Local Government Energy Audit:
Energy Audit Report

Police Department

Borough of Highland Park

222 South 5th Avenue
Highland Park, New Jersey 08904

October 18, 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 savings 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 Police Department.

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 Borough of Highland Park Police Department is located at 222 South 5th Avenue in Highland Park, New Jersey. The facility is two-story building totaling approximately 12,598 square feet and constructed in 2015. It is comprised of administrative offices, lunch rooms, an evidence room, a fitness room, locker rooms, a communication room, holding cells, an interview room, squad room, armory, storage and mechanical spaces. The building is occupied year round by approximately 24 people including Police Officers.

The building has flat and sloped roof sections. The exterior walls are constructed of brick veneer with store front style glass windows incorporated into the front brick walls. The front entry door is fully glass with aluminum frames and the exit doors are constructed of metal.

The building's interior lighting consists mainly of LED tubes and compact fluorescent lamps. Lighting is controlled throughout the building by a combination of occupancy sensors and manual wall switches. The exterior lighting system consists mainly of LED fixtures that are controlled with photocells.

The building is all electric. Heating and cooling systems consist of six Daikin heat pumps. Also, two indoor Renew Aire energy recovery ventilation (ERVs) provide tempered air to the building via ductwork.

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 three measures which together represent an opportunity for the Police Department to reduce annual energy costs by roughly $2,560 and annual greenhouse gas emissions by 23,537 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 2.5 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 Police Department's annual energy use by 10%.

Figure 1 – Previous 12 Month Utility Costs

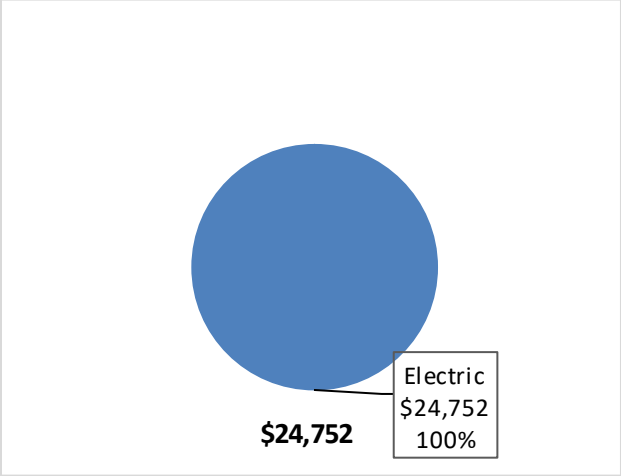
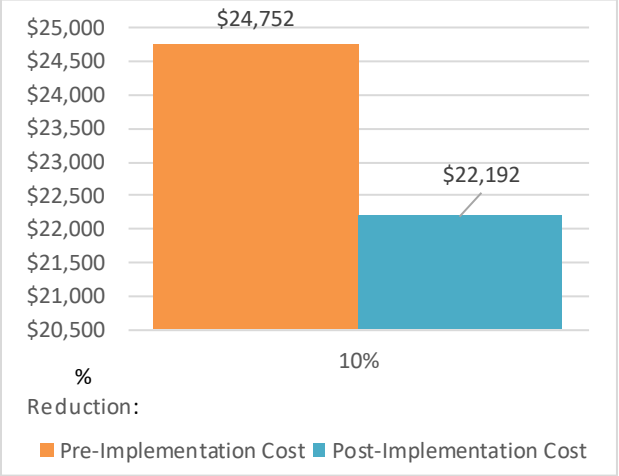


Figure 2 – Potential Post-Implementation Costs



A detailed description of The Police Department'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			**15,635**	**1.4**	**0.0**	**$1,712.56**	**$4,888.99**	**$150.00**	**$4,738.99**	**2.8**	**15,744**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	15,635	1.4	0.0	$1,712.56	$4,888.99	$150.00	$4,738.99	2.8	15,744
Lighting Control Measures			**7,739**	**0.6**	**0.0**	**$847.72**	**$1,844.00**	**$180.00**	**$1,664.00**	**2.0**	**7,793**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	3,978	0.3	0.0	$435.77	$1,244.00	$180.00	$1,064.00	2.4	4,006
ECM 3	Install High/Low Lighitng Controls	Yes	3,761	0.3	0.0	$411.95	$600.00	$0.00	$600.00	1.5	3,787
TOTALS			**23,374**	**2.0**	**0.0**	**$2,560.28**	**$6,732.99**	**$330.00**	**$6,402.99**	**2.5**	**23,537**

