Local Government Energy Audit:
Energy Audit Report

Buildings & Grounds Facility

Asbury Park Board of Education

914 Second Ave.

Asbury Park, New Jersey 07712

October 11, 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 Buildings & Grounds Facility.

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 schools in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

The Buildings and Grounds Facility is a 13,740 square foot facility comprised of three interconnecting buildings that function as a single facility. The facility contains two offices, a warehouse storage areas, workshops, and garage bays. It is primarily a single story building with an attic over the main warehouse area, used for additional storage. Interior lighting at the facility consists primarily of T8 linear fluorescent fixtures with some T5 and T12 linear fluorescent fixtures. The buildings also has some fixtures containing compact fluorescent lamps and some high intensity discharge (HID) lamps that light the exterior.

Nearly the entire facility is heated, but only limited areas are cooled. Three gas-fired ceiling-mounted hot air unit heaters and one small electric heater supply heat to most areas of the building. Spot cooling is provided by through-the-wall air conditioning units for the two office areas. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated six measures which together represent an opportunity for the Buildings and Grounds Facility to reduce its annual energy costs by about $3,550 and annual greenhouse gas emissions by 28,747 lbs CO_2e. We estimate that if all measures are implemented as recommended, the project would pay for itself in energy savings alone in about 4.8 years. The breakdown of current and future utility costs, following project implementation, are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce the Buildings and Grounds Facility's annual energy usage by about 11% overall.

Figure 1 – Previous 12 Month Utility Costs

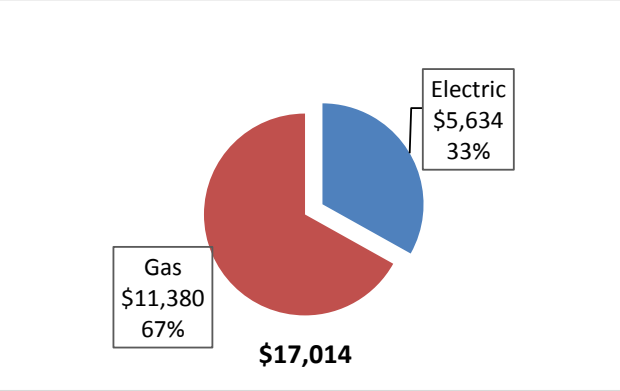
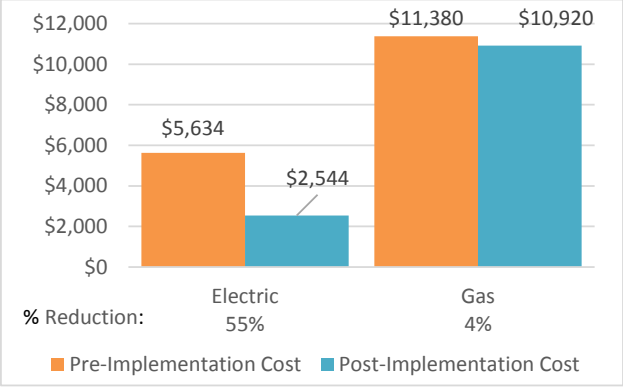


Figure 2 – Potential Post-Implementation Costs



A detailed description of Buildings & Grounds Facility'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			**21,248**	**6.0**	**0.0**	**$2,757.74**	**$10,317.72**	**$2,175.00**	**$8,142.72**	**3.0**	**21,396**
ECM 1	Install LED Fixtures	Yes	6,245	1.2	0.0	$810.50	$1,862.07	$900.00	$962.07	1.2	6,288
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	3,136	0.6	0.0	$407.00	$2,020.00	$0.00	$2,020.00	5.0	3,158
ECM 3	Retrofit Fixtures with LED Lamps	Yes	11,867	4.2	0.0	$1,540.23	$6,435.65	$1,275.00	$5,160.65	3.4	11,950
Lighting Control Measures			**2,454**	**0.7**	**0.0**	**$318.48**	**$3,318.00**	**$265.00**	**$3,053.00**	**9.6**	**2,471**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	2,454	0.7	0.0	$318.48	$3,318.00	$265.00	$3,053.00	9.6	2,471
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**40.7**	**$460.08**	**$5,842.75**	**$0.00**	**$5,842.75**	**12.7**	**4,771**
ECM 5	Install High Efficiency Unit Heaters	Yes	0	0.0	40.7	$460.08	$5,842.75	$0.00	$5,842.75	12.7	4,771
Domestic Water Heating Upgrade			**108**	**0.0**	**0.0**	**$14.07**	**$7.17**	**$0.00**	**$7.17**	**0.5**	**109**
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	108	0.0	0.0	$14.07	$7.17	$0.00	$7.17	0.5	109
TOTALS			**23,810**	**6.7**	**40.7**	**$3,550.36**	**$19,485.63**	**$2,440.00**	**$17,045.63**	**4.8**	**28,747**

