 and annual greenhouse gas emissions by 167,810 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 3.2 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 Public Library's annual energy use by 9%.

Figure 1 – Previous 12 Month Utility Costs

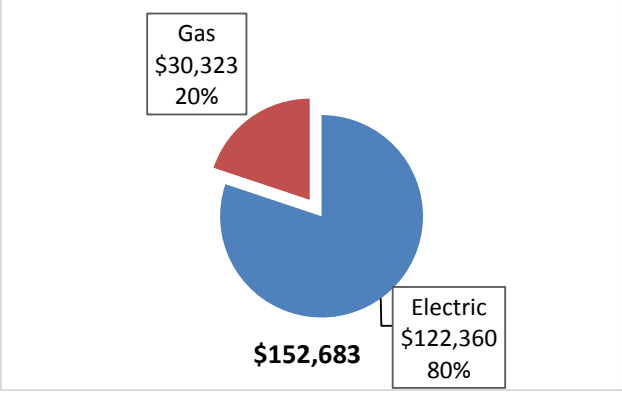
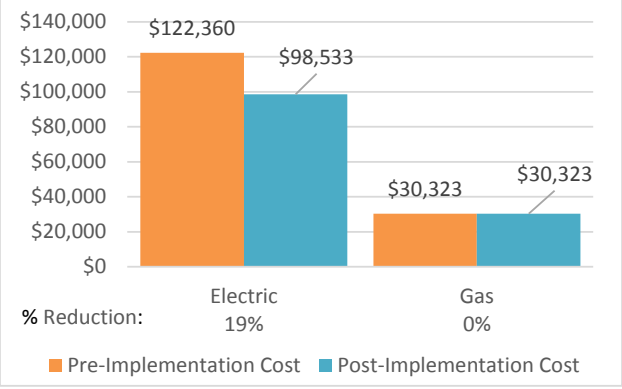


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**149,740**	**29.5**	**0.0**	**$21,409.63**	**$71,076.50**	**$8,250.00**	**$62,826.50**	**2.9**	**150,787**
ECM 1	Install LED Fixtures	Yes	543	0.1	0.0	$77.62	$781.35	$200.00	$581.35	7.5	547
ECM 2	Retrofit Fixtures with LED Lamps	Yes	149,197	29.4	0.0	$21,332.01	$70,295.15	$8,050.00	$62,245.15	2.9	150,240
Lighting Control Measures			**16,905**	**2.8**	**0.0**	**$2,417.09**	**$15,290.00**	**$1,920.00**	**$13,370.00**	**5.5**	**17,023**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	14,673	2.6	0.0	$2,097.99	$12,640.00	$1,035.00	$11,605.00	5.5	14,776
ECM 4	Install Daylight Dimming Controls	Yes	742	0.1	0.0	$106.05	$1,250.00	$885.00	$365.00	3.4	747
ECM 5	Install High/Low Lighting Controls	Yes	1,490	0.1	0.0	$213.05	$1,400.00	$0.00	$1,400.00	6.6	1,500
TOTALS			**166,645**	**32.3**	**0.0**	**$23,826.72**	**$86,366.50**	**$10,170.00**	**$76,196.50**	**3.2**	**167,810**

* - 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.

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

Energy Efficient Practices

TRC also identified five 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 Public Library include:

- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for the Plainsboro Public Library. 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	$140,400	

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
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- 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.

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.

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 5 – 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 Public Library located in Plainsboro, 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 Public Library is a 47,000 square foot, four-story facility that includes public spaces, office space, and storage and mechanical rooms. The public spaces include the front entry way, the main library stacks, community rooms, restrooms, and stairwells. The office area includes the staff offices, hallways, a break room, and a kitchenette. The storage and mechanical rooms include various storage rooms and supply closets, and mechanical and maintenance rooms.

The building was constructed in 2010. The equipment, including lighting, mechanical systems, and office equipment, is all original to the facility.

2.3 Building Occupancy

The building is open seven days a week. 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 150 people, including staff and the general public.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Plainsboro Library	Weekday	10 AM - 8:30 PM
Plainsboro Library	Weekend	10 AM - 5 PM

2.4 Building Envelope

The building is constructed of composite walls with a brick façade. The front entryway and other spaces in the building are constructed of floor to ceiling glass panels. The building has two roofs. The second floor roof includes public space and mechanical systems. The main roof is entirely reserved for mechanical systems. The public roof space is flat with grey and tan pavers, and the mechanical space is flat roof with a white membrane, both appear to be in good condition. The building has double pane operable windows with metal frames. The exterior doors are typically metal frames with glass panes.

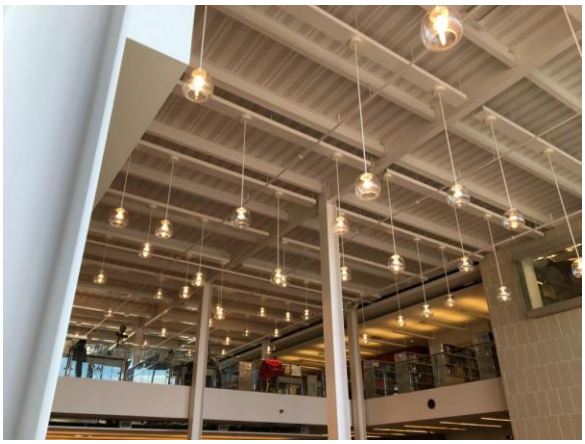

Building Façade

2.5 On-Site Generation

Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array. Adding a PV array to any nearby parking lots associated with the Library can increase the potential solar production for the site.

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 in the storage and mechanical spaces and 28-Watt T5 lamps in the public spaces. Fixtures throughout the building include surface mounted continuous row wrap fixtures, indirect/direct fixtures and industrial fixtures. These are in good condition.

There are also fixtures in the public and offices spaces that contain halogen incandescent and compact fluorescent lamps.

There is an opportunity for energy savings by replacing these lamps with LED lamps. The T5 and T8 fixtures are in good condition, but opportunity exists for energy savings by retrofitting to LED technology. Other light fixtures were evaluated for replacement with new LED fixtures as well.

Lighting control throughout the building is provided by wall switches and occupancy sensors, including high-low sensors. There are no lighting controls in the emergency stairwells.