* - 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 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 Police Department include:

- Perform Proper Lighting Maintenance
- Ensure Lighting Controls Are Operating Properly
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Furnace 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 Police Department. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- 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 8.2 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 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Teri Jover	Borough Administrator	tjover@hpboro.com	732-819-3789
Designated Representative			
Mike Wieczorkiewicz	Spervisor	mwieczorkiewicz@hpboro.com	732-894-7134
Scott Brescher	Spervisor	sbrescher@hpboro.com	732-289-5496
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On April 10, 2018, TRC performed an energy audit at the Police Department located in Highland Park, New Jersey. TRC's auditor met with Mike Wieczorkiewicz to review the facility operations and help focus our investigation on specific energy-using systems.

The Borough of Highland Park Police Department is located at 222 South 5th Avenue in Highland Park, New Jersey. The facility is two-story building totaling approximately 12,598 square feet and constructed in 2015. It is comprised of administrative offices, lunch rooms, an evidence room, a fitness room, locker rooms, a communication room, holding cells, an interview room, squad room, armory room, storage and mechanical spaces. The building is occupied year round by approximately 24 people including Police Officers.

2.3 Building Occupancy

The Police Department building is open 24 hours a day, seven days a week, year round.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Police Department	Weekday	12:00 AM - 12:00 AM
Police Department	Weekend	12:00 AM - 12:00 AM

2.4 Building Envelope

The building has a concrete foundation. Exterior walls are constructed of brick veneer. Portions of the front and the back walls of the building are in the style of store front windows. The front entry doors are glass with aluminum frames while the exit doors are constructed of metal. The roofing system consists of a front sloped roof covered with asphalt shingles and back flat roof with black membrane covering the HVAC equipment. The building is new and all its components are in good condition.

Image 1: Building Envelope

2.5 On-Site Generation

The Police Department has a solar photovoltaic (PV) array which generates approximately 29,000 kWh of annual electricity production and was installed in 2014. The PV arrays are installed on the metallic structure behind the adjacent Fire Department building. On-site solar production meets approximately 13% of the building's annual electricity requirements. There is one Baldor emergency backup diesel generator located on the ground floor of the back of the building.

Image 2: Solar PV Arrays

2.6 Energy-Using Systems

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

Lighting System

The building's interior lighting consists mainly of LED tubes and compact fluorescent lamps (CFL). The main lobby (reception area), hallways, restrooms, locker rooms, waiting room and the first floor server room are primarily illuminated with 4-pin CFL lamps. The remaining spaces are lit with LED tubes. Exit signs in the building are LED. Lighting control is provided by both occupancy sensors and manual wall switches. The exterior lighting system consists mainly of LED fixtures except the three wall mounted fixtures containing CFL lamps. They are controlled with photocells.

Image 3: Interior & Exterior Lighting System

Direct Expansion Air Conditioning System (DX)

The direct expansion system consists of three Daikin heat pumps with variable refrigerant flow (VRF) and three heat pumps with condensing units located on the roof. The units utilize an inverter driven rotary and a fixed speed scroll compressor. They provide cooling and heating as needed. Refer to the table below for the observed condition of the units. They are controlled with programmable thermostats.