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

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

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

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

Domestic Hot Water System upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems, or may include measures to reduce hot water demand. New domestic hot water heating systems and low-flow devices can provide equivalent or greater water heating performance compared to older equipment at a reduced energy cost. These measures save energy by reducing the fuel usage for domestic hot water heating due through improved heating efficiency or by reducing hot water usage and standby losses.

Energy Efficient Practices

TRC also identified eight 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 Buildings & Grounds Facility include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for the Buildings & Grounds Facility. Based on the configuration of the site and its loads there is a moderate potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	21	kW DC STC
Electric Generation	25,019	kWh/yr
Displaced Cost	$2,180	/yr
Installed Cost	$54,600	

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- 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.

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Walter Sosa	Buildings and Grounds Supervisor	sosaw@asburypark.k12.nj.us	(732) 776 2663 x2851
Geoffrey Hastings	Business Administrator	hastingsg@asburypark.k12.nj.us	(732) 776 2606 x2426
TRC Energy Services			
Tom Page	Auditor	TPage@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On July 11, 2017, TRC performed an energy audit at the Buildings & Grounds Facility located in Asbury Park, New Jersey. TRC's team met with Walter Sosa to review the facility operations and help focus our investigation on specific energy-using systems.

The Buildings and Grounds Facility is a 13,740 square foot facility comprised of three interconnecting buildings that function as a single facility. The facility contains two offices, a warehouse storage areas, workshops, and garage bays. The building was constructed in 1930. It is primarily a single story building with an attic over the main warehouse area, used for additional storage. Interior lighting at the facility consists primarily of T8 linear fluorescent fixtures with some T5 and T12 linear fluorescent fixtures. The buildings also has some fixtures containing compact fluorescent lamps and some high intensity discharge (HID) lamps that light the exterior.

Nearly the entire facility is heated, but only limited areas are cooled. Three gas-fired ceiling-mounted hot air unit heaters and one small electric heater supply heat to most areas of the building. Spot cooling is provided by through-the-wall air conditioning units for the two office areas.

2.3 Building Occupancy

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

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Buildings & Grounds Facility	Weekday	7:15 AM - 5:15 PM
Buildings & Grounds Facility	Weekend	Closed

2.4 Building Envelope

The buildings are constructed of concrete block with a stucco facade. The warehouse building has a low pitch roof covered with a white bitumen roof membrane. The garage buildings appear to have metal pan concrete roofs. The buildings have few windows. The windows are operable and single paned. The exterior doors are constructed of aluminum. The facility has four aluminum roll-up door that had visible air gaps, likely causing significant air infiltration.

2.5 On-Site Generation

The Buildings and Grounds Facility does not have any on-site electric generating capacity.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided almost primarily by linear fluorescent lamps with electronic ballasts. There is a prevalence of T8 lamps, though the main shop and warehouse are illumined by T5 lamps, and some T12 lamps were found in the back garage. Most of the fixtures are 4-lamp, 4-foot long troffers, though there are 2, and 3- lamp fixtures. The buildings also has some fixtures with metal halide lamps and a few fixtures with compact fluorescent bulbs. Lighting control throughout the building is provided by manually operated wall switches.

Exterior lighting around the building's perimeter is mostly provided by metal halide fixtures.

Heating and Direct Expansion Air Conditioning System (DX)

Nearly the entire facility is heated, but only limited areas are cooled. Three gas-fired ceiling-mounted unit heaters and one small electric unit heater heat most areas of the building. Two of the three gas-fired unit heaters are relatively new, however, the Bryant unit heater serving the back garage is estimated to be over 30 years old and should be replaced.