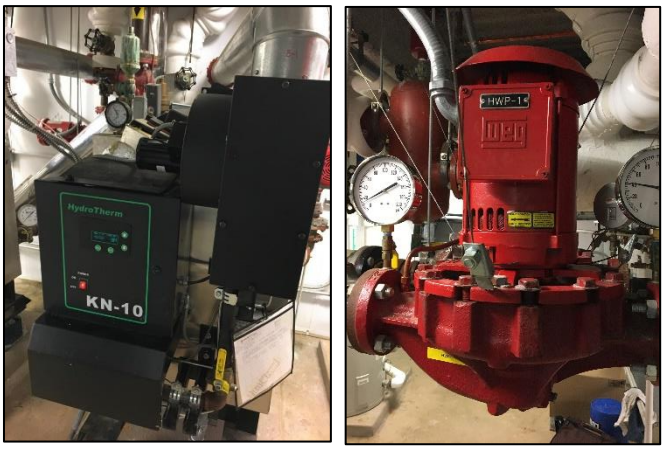
The building's exterior lighting consists of 24 T5 fluorescent fixtures, two fixtures with 70-Watt metal halide lamps, and a compact fluorescent fixture. All exterior lights are controlled by timers. The exterior lights were on at the time of the audit. There are also fluorescent fixtures with 21-Watt and 28-Watt T5 lamps in a protected walkway on the third floor roof. There is an opportunity for energy savings by upgrading the remaining fixtures to LED technology and installing and maintaining photocell controls to ensure operation is limited to dusk to dawn hours.

Lighting in public and office spaces

Exterior Lighting

Hot Water Heating System

Heating is provided to most of the building by two Hyrdo Therm KN-10 850 kBtu output, natural draft condensing hot water boilers (B1-2). The boiler has a nominal combustion efficiency of 85%. Hot water distribution is configured in a constant flow primary-secondary distribution loop with two ¾ HP pumps to circulate the primary loop, and two 5 HP pumps to distribute hot water through the secondary loop. 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 boilers provide hot water to water-source heat pump units (AC1-5), as well as various unit and cabinet heaters throughout the building. Areas not served by the boilers are the community room and four server/electrical rooms. The boilers are in good condition and well maintained.



Hyrdo Therm KN-10 boiler and distribution pump

Chilled Water Cooling System (CHW)

The primary cooling system consists of a BAC cooling tower model VTL-137-M located on the roof of the building. Chilled water is pumped from the cooling tower by two 15 HP pumps with low-voltage drives to the five water-source heat pump units located throughout the building. The cooling tower has one cell, and a single fractional HP centrifugal fan with a variable frequency drive used as a soft starter.

Chilled water pump, low-voltage drive, and AC1

Air Conditioning System

The building distributes conditioned air throughout the building via five heat pump units (AC1, 2, 3, 4, and 5). AC1, AC2, and AC3 are located in the basement of the building, and condition the first and second floors. AC4 and AC5 are located in the second floor mechanical room, and condition the third floor of the building. Units 1, 2, and 5 have a 15 HP supply fan and 5 HP exhaust fan with a cooling capacity of 30 tons. Unit 3 has a 10 HP supply fan and 3 HP exhaust fan, with a cooling capacity of 30 tons. Unit 4 has a 3 HP supply fan and a 3 HP exhaust fan with a cooling capacity of 20 tons. Each of the heat pump units have a heating capacity ranging from 104 kBtu/hr to 196 kBtu/hr.

Heat pump units AC2, AC3, and AC5

There are two small fan coil units in the building used to heat stairwell A and the second floor mechanical room. Stairwell A has a small 17 kBtu/hr capacity fan coil heater, and the second floor mechanical room has a 172 kBtu/hr capacity heater.

Stairwell B, stairwell C, and the vestibule are conditioned by cabinet heaters located in the space. There is no cooling for stairwells and mechanical spaces.

Domestic Hot Water Heating System

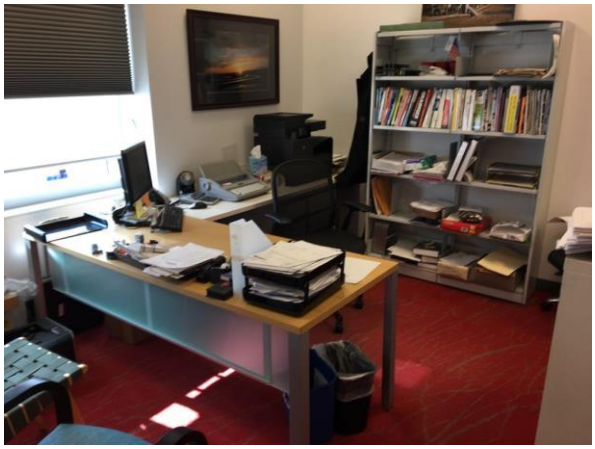
The domestic hot water heating system for the facility consists of one A.O. Smith gas-fired hot water heater with an input rating of 120 MBH and a nominal efficiency of 95%. The water heater has a 60 gallon storage tank. Two 5 HP recirculation pumps distribute 120°F water to the entire site. The recirculation pump operates continuously. The hot water heater is fairly new, highly efficient, and in good condition.

A.O. Smith gas fired hot water heater

Building Plug Load

There are 56 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 including a photo copier and desk top printers, as well as kitchen equipment.

The kitchenette in the office area has two refrigerators, microwave, water cooler, coffee maker, and toaster.



Kitchen and office 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 3.4 for additional information.