System Type	Quantity	Cooling Capacity (Ton)	Heating Capacity (MBh)	Areas Served	Manufacturer	Age (Year)	Condition
Split Heat Pump	1	6	81	PD	Daikin	5	Good
Split Heat Pump	1	8	108	PD	Daikin	5	Good
Split Heat Pump	1	10	135	PD	Daikin	5	Good
Split Heat Pump	1	3	38	PD	Daikin	5	Good
Split Heat Pump	2	2	27	PD	Daikin	5	Good

Image 4: Daikin VRF Heat Pumps

Image 5: Daikin Heat Pumps

Image 6: Programmable Thermostat

Ventilation System

The facility uses two Renew Aire energy Recovery Ventilation (ERU 1,2) units. They use exhausted building air to precondition the incoming outdoor ventilation air. During the warmer periods, the system pre-cools and dehumidifies while humidifying and pre-heating in the cooler periods. The unit provides a constant volume of air using a single 3 hp constant speed supply fan and 1.5 hp return fan.

Image 7: RenewAire ERV

Domestic Water Heating System

The domestic water heating system for the facility consists of one A.O. Smith electric water heater with an input rating of 18 kW. It is located in the custodian closet and has 80 gallon storage tank. The water heater is three years old and is in good condition.

Building Plug Load

There are approximately 22 computer work stations throughout the facility and they are mostly desktop units with LCD monitors. There is no centralized PC power management software installed. There are two copy machines, 11 printers, two water coolers and two server closets.

2.7 Water-Using Systems

There are several restrooms at this facility with the faucets rated as low flow.

3 SITE ENERGY USE AND COSTS

Utility data for electricity was analyzed to identify opportunities for savings. In addition, data for electricity was evaluated to determine the annual energy performance metrics for the building in energy cost 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 3.3 for additional information.

3.1 Total Cost of Energy

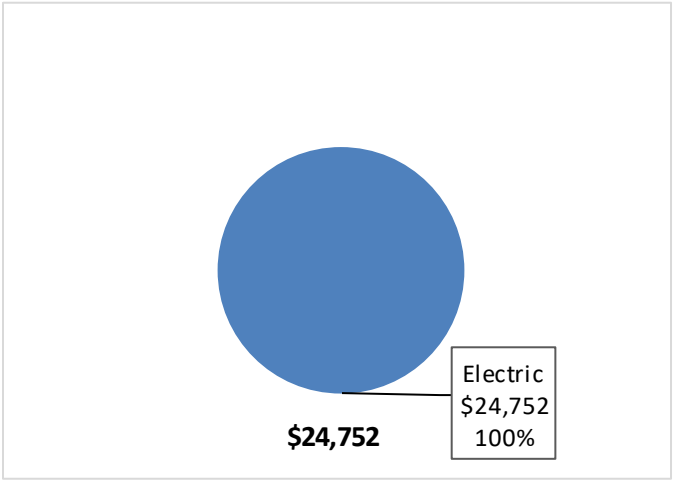
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Police Department		
Fuel	**Usage**	**Cost**
Electricity	225,974 kWh	$24,752
Total		**$24,752**

The current annual energy cost for this facility is $24,752 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G and by on-site solar production. The average electric cost over the past 12 months was $0.110/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. The high winter use indicates an electrical heating profile with summer cooling.