Spot cooling is provided by through-the-wall air conditioning units in the two offices. The AC units are manually controlled.

Domestic Water Heating System

The facility has two domestic water heaters, which supply the two restrooms. The main office restroom has a Rheem 13 kW electric tankless water heater. The garage area restroom is supplied by a Vanguard 2 kW electric domestic water heater with a 10 gallon storage tank.

Building Plug Load

There are roughly 10 computer work stations throughout the facility. The computers are desktop units with LCD monitors. There is no centralized PC power management software installed.

In addition to the typical office equipment, we observed three microwaves, two standard refrigerators, and a flat screen television.

2.7 Water-Using Systems

There are two restrooms at this facility. A faucet in the main office restroom appeared to be low flow. The sink in the other restroom had a high flow faucet, estimated to be greater than 2.5 gallons per minute (gpm). The toilets both appeared to be low flow, less than 2.5 gallons per flush (gpf).

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost 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

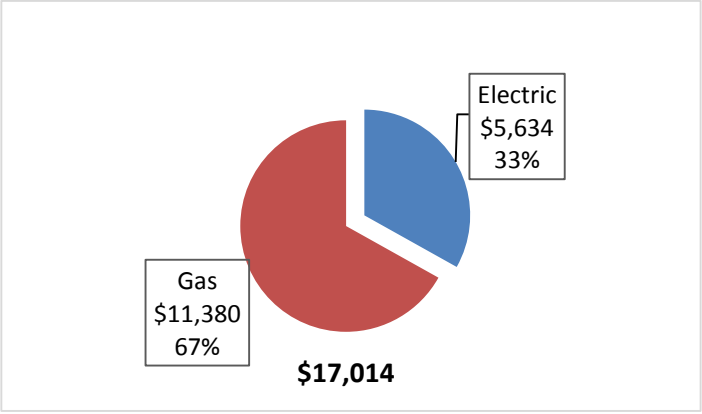
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Buildings & Grounds Facility		
Fuel	**Usage**	**Cost**
Electricity	43,410 kWh	$5,634
Natural Gas	10,078 Therms	$11,380
Total		**$17,014**

The current annual energy cost for this facility is $17,014 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over a recent 12 month period was found to be about $0.130/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. Electric demand appears to be slightly higher during the summer months, but does not vary significantly throughout the year.