3.1 Total Cost of Energy

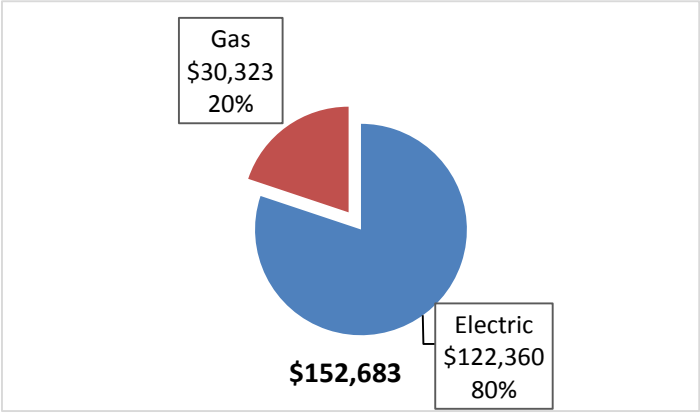
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Plainsboro Library		
Fuel	**Usage**	**Cost**
Electricity	855,789 kWh	$122,360
Natural Gas	35,875 Therms	$30,323
Total		**$152,683**

The current annual energy cost for this facility is $152,683 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.143/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 9 - Electric Usage & Demand

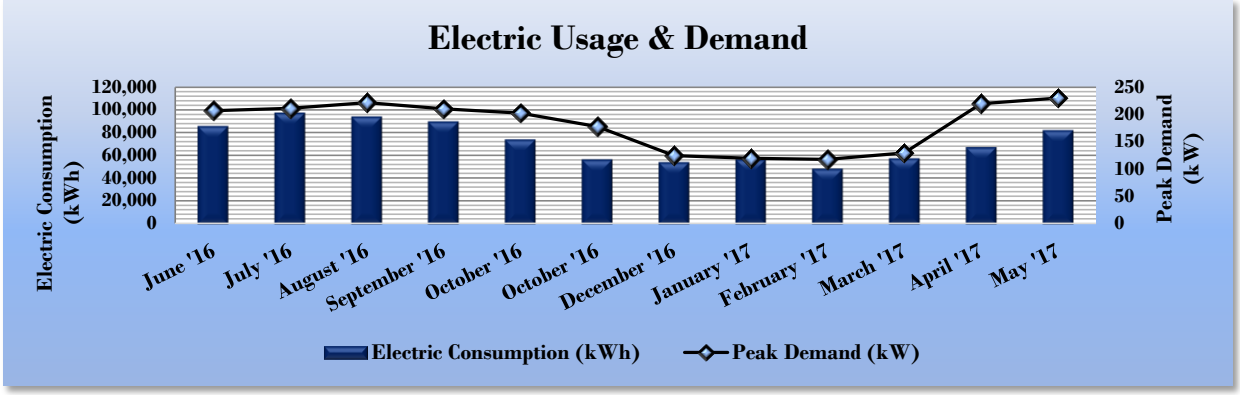


Figure 10 - Electric Usage & Demand

Electric Billing Data for Plainsboro Library						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
6/17/16	30	85,223	207	$757	$12,815	No
7/19/16	31	97,012	211	$775	$13,817	No
8/17/16	29	93,615	222	$812	$13,424	No
9/16/16	30	89,354	210	$777	$12,792	Yes
10/17/16	31	73,747	203	$765	$9,517	Yes
11/15/16	29	56,457	178	$662	$8,176	No
12/16/16	31	54,064	124	$463	$7,843	No
1/19/17	34	56,530	120	$445	$8,072	No
2/16/17	28	48,297	118	$438	$7,556	No
3/20/17	32	57,391	129	$484	$8,331	No
4/19/17	30	67,142	220	$827	$9,580	No
5/18/17	32	81,646	230	$866	$11,109	No
Totals	**367**	**860,478**	**230**	**$8,071**	**$123,030**	2
Annual	**365**	**855,789**	**230**	**$8,027**	**$122,360**	

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.845/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

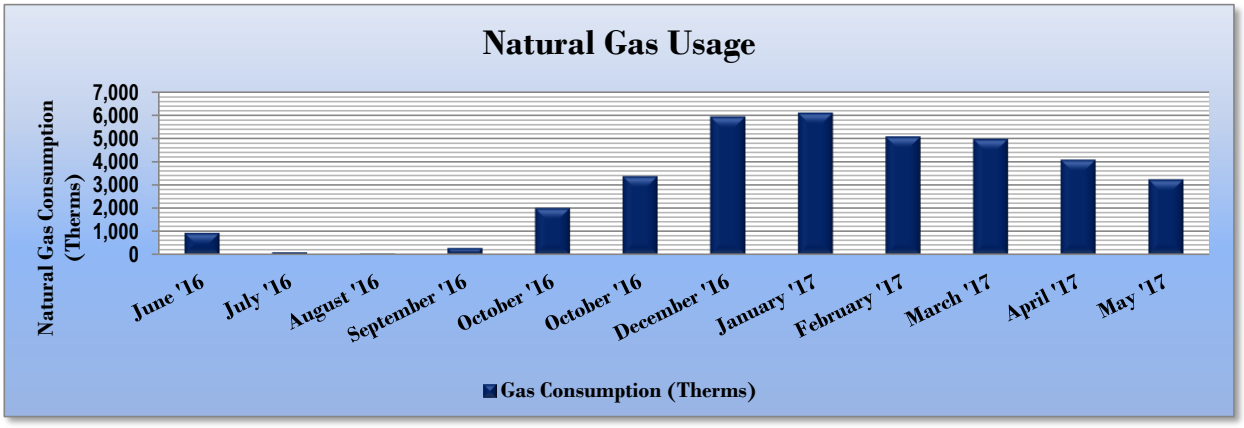


Figure 12 - Natural Gas Usage

Gas Billing Data for Plainsboro Library				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
6/17/16	30	930	$584	Yes
7/19/16	31	95	$162	No
8/17/16	29	35	$128	No
9/16/16	30	276	$273	No
10/17/16	31	1,997	$1,337	No
11/15/16	29	3,365	$3,233	No
12/16/16	31	5,930	$4,786	No
1/19/17	34	6,095	$5,744	Yes
2/16/17	28	5,074	$4,938	No
3/20/17	32	4,976	$4,478	No
4/19/17	30	4,071	$2,655	No
5/18/17	32	3,230	$2,172	No
Totals	**367**	**36,072**	**$30,490**	2
Annual	**365**	**35,875**	**$30,323**	

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 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Plainsboro Library	National Median Building Type: Library
Source Energy Use Intensity (kBtu/ft^2)	275.2	235.6
Site Energy Use Intensity (kBtu/ft^2)	138.5	91.6

Implementation of all recommended measures in this report would improve the building's estimated EUI significantly, 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		
	Plainsboro Library	National Median Building Type: Library
Source Energy Use Intensity (kBtu/ft^2)	237.2	235.6
Site Energy Use Intensity (kBtu/ft^2)	126.4	91.6

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. Your building is not is one of the building categories that are eligible 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.