Figure 8 - Electric Usage & Demand

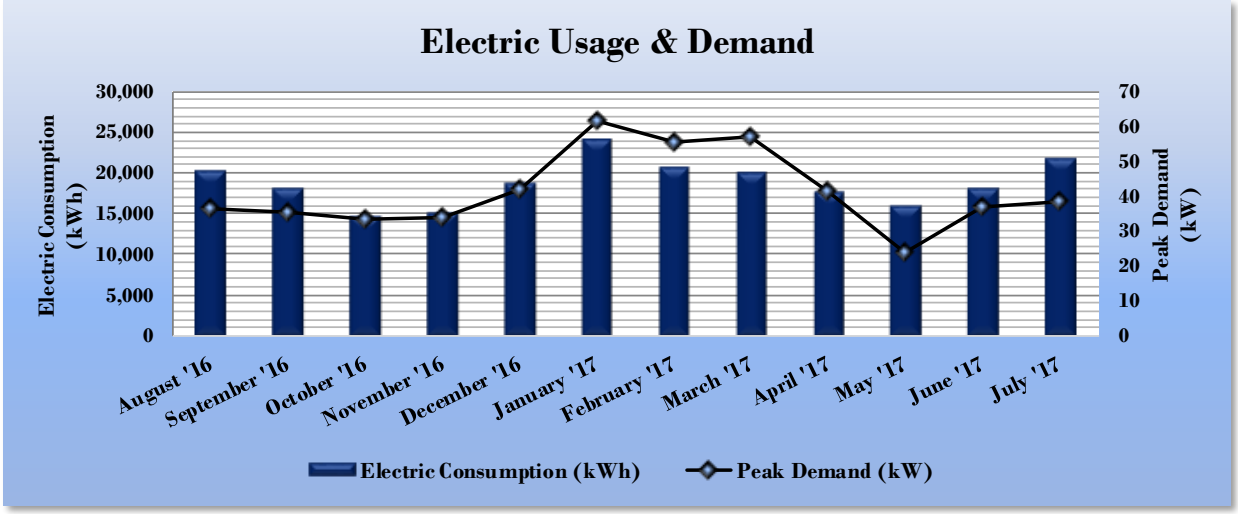


Figure 9 - Electric Usage & Demand

Electric Billing Data for Police Department					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
8/18/16	31	20,275	36	$160	$2,375
9/19/16	30	18,176	35	$157	$2,268
10/18/16	31	14,690	33	$149	$1,617
11/16/16	30	15,064	34	$152	$1,617
12/19/16	31	18,823	42	$186	$1,933
1/20/17	31	24,195	62	$275	$2,481
2/17/17	28	20,802	56	$248	$2,160
3/21/17	30	20,218	57	$256	$2,128
4/20/17	31	17,837	42	$187	$1,854
5/22/17	31	16,022	24	$148	$1,678
6/20/17	31	18,108	37	$167	$2,210
7/20/17	30	21,764	38	$172	$2,433
Totals	**365**	**225,974**	**61.7**	**$2,259**	**$24,752**
Annual	**365**	**225,974**	**61.7**	**$2,259**	**$24,752**

3.3 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 10 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Police Department	National Median Building Type: Fire/Police Station
Source Energy Use Intensity (kBtu/ft^2)	192.2	154.4
Site Energy Use Intensity (kBtu/ft^2)	61.2	88.3

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

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Police Department	National Median Building Type: Fire/Police Station
Source Energy Use Intensity (kBtu/ft^2)	172.3	154.4
Site Energy Use Intensity (kBtu/ft^2)	54.9	88.3

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This building is not eligible to receive a score because the property type falls under Police Station type, which is currently not being rated by 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.