Figure 9 - Electric Usage & Demand

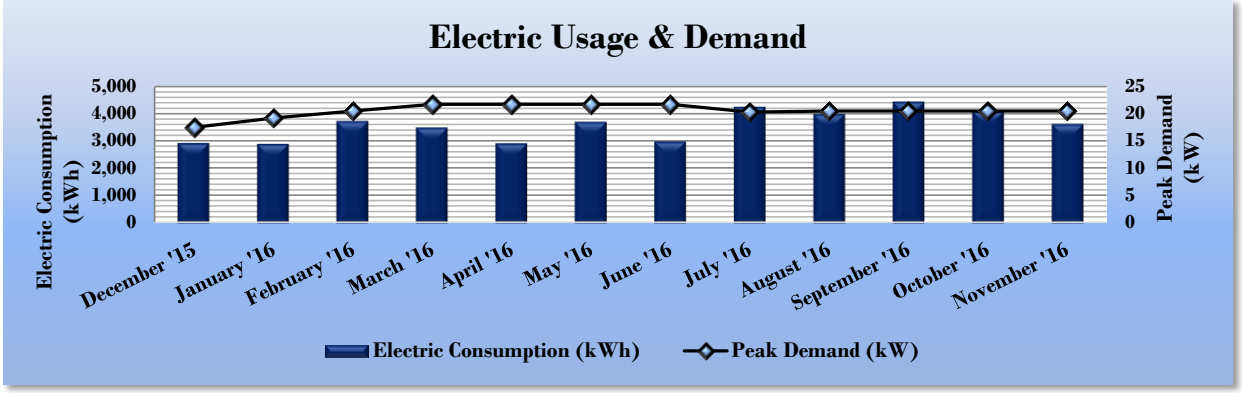


Figure 10 - Electric Usage & Demand

Electric Billing Data for Buildings & Grounds Facility				
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost
12/29/15	31	2,910	18	$390
1/27/16	29	2,880	19	$390
2/25/16	29	3,709	21	$472
3/25/16	29	3,478	22	$447
4/25/16	31	2,902	22	$390
5/24/16	29	3,687	22	$468
6/23/16	30	2,971	22	$409
7/25/16	32	4,224	20	$544
8/23/16	29	3,970	21	$516
9/23/16	31	4,416	21	$526
10/25/16	32	4,068	21	$527
11/22/16	28	3,600	21	$478
Totals	**360**	**42,815**	**21.7**	**$5,557**
Annual	**365**	**43,410**	**21.7**	**$5,634**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost over a recent 12 month period was found to be about $1.129/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. The only significant use of natural gas at the facility is for heating in the winter months.

Figure 11 - Natural Gas Usage

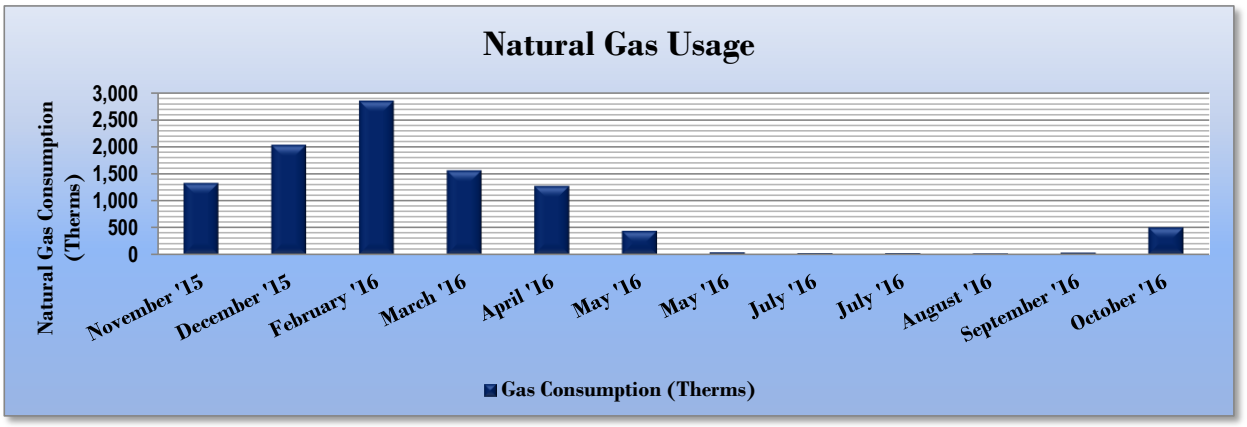


Figure 12 - Natural Gas Usage

Gas Billing Data for Buildings & Grounds Facility			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
12/14/15	33	1,324	$1,328
1/15/16	32	2,030	$1,892
2/17/16	33	2,848	$2,545
3/17/16	29	1,557	$1,514
4/18/16	32	1,267	$1,283
5/16/16	28	436	$619
6/15/16	30	41	$304
7/18/16	33	23	$290
8/15/16	28	22	$289
9/13/16	29	20	$287
10/13/16	30	35	$330
11/11/16	29	502	$730
Totals	**366**	**10,106**	**$11,411**
Annual	**365**	**10,078**	**$11,380**

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		
	Buildings & Grounds Facility	National Median Building Type: Garage
Source Energy Use Intensity (kBtu/ft^2)	110.9	123.1
Site Energy Use Intensity (kBtu/ft^2)	84.1	78.8

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		
	Buildings & Grounds Facility	National Median Building Type: Garage
Source Energy Use Intensity (kBtu/ft^2)	89.2	123.1
Site Energy Use Intensity (kBtu/ft^2)	75.3	78.8