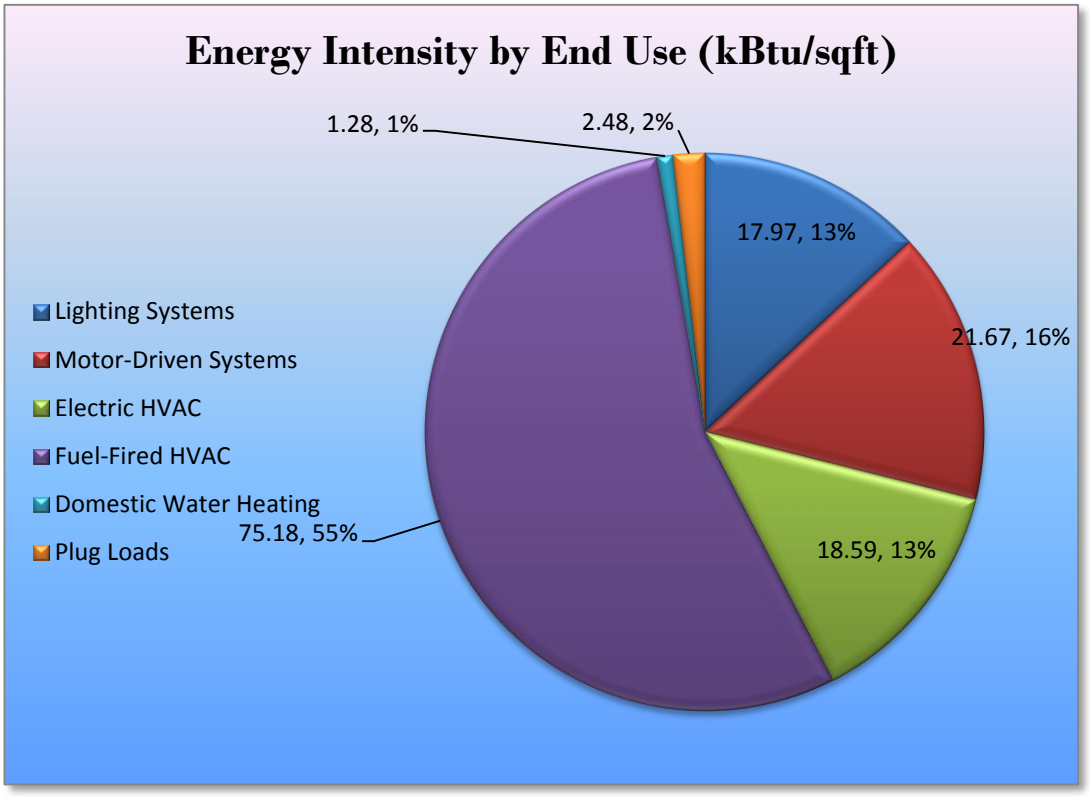
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 15 - Energy Balance (kBtu/SF)



4 ENERGY CONSERVATION MEASURES

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 Public Library 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		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		**149,740**	**29.5**	**0.0**	**$21,409.63**	**$71,076.50**	**$8,250.00**	**$62,826.50**	**2.9**	**150,787**
ECM 1	Install LED Fixtures	543	0.1	0.0	$77.62	$781.35	$200.00	$581.35	7.5	547
ECM 2	Retrofit Fixtures with LED Lamps	149,197	29.4	0.0	$21,332.01	$70,295.15	$8,050.00	$62,245.15	2.9	150,240
Lighting Control Measures		**16,905**	**2.8**	**0.0**	**$2,417.09**	**$15,290.00**	**$1,920.00**	**$13,370.00**	**5.5**	**17,023**
ECM 3	Install Occupancy Sensor Lighting Controls	14,673	2.6	0.0	$2,097.99	$12,640.00	$1,035.00	$11,605.00	5.5	14,776
ECM 4	Install Daylight Dimming Controls	742	0.1	0.0	$106.05	$1,250.00	$885.00	$365.00	3.4	747
ECM 5	Install High/Low Lighitng Controls	1,490	0.1	0.0	$213.05	$1,400.00	$0.00	$1,400.00	6.6	1,500
TOTALS		**166,645**	**32.3**	**0.0**	**$23,826.72**	**$86,366.50**	**$10,170.00**	**$76,196.50**	**3.2**	**167,810**

* - 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 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		**149,740**	**29.5**	**0.0**	**$21,409.63**	**$71,076.50**	**$8,250.00**	**$62,826.50**	**2.9**	**150,787**
ECM 1	Install LED Fixtures	543	0.1	0.0	$77.62	$781.35	$200.00	$581.35	7.5	547
ECM 2	Retrofit Fixtures with LED Lamps	149,197	29.4	0.0	$21,332.01	$70,295.15	$8,050.00	$62,245.15	2.9	150,240

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	543	0.1	0.0	$77.62	$781.35	$200.00	$581.35	7.5	547

Measure Description

We recommend replacing existing fixtures containing fluorescent and 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 fluorescent tubes and more than ten times longer than many incandescent lamps.

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	147,574	29.1	0.0	$21,099.96	$69,343.64	$8,010.00	$61,333.64	2.9	148,606
Exterior	1,623	0.3	0.0	$232.05	$951.51	$40.00	$911.51	3.9	1,634

Measure Description

We recommend retrofitting existing incandescent, halogen, linear fluorescent, and compact fluorescent lighting fixtures 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.

4.1.2 Lighting Control Measures

Our recommendations for upgrades to existing lighting controls 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		**16,905**	**2.8**	**0.0**	**$2,417.09**	**$15,290.00**	**$1,920.00**	**$13,370.00**	**5.5**	**17,023**
ECM 3	Install Occupancy Sensor Lighting Controls	14,673	2.6	0.0	$2,097.99	$12,640.00	$1,035.00	$11,605.00	5.5	14,776
ECM 4	Install Daylight Dimming Controls	742	0.1	0.0	$106.05	$1,250.00	$885.00	$365.00	3.4	747
ECM 5	Install High/Low Lighitng Controls	1,490	0.1	0.0	$213.05	$1,400.00	$0.00	$1,400.00	6.6	1,500

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
14,673	2.6	0.0	$2,097.99	$12,640.00	$1,035.00	$11,605.00	5.5	14,776

Measure Description

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

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

ECM 4: Install Daylight Dimming 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)
742	0.1	0.0	$106.05	$1,250.00	$885.00	$365.00	3.4	747

Measure Description

We recommend installing daylight dimming controls that use photosensors to reduce electric lighting in areas when ample daylight lighting is present. Photosensor controls are recommended for fixtures that are adjacent to windows that receive lots of sunlight. As sunlight level increase in the room, fixture lighting is decreased or turned off. This measure reduces energy use in spaces where sufficient lighting levels can be met by ambient daylight.