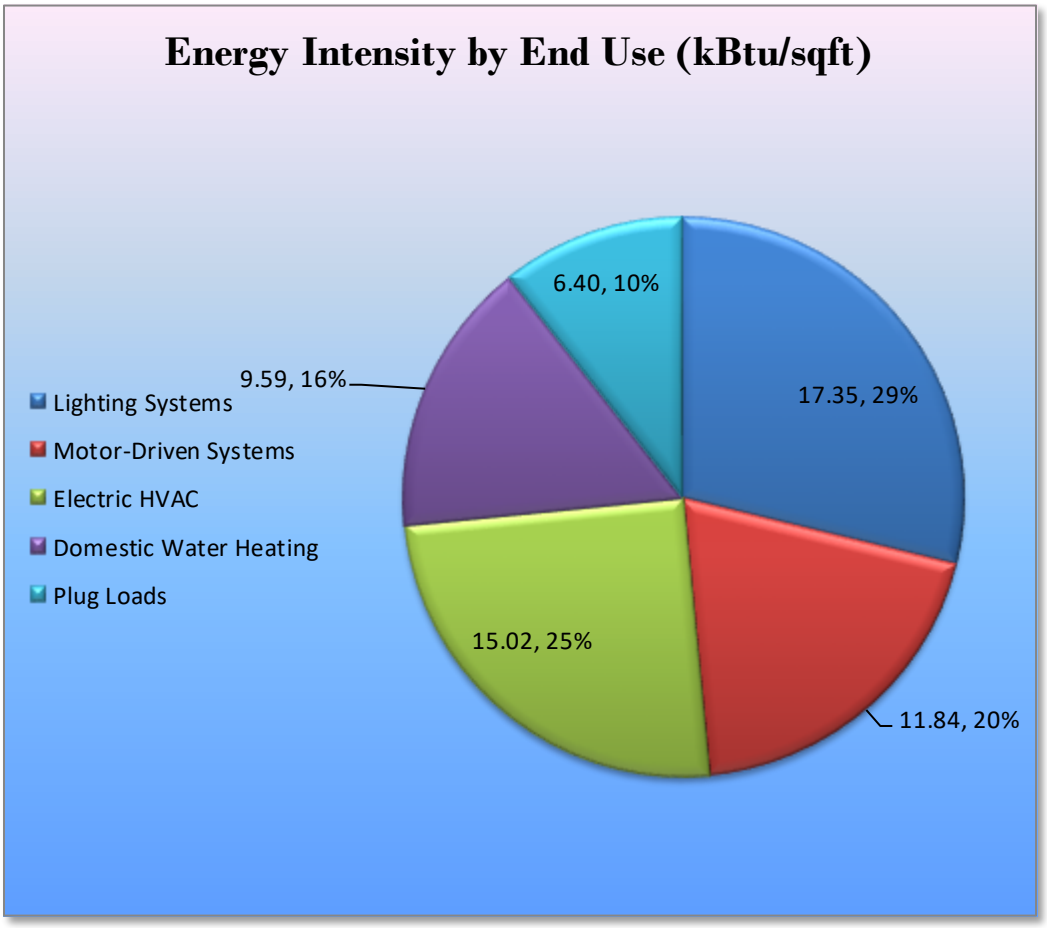
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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.

3.4 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building 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 12 - 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 Police Department regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 13 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**15,635**	**1.4**	**0.0**	**$1,712.56**	**$4,888.99**	**$150.00**	**$4,738.99**	**2.8**	**15,744**
ECM 1	Retrofit Fixtures with LED Lamps	15,635	1.4	0.0	$1,712.56	$4,888.99	$150.00	$4,738.99	2.8	15,744
Lighting Control Measures		**7,739**	**0.6**	**0.0**	**$847.72**	**$1,844.00**	**$180.00**	**$1,664.00**	**2.0**	**7,793**
ECM 2	Install Occupancy Sensor Lighting Controls	3,978	0.3	0.0	$435.77	$1,244.00	$180.00	$1,064.00	2.4	4,006
ECM 3	Install High/Low Lighitng Controls	3,761	0.3	0.0	$411.95	$600.00	$0.00	$600.00	1.5	3,787
TOTALS		**23,374**	**2.0**	**0.0**	**$2,560.28**	**$6,732.99**	**$330.00**	**$6,402.99**	**2.5**	**23,537**

* - 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 14 below.

Figure 14 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**15,635**	**1.4**	**0.0**	**$1,712.56**	**$4,888.99**	**$150.00**	**$4,738.99**	**2.8**	**15,744**
ECM 1	Retrofit Fixtures with LED Lamps	15,635	1.4	0.0	$1,712.56	$4,888.99	$150.00	$4,738.99	2.8	15,744

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: 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	15,412	1.4	0.0	$1,688.16	$4,756.84	$150.00	$4,606.84	2.7	15,520
Exterior	223	0.0	0.0	$24.40	$132.15	$0.00	$132.15	5.4	224

Measure Description

We recommend retrofitting the remaining linear fluorescent and CFL 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.

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

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 15 below.

Figure 15 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**7,739**	**0.6**	**0.0**	**$847.72**	**$1,844.00**	**$180.00**	**$1,664.00**	**2.0**	**7,793**
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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 2: 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)
3,978	0.3	0.0	$435.77	$1,244.00	$180.00	$1,064.00	2.4	4,006

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in several restrooms and offices. 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 3: 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)
3,761	0.3	0.0	$411.95	$600.00	$0.00	$600.00	1.5	3,787

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in hallways 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. 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.

Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

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.

Perform Proper Lighting Maintenance

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

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.