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

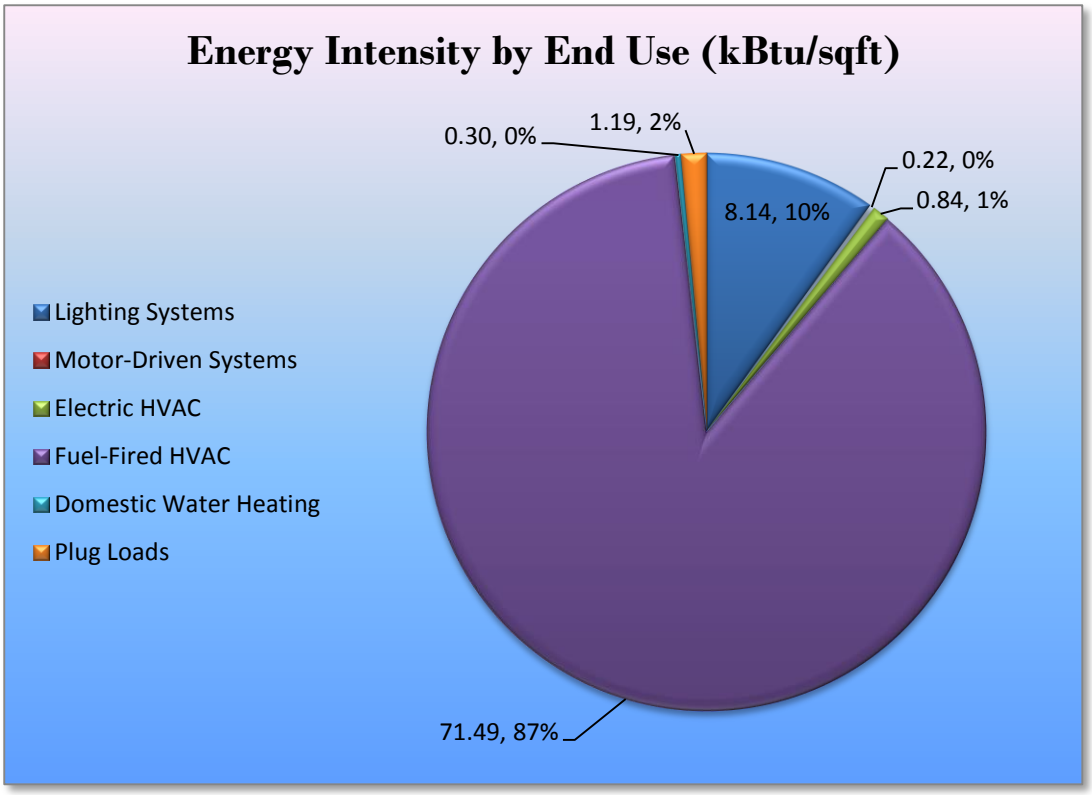
A Portfolio Manager® account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance. Free online training 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.

Natural gas heating in the winter plus electric lighting at the facility appear to make up nearly 96 percent of total onsite energy usage.

Figure 15 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Buildings & Grounds Facility 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		**21,248**	**6.0**	**0.0**	**$2,757.74**	**$10,317.72**	**$2,175.00**	**$8,142.72**	**3.0**	**21,396**
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ECM 4	Install Occupancy Sensor Lighting Controls	2,454	0.7	0.0	$318.48	$3,318.00	$265.00	$3,053.00	9.6	2,471
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**40.7**	**$460.08**	**$5,842.75**	**$0.00**	**$5,842.75**	**12.7**	**4,771**
ECM 5	Install High Efficiency Unit Heaters	0	0.0	40.7	$460.08	$5,842.75	$0.00	$5,842.75	12.7	4,771
Domestic Water Heating Upgrade		**108**	**0.0**	**0.0**	**$14.07**	**$7.17**	**$0.00**	**$7.17**	**0.5**	**109**
ECM 6	Install Low-Flow Domestic Hot Water Devices	108	0.0	0.0	$14.07	$7.17	$0.00	$7.17	0.5	109
TOTALS		**23,810**	**6.7**	**40.7**	**$3,550.36**	**$19,485.63**	**$2,440.00**	**$17,045.63**	**4.8**	**28,747**

* - 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		**21,248**	**6.0**	**0.0**	**$2,757.74**	**$10,317.72**	**$2,175.00**	**$8,142.72**	**3.0**	**21,396**
ECM 1	Install LED Fixtures	6,245	1.2	0.0	$810.50	$1,862.07	$900.00	$962.07	1.2	6,288
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	3,136	0.6	0.0	$407.00	$2,020.00	$0.00	$2,020.00	5.0	3,158
ECM 3	Retrofit Fixtures with LED Lamps	11,867	4.2	0.0	$1,540.23	$6,435.65	$1,275.00	$5,160.65	3.4	11,950