Optimum light levels and the method of dimming should be determined during lighting design. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 5: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,490	0.1	0.0	$213.05	$1,400.00	$0.00	$1,400.00	6.6	1,500

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. In parking lots and parking garages with significant ambient lighting this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylighting. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

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.

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

Perform Proper 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 Water Heater Maintenance

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

Water Conservation

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

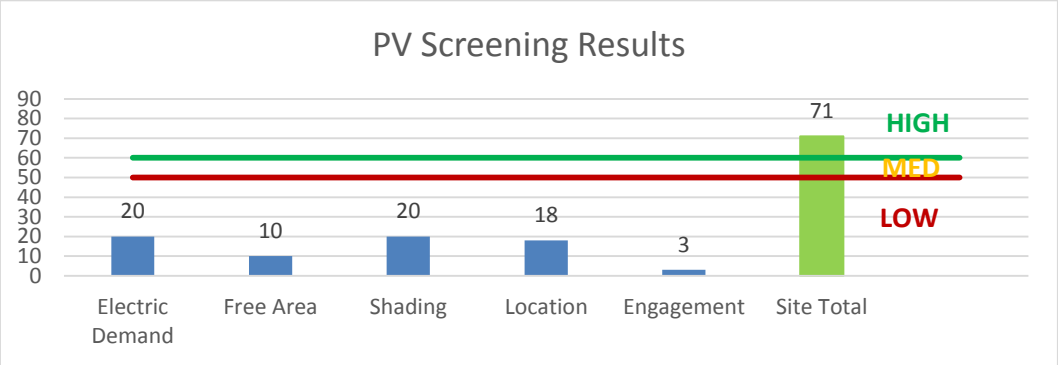
6.1 Photovoltaic

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 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 or over the main parking lot may be feasible. If the Plainsboro Public Library is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 19 - Photovoltaic Screening



Potential	High	
System Potential	54	kW DC STC
Electric Generation	64,334	kWh/yr
Displaced Cost	$5,600	/yr
Installed Cost	$140,400	

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 developed new solar projects 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

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.

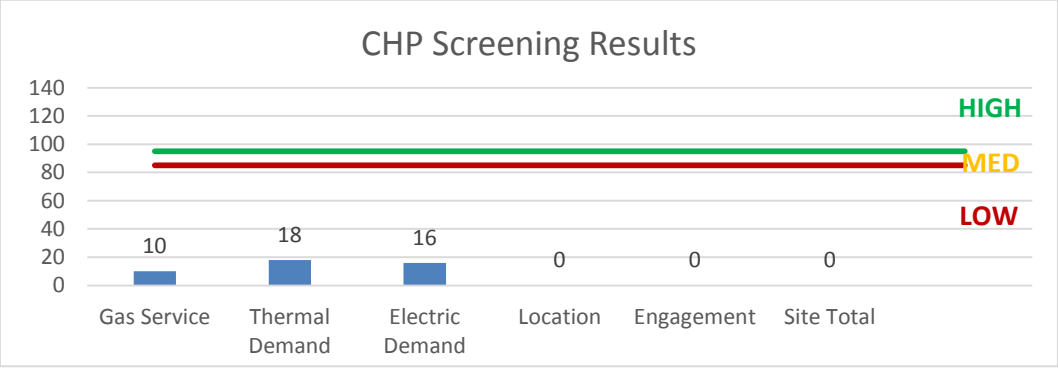
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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					
ECM 2	Retrofit Fixtures with LED Lamps	x					
ECM 3	Install Occupancy Sensor Lighting Controls	x					
ECM 4	Install Daylight Dimming Controls	x					
ECM 5	Install High/Low Lighitng Controls						

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 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. SRECs 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 SRECs 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 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
Mechanical Room - 2nd Floor	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
Boiler Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.21	1,218	0.0	$174.11	$468.00	$80.00	2.23
Break Room and Hallway	14	Compact Fluorescent: Long Lamp Pin	Occupancy Sensor	13	2,857	Relamp	No	14	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	9	2,857	0.04	176	0.0	$25.21	$752.54	$0.00	29.86
Break Room and Hallway	1	Compact Fluorescent: Recessed Can	Occupancy Sensor	13	2,857	Relamp	No	1	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	9	2,857	0.00	13	0.0	$1.80	$53.75	$0.00	29.86
Business Manager Room	4	Compact Fluorescent: Long Lamp Pin	Occupancy Sensor	13	2,857	Relamp	No	4	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	9	2,857	0.01	50	0.0	$7.20	$215.01	$0.00	29.86
Assistant Director Room	4	Compact Fluorescent: Long Lamp Pin	Occupancy Sensor	13	2,857	Relamp	No	4	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	9	2,857	0.01	50	0.0	$7.20	$215.01	$0.00	29.86
Director Room	6	Compact Fluorescent: Long Lamp Pin	Occupancy Sensor	13	2,857	Relamp	No	6	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	9	2,857	0.02	76	0.0	$10.80	$322.52	$0.00	29.86
Basement and Mechanical Room (B12)	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.19	1,066	0.0	$152.35	$409.50	$70.00	2.23
Electrical Room (B16)	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.05	304	0.0	$43.53	$117.00	$20.00	2.23
Janitor Closet (B10)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.03	152	0.0	$21.76	$58.50	$10.00	2.23
Maintenance Room (B11)	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.10	577	0.0	$82.50	$291.50	$50.00	2.93
Storage Room (B15)	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.31	1,731	0.0	$247.51	$846.50	$90.00	3.06
Mechanical Room (B14)	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.21	1,218	0.0	$174.11	$468.00	$80.00	2.23
Basement Hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,760	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,132	0.27	3,302	0.0	$472.15	$868.00	$80.00	1.67
Basement Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,760	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,132	0.03	413	0.0	$59.02	$258.50	$10.00	4.21
Basement Hall	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
Basement and Books Area	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.47	2,693	0.0	$385.02	$1,359.00	$210.00	2.98
Basement and Books Area	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
Workshop (B03)	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.20	1,154	0.0	$165.01	$467.00	$80.00	2.35
Server Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,857	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.03	107	0.0	$15.23	$58.50	$10.00	3.18
Elevator Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.05	304	0.0	$43.53	$117.00	$20.00	2.23
Storage Room (B19)	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.61	3,462	0.0	$495.03	$1,593.00	$180.00	2.85
Reserve Book Area (B04)	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.31	1,731	0.0	$247.51	$758.50	$130.00	2.54
Community Room Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.14	769	0.0	$110.01	$394.00	$40.00	3.22
Receiving Room (B08)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.03	152	0.0	$21.76	$58.50	$10.00	2.23