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.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

Air filters work to reduce the amount of indoor air pollution and increase occupant comfort. Over time, filters become less and less effective as particulate buildup increases. In addition to health concerns related to clogged filters, filters that have reached saturation also restrict air flow through the facility's air conditioning or heat pump system, increasing the load on the distribution fans and decreasing occupant comfort levels. Filters should be checked monthly and cleaned or replaced when appropriate.

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.

Water Conservation

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

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

6 On-Site Generation Measures

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

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

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

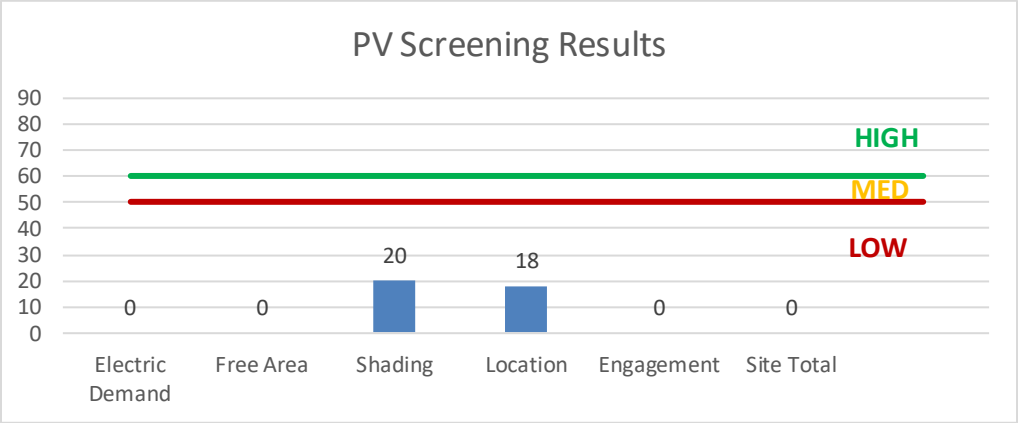
6.1 Photovoltaic

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

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

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear not meet these minimum criteria for cost-effective PV installation.

Figure 16 - Photovoltaic Screening



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

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

6.2 Combined Heat and Power

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

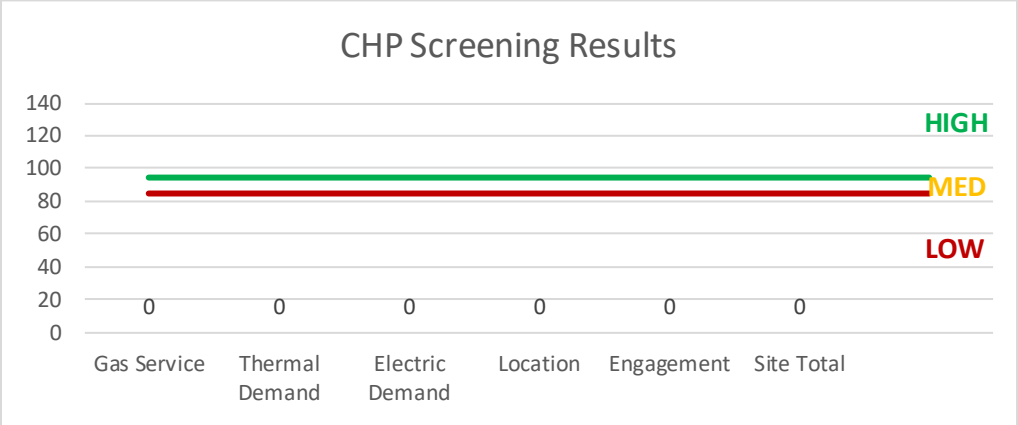
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

The facility has no thermal load.

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 17 - 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.

In our opinion, the facility is not a good candidate for DR curtailment.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 18 for a list of the eligible programs identified for each recommended ECM.