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	1,537	0.4	0.0	$199.49	$690.04	$600.00	$90.04	0.5	1,548
Exterior	4,708	0.7	0.0	$611.02	$1,172.03	$300.00	$872.03	1.4	4,741

Measure Description

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

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

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	1,140	0.3	0.0	$147.89	$1,010.00	$0.00	$1,010.00	6.8	1,147
Exterior	1,996	0.3	0.0	$259.11	$1,010.00	$0.00	$1,010.00	3.9	2,010

Measure Description

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

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	11,867	4.2	0.0	$1,540.23	$6,435.65	$1,275.00	$5,160.65	3.4	11,950
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T8 and T5 fluorescent lighting technologies with new 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. Even screw-in compact fluorescent bulbs (which used to be the high efficiency standard) can now be cost effectively replaced with lower wattage LED bulbs, which have a longer life.

This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

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

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**2,454**	**0.7**	**0.0**	**$318.48**	**$3,318.00**	**$265.00**	**$3,053.00**	**9.6**	**2,471**
ECM 4	Install Occupancy Sensor Lighting Controls	2,454	0.7	0.0	$318.48	$3,318.00	$265.00	$3,053.00	9.6	2,471

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

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,454	0.7	0.0	$318.48	$3,318.00	$265.00	$3,053.00	9.6	2,471

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, and offices 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.

4.1.3 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 19 below.

Figure 19 - Summary of Gas-Fired Heating Replacement 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)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**40.7**	**$460.08**	**$5,842.75**	**$0.00**	**$5,842.75**	**12.7**	**4,771**
ECM 5	Install High Efficiency Unit Heaters	0	0.0	40.7	$460.08	$5,842.75	$0.00	$5,842.75	12.7	4,771

ECM 5: Install High Efficiency Unit Heaters

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)
0	0.0	40.7	$460.08	$5,842.75	$0.00	$5,842.75	12.7	4,771

Measure Description

We recommend replacing existing standard gas-fired unit heaters with high efficiency gas-fired unit heaters. Improved combustion technology and heat exchanger design optimize the heat recovery from the combustion gases which can significantly improve unit heater efficiency. Savings result from improved system efficiency.

For the purpose of this analysis, we assumed that the current Bryant unit heater (~80% efficient) would be replaced by a new high efficiency unit heater of similar size (e.g. *Modine Effinity 93* unit heater, 215 MBH input, ~93% efficient).

4.1.4 Domestic Hot Water Heating System Upgrades

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

Figure 20 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**108**	**0.0**	**0.0**	**$14.07**	**$7.17**	**$0.00**	**$7.17**	**0.5**	**109**
ECM 6	Install Low-Flow Domestic Hot Water Devices	108	0.0	0.0	$14.07	$7.17	$0.00	$7.17	0.5	109

ECM 6: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
108	0.0	0.0	$14.07	$7.17	$0.00	$7.17	0.5	109

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard showerheads and aerators, which saves energy. Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Perform Proper Furnace Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 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 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

Refer to Section 4.1.4 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

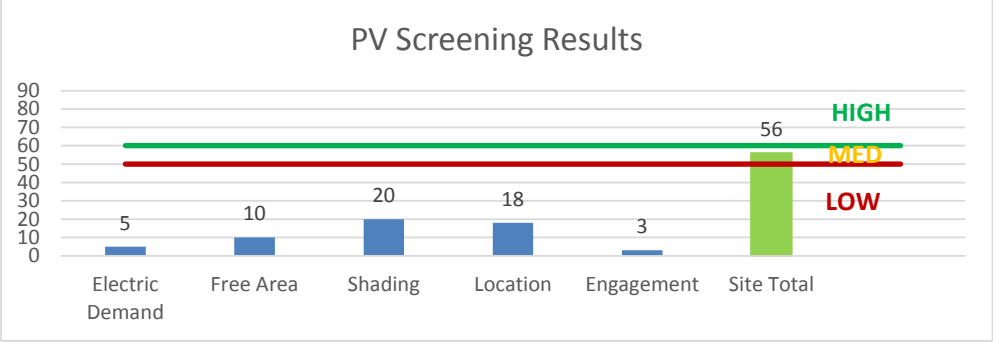
Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection,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