	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
Foyer Entry	2	Linear Fluorescent - T8: 3' T8 (25W) - 1L	High/Low Control	27	3,143	Relamp	No	2	LED - Linear Tubes: (1) 3' Lamp	High/Low Control	11	3,143	0.03	117	0.0	$16.76	$69.60	$0.00	4.15
Foyer Entry	1	Linear Fluorescent - T8: 5' T8 (40W) - 1L	High/Low Control	46	3,143	Relamp	No	1	LED - Linear Tubes: (1) 5' Lamp	High/Low Control	20	3,143	0.02	92	0.0	$13.20	$37.90	$0.00	2.87
Lobby	11	Linear Fluorescent - T8: 3' T8 (25W) - 2L	High/Low Control	48	3,143	Relamp	No	11	LED - Linear Tubes: (2) 3' Lamps	High/Low Control	21	3,143	0.24	1,055	0.0	$150.82	$587.40	$0.00	3.89
Restroom/Kitchenette Area	3	Compact Fluorescent: Recessed Can	High/Low Control	32	3,143	Relamp	No	3	LED Screw-In Lamps: LED replacement for CFL	High/Low Control	22	3,143	0.02	102	0.0	$14.63	$161.26	$0.00	11.03
Coat Room	1	Compact Fluorescent: Long Lamp Pin	Wall Switch	32	4,082	Relamp	No	1	LED Screw-In Lamps: LED replacement for CFL	Wall Switch	22	4,082	0.01	44	0.0	$6.33	$53.75	$0.00	8.49
Kitchenette	2	Compact Fluorescent: Long Lamp Pin	Wall Switch	32	4,082	Relamp	No	2	LED Screw-In Lamps: LED replacement for CFL	Wall Switch	22	4,082	0.02	89	0.0	$12.66	$107.51	$0.00	8.49
Community Room	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
Community Room	21	Halogen Incandescent: PAR38; Recessed Can	Wall Switch	70	4,082	Relamp	Yes	21	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	11	2,857	1.07	6,069	0.0	$867.69	$2,800.71	$175.00	3.03
Community Room	43	Halogen Incandescent: PAR38; Track Lighting	Wall Switch	100	4,082	Relamp	Yes	43	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	15	2,857	3.13	17,752	0.0	$2,538.13	$5,169.08	$285.00	1.92
Community Room	7	Halogen Incandescent: Track Lighting	Wall Switch	35	4,082	Relamp	Yes	7	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	5	2,857	0.18	1,011	0.0	$144.61	$595.17	$55.00	3.74
Community Room	40	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	40	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.65	3,662	0.0	$523.65	$1,976.00	$270.00	3.26
Lobby	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
Community Room Storage	214	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	Yes	214	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	7.26	41,162	0.0	$5,885.35	$16,569.00	$2,140.00	2.45
Men's Restroom	8	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.13	732	0.0	$104.73	$827.20	$110.00	6.85
Women's Restroom	10	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.16	916	0.0	$130.91	$899.00	$120.00	5.95
Front Desk Area	1	LED - Fixtures: Shelf-Mounted Display and Task Lights	Wall Switch	10	4,082	None	No	1	LED - Fixtures: Shelf-Mounted Display and Task Lights	Wall Switch	10	4,082	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Front Desk Area	24	Compact Fluorescent: Recessed Can	Wall Switch	32	4,082	Relamp	No	24	LED Screw-In Lamps: LED replacement for CFL	Wall Switch	22	4,082	0.19	1,063	0.0	$151.95	$1,290.07	$0.00	8.49
Technical/Volunteer Area	12	Compact Fluorescent: Long Lamp Pin	Occupancy Sensor	50	2,857	Relamp	No	12	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	35	2,857	0.15	581	0.0	$83.10	$645.04	$0.00	7.76
Technical/Volunteer Area	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
Back Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	8,760	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,132	0.03	413	0.0	$59.02	$174.50	$30.00	2.45
Back Entrance - Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.03	152	0.0	$21.76	$58.50	$10.00	2.23
Telcom (118)	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,082	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,082	0.08	457	0.0	$65.29	$175.50	$30.00	2.23
1st Floor near Stair A	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1st Floor near Stair A	4	Compact Fluorescent: Recessed Can - 1L	High/Low Control	32	3,143	Relamp	No	4	LED Screw-In Lamps: LED replacement for CFL	High/Low Control	22	3,143	0.03	136	0.0	$19.50	$215.01	$0.00	11.03
Main Area - 1st Floor	106	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	High/Low Control	62	3,143	Relamp	No	106	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	3,143	4.10	17,883	0.0	$2,556.89	$3,805.40	$530.00	1.28