Figure 18 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Retrofit Fixtures with LED Lamps	X					
ECM 2	Install Occupancy Sensor Lighting Controls	X					
ECM 3	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 (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 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
Reception Area	5	Compact Fluorescent: CFL 4 pin	Wall Switch	26	8,736	Relamp	No	5	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	15	8,736	0.04	480	0.0	$52.63	$220.26	$0.00	4.19
Reception Area	2	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	35	8,736	0.03	336	0.0	$36.76	$88.10	$0.00	2.40
Reception Area	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
First Floor Hallway	15	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	15	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	35	6,115	0.34	4,072	0.0	$446.04	$860.77	$0.00	1.93
First Floor Hallway	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
Second Floor Hallway	14	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	14	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	35	6,115	0.31	3,801	0.0	$416.30	$816.71	$0.00	1.96
Second Floor Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
North Fan Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	6,115	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.03	228	0.0	$24.98	$58.50	$10.00	1.94
Evidence Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	6,115	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.05	456	0.0	$49.96	$117.00	$20.00	1.94
Server Room	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Women Restroom	4	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	4	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.09	1,086	0.0	$118.94	$292.20	$20.00	2.29
Female Locker Room	2	Compact Fluorescent: CFL 4 pin	Occupancy Sensor	52	6,115	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.03	235	0.0	$25.73	$88.10	$0.00	3.42
Custodian Closet	2	Compact Fluorescent: CFL 4 pin	Occupancy Sensor	52	6,115	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.03	235	0.0	$25.73	$88.10	$0.00	3.42
Men Restroom	4	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	4	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.09	1,086	0.0	$118.94	$292.20	$20.00	2.29
Men Locker Room	6	Compact Fluorescent: CFL 4 pin	Occupancy Sensor	52	6,115	Relamp	No	6	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.08	705	0.0	$77.20	$264.31	$0.00	3.42
Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	6,115	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.03	228	0.0	$24.98	$58.50	$10.00	1.94
South Fan Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	6,115	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.03	228	0.0	$24.98	$58.50	$10.00	1.94
Fitness Room	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	None	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Administration Hallway	12	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	12	LED Screw-In Lamps: LED Screw-In Lamps	High/Low Control	35	6,115	0.27	3,258	0.0	$356.83	$728.61	$0.00	2.04
Administration Hallway	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
Restroom	2	Compact Fluorescent: CFL 4 pin	Occupancy Sensor	52	6,115	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.03	235	0.0	$25.73	$88.10	$0.00	3.42
Detective Bureau	6	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	6	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.13	1,629	0.0	$178.41	$380.31	$20.00	2.02
Detective Bureau	12	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	Yes	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.05	604	0.0	$66.18	$116.00	$20.00	1.45
Sergent Office	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	Yes	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.02	302	0.0	$33.09	$116.00	$20.00	2.90
EOC	8	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	Yes	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.03	403	0.0	$44.12	$116.00	$20.00	2.18

	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
Second Floor Lunch Room	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Waiting Room	3	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	3	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.07	814	0.0	$89.21	$248.15	$20.00	2.56
Hallway	2	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	35	8,736	0.03	336	0.0	$36.76	$88.10	$0.00	2.40
Secretary Office	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Chief Office	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	Yes	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.02	302	0.0	$33.09	$200.00	$0.00	6.04
Captain Office	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Copy Room	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
South Stairwell	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.05	652	0.0	$71.37	$117.00	$20.00	1.36
South Stairwell	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
North Stairwell	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.05	652	0.0	$71.37	$117.00	$20.00	1.36
North Stairwell	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
First Floor Lunch Room	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Communication Room	12	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	Yes	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.05	604	0.0	$66.18	$116.00	$20.00	1.45
First Floor Server Room	3	Compact Fluorescent: CFL 4 pin	Occupancy Sensor	52	6,115	Relamp	No	3	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.04	352	0.0	$38.60	$132.15	$0.00	3.42
Lieutenant Office	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Youth Sergent Office	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Rom	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sally Porte	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	None	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Holding Cells	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Holding Cells	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	8,736	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.05	652	0.0	$71.37	$117.00	$20.00	1.36
Squad Room	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	None	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Squad Room	5	Compact Fluorescent: CFL 4 pin	Wall Switch	52	8,736	Relamp	Yes	5	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.11	1,357	0.0	$148.68	$336.26	$20.00	2.13
Squad 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
Sergent Office	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
Interview Room	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	8,736	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	8,736	0.03	316	0.0	$34.60	$96.40	$20.00	2.21