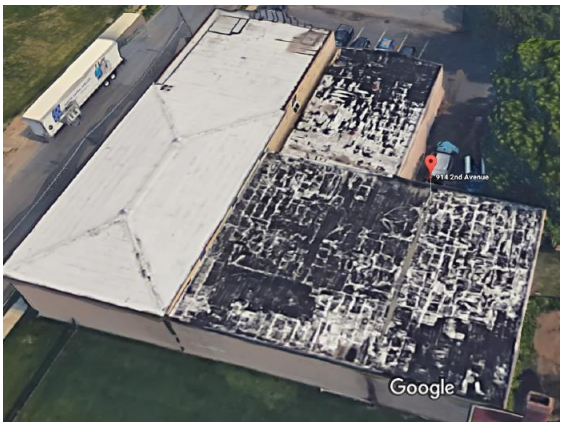
6.1 Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a moderate potential for cost-effective installation of a solar PV array on site. So, a rooftop PV array may be feasible. If the Asbury Park school district is interested in pursuing the installation of a PV array at the Buildings and Grounds Facility, we recommended a full feasibility study be conducted.

Figure 21 - Photovoltaic Screening





Potential	Medium	
System Potential	21	kW DC STC
Electric Generation	25,019	kWh/yr
Displaced Cost	$2,180	/yr
Installed Cost	$54,600	

The image above shows an aerial view of the facility's rooftop. There appears to be adequate space available, above 8,000 square feet of potentially useable unshaded roof space. We estimate that the space might support a modest sized PV array of about 21,000 watts (or about seventy 300-watt panels), which could offset a significant portion of the facility's annual electric demand. Estimated costs and benefits for such a system are shown above. The school district could earn several thousand dollars in additional benefits per year through participation in the state's SREC program.

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 8.3 for additional information.

However, first the building's roof should to be assessed by a qualified solar technician to determine feasibility and structural soundness of the roof for such an installation.

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.

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

The low and infrequent thermal load, and lack 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/.

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.

This facility does not appear to be eligible for participation in a demand response program due to its low electric usage and minimal variance in demand throughout the year.

8 PROJECT FUNDING / INCENTIVES

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

Figure 22 - ECM Incentive Program Eligibility

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

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

The program pays up to **70%** of the total installed cost of eligible measures, up to $125,000 per project. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

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

Since Direct Install offers a free assessment of eligible measures, Direct Install is also available to small businesses and other commercial facilities too that may not be eligible for the more detailed facility audits provided by LGEA.