	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
Main Area - 1st Floor	59	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	High/Low Control	62	3,143	Relamp	No	59	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	3,143	2.28	9,954	0.0	$1,423.18	$2,118.10	$295.00	1.28
Gallery Area	39	Halogen Incandescent: Track Lighting	High/Low Control	35	3,143	Relamp	No	39	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	5	3,143	0.94	4,121	0.0	$589.20	$2,669.67	$195.00	4.20
Main Area - Control	42	Halogen Incandescent: Globe Hanging	High/Low Control	70	3,143	Relamp	No	42	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	11	3,143	2.03	8,876	0.0	$1,269.05	$2,257.63	$210.00	1.61
Foyer - Reaccess Entry	2	Linear Fluorescent - RWT8: 3' T8 (25W) - 2L	High/Low Control	38	2,857	Relamp	No	2	LED - Linear Tubes: (2) 3' Lamps	High/Low Control	21	2,857	0.03	110	0.0	$15.70	$106.80	$0.00	6.80
Stairwell A	1	Compact Fluorescent: Recessed Can	High/Low Control	32	3,143	Relamp	No	1	LED Screw-In Lamps: LED replacement for CFL	High/Low Control	22	3,143	0.01	34	0.0	$4.88	$53.75	$0.00	11.03
Stairwell A	46	Linear Fluorescent - T5: 4' T5 (28W) - 1L	High/Low Control	30	3,143	Relamp	No	46	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	3,143	0.58	2,532	0.0	$362.08	$1,651.40	$230.00	3.93
Stairwell A	3	Halogen Incandescent: Landing Light	High/Low Control	35	3,143	Relamp	No	3	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	5	3,143	0.07	317	0.0	$45.32	$161.26	$15.00	3.23
Stairwell A	5	Compact Fluorescent: Recessed Can	High/Low Control	32	3,143	Relamp	No	5	LED Screw-In Lamps: LED replacement for CFL	High/Low Control	22	3,143	0.04	170	0.0	$24.38	$268.77	$0.00	11.03
2nd Floor	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
Reference Desk area	30	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	No	30	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,082	0.38	2,145	0.0	$306.67	$1,077.00	$150.00	3.02
Reference Desk area	2	Compact Fluorescent: Recessed Can	Wall Switch	32	4,082	Relamp	Yes	2	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	22	2,857	0.03	151	0.0	$21.53	$223.51	$20.00	9.45
History Room	3	Linear Fluorescent - T8: 3' T8 (25W) - 2L	Wall Switch	48	4,082	Relamp	Yes	3	LED - Linear Tubes: (2) 3' Lamps	Occupancy Sensor	21	2,857	0.08	461	0.0	$65.89	$276.20	$20.00	3.89
History Room	14	Compact Fluorescent: Recessed Can	Wall Switch	32	4,082	Relamp	Yes	14	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	22	2,857	0.19	1,054	0.0	$150.69	$1,022.54	$35.00	6.55
Men's Restroom - 2nd Floor	4	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Occupancy Sensor	30	2,857	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.05	200	0.0	$28.62	$143.60	$20.00	4.32
Men's Restroom - 2nd Floor	1	Compact Fluorescent: Recessed Can	Occupancy Sensor	32	2,857	Relamp	No	1	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	22	2,857	0.01	31	0.0	$4.43	$53.75	$0.00	12.13
Women's Restroom - 2nd Floor	4	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Occupancy Sensor	30	2,857	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.05	200	0.0	$28.62	$143.60	$20.00	4.32
Women's Restroom - 2nd Floor	1	Compact Fluorescent: Recessed Can	Occupancy Sensor	32	2,857	Relamp	No	1	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	22	2,857	0.01	31	0.0	$4.43	$53.75	$0.00	12.13
Diplay Case (Bull)	12	Halogen Incandescent: 35W - 1L	Wall Switch	35	4,082	Relamp	Yes	12	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	5	2,857	0.31	1,734	0.0	$247.91	$1,185.04	$130.00	4.26
Reference Office	6	Compact Fluorescent: Long Lamp Pin	Wall Switch	32	4,082	Relamp	No	6	LED Screw-In Lamps: LED replacement for CFL	Wall Switch	22	4,082	0.05	266	0.0	$37.99	$322.52	$0.00	8.49
Main Area - 2nd Floor	36	Halogen Incandescent: Globe; PAR30L	High/Low Control	70	3,143	Relamp	No	36	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	11	3,143	1.74	7,608	0.0	$1,087.76	$2,291.44	$180.00	1.94
Main Area - 2nd Floor	106	Linear Fluorescent - T5: 4' T5 (28W) - 1L	High/Low Control	30	3,143	Relamp	No	106	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	3,143	1.34	5,836	0.0	$834.36	$3,805.40	$530.00	3.93
Study Room (211)	2	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.03	183	0.0	$26.18	$187.80	$30.00	6.03
Study Room (210)	2	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.03	183	0.0	$26.18	$187.80	$30.00	6.03
Study Room (209)	2	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.03	183	0.0	$26.18	$187.80	$30.00	6.03
Study Room (208)	2	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.03	183	0.0	$26.18	$187.80	$30.00	6.03