	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
Armory Room	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	6,115	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.03	221	0.0	$24.22	$96.40	$20.00	3.15
Restroom	2	Compact Fluorescent: CFL 4 pin	Occupancy Sensor	52	6,115	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Occupancy Sensor	35	6,115	0.03	235	0.0	$25.73	$88.10	$0.00	3.42
Interview Room	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	None	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	6,115	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Front Entrance Recessed	4	LED - Fixtures: Downlight Recessed	Daylight Dimming	23	4,368	None	No	4	LED - Fixtures: Downlight Recessed	Daylight Dimming	23	4,368	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior Wall Pack	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	45	4,368	None	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	45	4,368	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior Wall Pack	3	Compact Fluorescent: CFL 4 pin	Daylight Dimming	52	4,368	Relamp	No	3	LED Screw-In Lamps: LED Screw-In Lamps	Daylight Dimming	35	4,368	0.04	252	0.0	$27.57	$132.15	$0.00	4.79
Exterior Rear Building	4	LED - Fixtures: Downlight Recessed	Daylight Dimming	23	4,368	None	No	4	LED - Fixtures: Downlight Recessed	Daylight Dimming	23	4,368	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Parking Lot	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	55	4,368	None	No	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	55	4,368	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
PV Support Structure	4	LED - Fixtures: Downlight Recessed	Daylight Dimming	45	4,368	None	No	4	LED - Fixtures: Downlight Recessed	Daylight Dimming	45	4,368	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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
Elevator Room	Elevator	1	Process Pump	25.0	94.0%	No	2,184	No	94.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Custodian Closet	DHW	1	Other	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	RTU	1	Supply Fan	1.5	82.0%	No	2,745	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	RTU	1	Other	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Fan Rooms	ERV	2	Supply Fan	3.0	178.0%	No	2,745	No	178.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Fan Rooms	ERV	2	Return Fan	1.5	278.0%	No	2,745	No	278.0%	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
Rooftop	Police Department (CU-2)	1	Split-System Air-Source HP	6.00	81.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Police Department (CU-1)	1	Split-System Air-Source HP	8.00	108.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Police Department (CU-1)	1	Split-System Air-Source HP	10.00	135.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Police Department (CU-A)	1	Split-System Air-Source HP	3.00	38.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Police Department (CU-B,C)	2	Split-System Air-Source HP	2.00	27.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Sally Porte	Sally Porte	1	Electric Resistance Heat		17.50	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Custodian Closet	Police Department	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?
Police Department	22	Desktop with LCD Monitors	191.0	Yes
Police Department	11	Printer	56.0	Yes
Police Department	5	TVs	224.0	Yes
Police Department	2	Water Cooler	272.0	No
Police Department	2	Microwave	1,000.0	No
Police Department	2	Coffee Machine	800.0	No
Police Department	1	Toaster	800.0	No
Police Department	2	Copy Machine	800.0	Yes
Police Department	2	Server	850.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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N/A

ENERGY STAR® Score[1]

Highland Park Police Department

Primary Property Type: Police Station
Gross Floor Area (ft²): 12,598
Built: 2015

For Year Ending: June 30, 2017
Date Generated: May 01, 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
Highland Park Police Department 222 S. 5th Avenue Highland Park, New Jersey 08904	Borough of Highland Park 221 South Fifth Avenue Highland Park, NJ 08904 (732) 819-3789	Teri Jover 221 South Fifth Avenue Highland Park, NJ 08904 (732) 819-3789 tjover@hpboro.com

Property ID: 6319239

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
61.5 kBtu/ft²

Source EUI
175.9 kBtu/ft²

Annual Energy by Fuel	
Electric - Solar (kBtu)	100,486 (13%)
Electric - Grid (kBtu)	673,733 (87%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	53.9
National Median Source EUI (kBtu/ft²)	154.4
% Diff from National Median Source EUI	14%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	75

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)