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

8.3 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.32	1,167	0.0	$151.47	$840.80	$155.00	4.53
Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.09	332	0.0	$43.03	$175.50	$65.00	2.57
Exit Signs	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	800	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	560	0.05	62	0.0	$8.08	$211.13	$20.00	23.66
Foyer	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.05	195	0.0	$25.25	$211.13	$20.00	7.57
Shop Area	7	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	2,500	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.44	1,580	0.0	$205.13	$1,110.80	$190.00	4.49
Shop Area	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.11	389	0.0	$50.49	$190.27	$75.00	2.28
Main Storage Area	11	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	2,500	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.79	2,852	0.0	$370.22	$1,380.80	$120.00	3.41
Main Storage Area	6	Compact Fluorescent: 23W CFL - 1L	Wall Switch	23	2,500	Relamp	Yes	6	LED Screw-In Lamps: 5W LED	Occupancy Sensor	9	1,750	0.07	266	0.0	$34.46	$93.00	$0.00	2.70
Behind Office	1	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	2,500	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.06	210	0.0	$27.31	$365.13	$20.00	12.64
2nd Floor Attic	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,000	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.49	712	0.0	$92.45	$1,141.60	$240.00	9.75
2nd Floor Attic	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	114	1,000	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.75	1,081	0.0	$140.33	$702.00	$120.00	4.15
2nd Floor Attic	8	Incandescent: 60W Incan	Wall Switch	60	1,000	Relamp	No	8	LED Screw-In Lamps: 9W LED Bulb	Wall Switch	9	1,000	0.30	432	0.0	$56.13	$124.00	$40.00	1.50
Garage	4	Metal Halide: (1) 150W Lamp	Wall Switch	190	2,500	Fixture Replacement	Yes	4	LED - Fixtures: Low-Bay	Occupancy Sensor	45	1,750	0.46	1,680	0.0	$218.06	$960.04	$635.00	1.49
Garage	1	Compact Fluorescent: 13W CFL - 1L	Wall Switch	13	2,500	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Bulb	Occupancy Sensor	9	1,750	0.00	18	0.0	$2.30	$15.50	$35.00	-8.46
Back Garage	24	Linear Fluorescent - T5: 4' T5 (28W) - 3L	Wall Switch	90	2,500	Relamp	Yes	12	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	1,750	1.05	3,787	0.0	$491.56	$2,420.68	$465.00	3.98
Back Garage	4	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,500	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	1,750	0.31	1,141	0.0	$148.03	$808.00	$35.00	5.22
Back Garage Rest Room	1	Compact Fluorescent: 13W CFL - 1L	Wall Switch	13	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulb	Wall Switch	9	800	0.00	3	0.0	$0.44	$15.50	$5.00	23.85
Back Garage Office	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,500	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	1,750	0.08	285	0.0	$37.01	$202.00	$20.00	4.92
Back Garage Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	114	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.14	497	0.0	$64.45	$233.00	$40.00	2.99
Office Back Rm	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,500	0.08	307	0.0	$39.90	$252.80	$0.00	6.34
Exterior	3	Metal Halide: (1) 400W Lamp	Wall Switch	458	4,380	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	120	4,380	0.74	4,708	0.0	$611.02	$1,172.03	$300.00	1.43
Exterior	5	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	4,380	Relamp & Reballast	No	5	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	4,380	0.31	1,996	0.0	$259.11	$1,010.00	$0.00	3.90

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
Back Garage	Exhaust Fan	1	Exhaust Fan	0.3	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Back Garage	Exhaust Fan	2	Other	0.1	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Restroom	Exhaust Fan	1	Exhaust Fan	0.1	82.5%	No	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Grounds building	Office	1	Through-The-Wall AC	1.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	Office	1	Through-The-Wall AC	0.75		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
Garage	Storage	1	Warm Air Unit Heater	145.25	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	Garage	1	Warm Air Unit Heater	207.50	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	Garage	1	Warm Air Unit Heater	200.00	Yes	1	Warm Air Unit Heater	199.95	93.00%	Et	0.00	0	40.7	$460.08	$5,842.75	$0.00	12.70

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
Office	Office Restroom	1	Tankless Water Heater	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Garage	Garage restroom	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Back Garage Restroom	1	Faucet Aerator (Lavatory)	2.50	1.00	0.00	108	0.0	$14.07	$7.17	$0.00	0.51

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Various	10	Desktop Computers	120.0	Yes
Various	10	Computer Monitors	28.0	Yes
Various	1	Sm. Printers	13.0	Yes
Office	1	Lg. Copiers	380.0	Yes
Various	3	Microwaves	800.0	No
Various	2	Refrigerator	500.0	Yes
Office	1	TV	150.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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N/A

ENERGY STAR® Score[1]

Asbury Park BOE Buildings & Grounds Facility

Primary Property Type: Repair Services (Vehicle, Shoe, Locksmith, etc.)
Gross Floor Area (ft²): 13,740
Built: 1930

For Year Ending: October 31, 2016
Date Generated: October 13, 2017

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
Asbury Park BOE Buildings & Grounds Facility 914 2nd Avenue Asbury Park, New Jersey 07712	Asbury Park Board of Education 910 4th Avenue Asbury Park, NJ 07712 (732) 776-2606 x 2426	Geoffrey Hastings 910 4th Avenue Asbury Park, NJ 07712 (732) 776-2606 x 2426 hastingsg@asburypark.k12.nj.us

Property ID: 6049947

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
83.4 kBtu/ft²

Source EUI
109.8 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	1,000,375 (87%)
Electric - Grid (kBtu)	146,005 (13%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	76.3
National Median Source EUI (kBtu/ft²)	100.4
% Diff from National Median Source EUI	9%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	69

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)