	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
Study Room (207)	3	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.05	275	0.0	$39.27	$223.70	$35.00	4.80
Emergency Stairwell	9	Linear Fluorescent - T8: U T8 (32W) - 1L	None	22	8,760	Relamp	Yes	9	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	6,132	0.07	900	0.0	$128.65	$833.80	$90.00	5.78
Emergency Stairwell	9	Linear Fluorescent - T8: U T8 (32W) - 1L	None	22	8,760	Relamp	Yes	9	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	6,132	0.07	900	0.0	$128.65	$833.80	$90.00	5.78
Front Desk Area - 3rd Floor	25	Compact Fluorescent: Recessed Can	High/Low Control	32	3,143	Relamp	No	25	LED Screw-In Lamps: LED replacement for CFL	High/Low Control	22	3,143	0.20	852	0.0	$121.88	$1,343.83	$0.00	11.03
Front Desk Area - 3rd Floor	9	Halogen Incandescent: 35 W	High/Low Control	35	3,143	Relamp	No	9	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	5	3,143	0.22	951	0.0	$135.97	$483.78	$45.00	3.23
Program Room	21	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.34	1,923	0.0	$274.92	$1,023.90	$140.00	3.22
Program Room	9	Halogen Incandescent: Incandescent	Wall Switch	35	4,082	Relamp	Yes	9	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	5	2,857	0.23	1,300	0.0	$185.93	$715.78	$85.00	3.39
3rd Floor	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
Exit Stair Area - 3rd Floor	3	LED - Fixtures: Ceiling Mount	High/Low Control	10	3,143	None	No	3	LED - Fixtures: Ceiling Mount	High/Low Control	10	3,143	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Area - 3rd Floor	175	Linear Fluorescent - T5: 4' T5 (28W) - 1L	High/Low Control	30	3,143	Relamp	No	175	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	3,143	2.21	9,634	0.0	$1,377.47	$6,282.50	$875.00	3.93
Building Room	53	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	53	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.86	4,853	0.0	$693.84	$2,442.70	$335.00	3.04
Children's Services Office	14	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.23	1,282	0.0	$183.28	$772.60	$105.00	3.64
Storage Room (307)	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,857	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,857	0.13	533	0.0	$76.17	$292.50	$50.00	3.18
Restroom - Adults	3	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.05	275	0.0	$39.27	$377.70	$50.00	8.34
Restroom - Children	3	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,857	0.05	275	0.0	$39.27	$377.70	$50.00	8.34
Exterior - 3rd Floor	8	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	30	4,082	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Daylight Dimming	15	2,041	0.15	840	0.0	$120.03	$537.20	$400.00	1.14
Exterior - 3rd Floor	16	Linear Fluorescent - T5: 3' T5 (21W) - 1L	Wall Switch	27	4,082	Relamp	Yes	16	LED - Linear Tubes: (1) 3' Lamp	Daylight Dimming	11	2,041	0.28	1,605	0.0	$229.51	$1,056.80	$720.00	1.47
Exterior Entry	2	Metal Halide: (1) 70W Lamp	Wall Switch	95	4,082	Fixture Replacement	Yes	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	29	2,041	0.13	745	0.0	$106.51	$1,031.35	$290.00	6.96
Exterior Entry	1	Compact Fluorescent: 2L	Wall Switch	32	4,082	Relamp	Yes	1	LED Screw-In Lamps: LED replacement for CFL	Daylight Dimming	22	2,041	0.02	96	0.0	$13.72	$357.51	$45.00	22.78
Supply Closets	4	Compact Fluorescent: 32w - 1L pin	Wall Switch	32	4,082	Relamp	Yes	4	LED Screw-In Lamps: LED replacement for CFL	Occupancy Sensor	22	2,857	0.05	301	0.0	$43.05	$375.01	$0.00	8.71

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
Mechanical Room - 2nd Floor	CWP-1&2	2	Condenser Water Pump	15.0	93.0%	Yes	3,391	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - 2nd Floor	HWP-1&2	2	Heating Hot Water Pump	5.0	87.5%	Yes	2,745	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room #3 - 2nd Floor	BCP-1&2	2	Heating Hot Water Pump	0.8	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - Basement	2nd floor MER #3	1	Exhaust Fan	0.5	77.0%	No	3,458	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - 2nd Floor	General AC-1	1	Exhaust Fan	5.0	89.5%	Yes	3,458	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof - 2nd Floor	General AC-2	1	Exhaust Fan	5.0	89.5%	Yes	3,458	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	General AC-3	1	Exhaust Fan	3.0	89.5%	Yes	3,458	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - Basement	General AC-4	1	Exhaust Fan	3.0	89.5%	Yes	3,458	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - 2nd Floor	General AC-5	1	Exhaust Fan	5.0	89.5%	Yes	3,458	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - 2nd Floor	General AC-1	1	Supply Fan	15.0	93.0%	Yes	3,458	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof - 2nd Floor	General AC-2	1	Supply Fan	15.0	93.0%	Yes	3,458	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	General AC-3	1	Supply Fan	15.0	93.0%	Yes	3,458	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - Basement	General AC-4	1	Supply Fan	10.0	91.7%	Yes	3,458	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room - 2nd Floor	General AC-5	1	Supply Fan	15.0	93.0%	Yes	3,458	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Community Room Roof	Community Room	1	Supply Fan	7.5	91.0%	Yes	3,458	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Community Room Roof	Community Room	1	Exhaust Fan	2.0	86.5%	Yes	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building	1	Cooling Tower Fan	25.0	93.6%	Yes	4,067	No	93.6%	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
Roof	Community Room	1	Packaged AC	14.63		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement MER	AC-1	1	Water Source HP	35.00	177.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement MER	AC-2	1	Water Source HP	27.00	160.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement MER	AC-3	1	Water Source HP	27.00	177.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement MER	AC-3	1	Water Source HP	27.00	177.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Floor MER	AC-4	1	Water Source HP	18.00	104.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Floor MER	AC-5	1	Water Source HP	36.00	196.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MDF Room, Electrical Room, IDF Room 1	1	Split-System Air-Source HP	4.00	17.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Floor Roof	IDF Room 2	1	Split-System Air-Source HP	1.25	17.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Elevator Machine Room	Elevator Machine Room	1	Split-System AC	3.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Floor	2nd Floor	1	Electric Resistance Heat		2.56	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
2nd Floor	2nd Floor	1	Electric Resistance Heat		1.91	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
3rd Floor	3rd Floor	1	Electric Resistance Heat		6.42	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
3rd Floor	3rd Floor	1	Electric Resistance Heat		1.91	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
Boiler Room	Whole Building	1	Non-Condensing Hot Water Boiler	850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building	1	Non-Condensing Hot Water Boiler	850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building	1	Non-Condensing Hot Water Boiler	850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building	1	Non-Condensing Hot Water Boiler	850.00	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	Whole Building	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?
Various Offices	54	Desktop Computer	120.0	No
Various Offices	6	Desk Printer	192.0	No
Director Room	1	Photocopier	494.0	No
Kitchenette	1	Refrigerator	650.0	Yes
Kitchenette	1	Refrigerator	1,276.0	Yes
Kitchenette	2	Microwave	1,200.0	No
Kitchenette	2	Water Cooler	800.0	No
Kitchenette	1	Coffee Maker	900.0	No
Kitchenette	1	Toaster	900.0	No
Director Room	1	Large Projector	15.0	No
Break Room	1	TV LCD	150.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

Plainsboro Library

Primary Property Type: Library
Gross Floor Area (ft²): 47,000
Built: 2010

For Year Ending: April 30, 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 Library 9 Van Doren Street Plainsboro, New Jersey 08536	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: 6258277

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
138 kBtu/ft²

Source EUI
273.5 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	2,891,253 (45%)
Natural Gas (kBtu)	3,594,890 (55%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	118.9
National Median Source EUI (kBtu/ft²)	235.6
% Diff from National Median Source EUI	16%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	512

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)