Local Government Energy Audit:
Energy Audit Report

Fire Headquarters

City of Jersey City

465 Marin Boulevard

Jersey City, NJ 07302

February 19, 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 Fire Headquarters. The goal of a LGEA is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and put you in a position to implement the ECMs. The LGEA also sets you on the path to receive financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing the ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey Firehouse Headquarters in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

1.1 Facility Summary

The Fire Headquarters is a two-story 17,000 square foot facility comprised of office spaces, dormitories for the fire fighters and an apparatus floor (garage where fire engines are parked). The building also contains a commercial kitchen and mechanical rooms. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC recommends the installation of eight (7) energy conservation measures which together represent an opportunity to reduce annual energy costs by roughly $9,830 and reduce annual greenhouse gas emissions by approximately 79,091 lbs CO_2e. The measures would likely pay for themselves in energy cost saving in about 3.54 years. A breakdown of current energy costs and potential future energy costs is shown in Figure 1 and Figure 2, respectively. These measures together represent an opportunity to reduce Fire Headquarters' annual energy usage by about 9.46% and total energy costs by 11.4%.

Figure 1 – Previous 12 Month Utility Costs

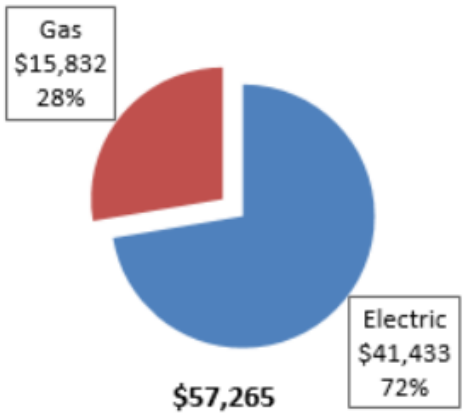
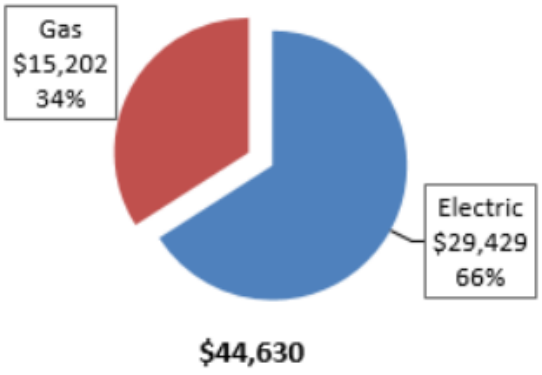


Figure 2 – Potential Post-Implementation Costs



A detailed description of the Fire Headquarters' existing energy usage can be found in Section 3.

The recommended measures have been listed and grouped into major categories as shown in Figure 3. Brief descriptions of the categories can be found below and descriptions of the individual measures 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			**63,655**	**15.0**	**0.0**	**$8,310.38**	**$31,935.15**	**$430.00**	**$31,505.15**	**3.79**	**64,100**
ECM 1	Install LED Fixtures	Yes	2,108	0.4	0.0	$275.16	$2,005.11	$300.00	$1,705.11	6.20	2,122
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	55,944	13.6	0.0	$7,303.69	$27,725.48	$0.00	$27,725.48	3.80	56,335
ECM 3	Retrofit Fixtures with LED Lamps	Yes	820	0.6	0.0	$107.09	$698.79	$130.00	$568.79	5.31	826
ECM 4	Install LED Exit Signs	Yes	4,783	0.4	0.0	$624.43	$1,505.77	$0.00	$1,505.77	2.41	4,816
Lighting Control Measures			**4,649**	**1.4**	**0.0**	**$606.96**	**$3,248.00**	**$560.00**	**$2,688.00**	**4.43**	**4,682**
ECM 5	Install Occupancy Sensor Lighting Controls	Yes	4,649	1.4	0.0	$606.96	$3,248.00	$560.00	$2,688.00	4.43	4,682
Electric Unitary HVAC Measures			**1,062**	**0.3**	**0.0**	**$138.60**	**$13,365.79**	**$547.50**	**$12,818.29**	**92.48**	**1,069**
	Install High Efficiency Electric AC	No	1,062	0.3	0.0	$138.60	$13,365.79	$547.50	$12,818.29	92.48	1,069
HVAC System Improvements			**2,164**	**0.5**	**0.0**	**$282.51**	**$750.00**	**$250.00**	**$500.00**	**1.77**	**2,179**
ECM 6	Install Dual Enthalpy Outside Economizer Control	Yes	2,164	0.5	0.0	$282.51	$750.00	$250.00	$500.00	1.77	2,179
Domestic Water Heating Upgrade			**0**	**0.0**	**69.4**	**$630.51**	**$93.21**	**$0.00**	**$93.21**	**0.15**	**8,131**
ECM 7	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	69.4	$630.51	$93.21	$0.00	$93.21	0.15	8,131
TOTALS OF EVALUATED ECMS			**71,529**	**17.2**	**69.4**	**$9,968.96**	**$49,392.15**	**$1,787.50**	**$47,604.65**	**4.78**	**80,160**
TOTALS OF RECOMMENDED ECMS			**70,468**	**17**	**69**	**$ 9,830.35**	**$ 36,026.36**	**$ 1,240.00**	**$ 34,786.36**	**3.54**	**79,091**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

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

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when conditions allow. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

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

HVAC System Improvements generally involve the installation of automated controls to reduce heating and cooling demand when conditions allow. These measures could encompass changing temperature setpoints, using outside air for free cooling, or limiting excessive outside air during extreme outdoor air temperatures. These measures save energy by reducing the demand on the systems and the amount of time systems operate.

Energy Efficient Practices

TRC also identified seven (7) low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems. Through these practices, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance costs can be reduced. Opportunities identified at Fire Headquarters include:

- Reduce Air Leakage

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Perform Proper Boiler Maintenance
- Install Plug Load Controls
- Water Conservation

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

Self-Generation Measures

TRC evaluated the potential for installing self-generation sources for Fire Headquarters. Based on the configuration of the site and its electric and thermal loads there appears to be no potential for cost-effective installation of any combined heat and power system.

There also appears to be very little potential for installing a solar photovoltaic (PV) system onsite. However, a more detailed study of site PV options would need to be conducted to determine the solar potential and payback for the site. For more details on our evaluation of on-site generation potential, please see 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

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.

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

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			
John Mercer	Assistant Business Administrator	jmercer@jcnj.org	201-547-4417
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On July 14, 2016, TRC performed an energy audit of the Fire Headquarters located in Jersey City, New Jersey. TRC's team met with Nelson Estremera, one of the firefighters, to review the facility operations and focus the investigation on specific energy-using systems.

The Fire Headquarters is a 17,000 square foot facility comprised of office spaces, dormitories for the firefighters and an apparatus floor (garage where fire engines are parked). The building has two (2) floors with a commercial kitchen and mechanical rooms. The building was constructed in 1982 and is centrally heated and cooled.

2.3 Building Occupancy

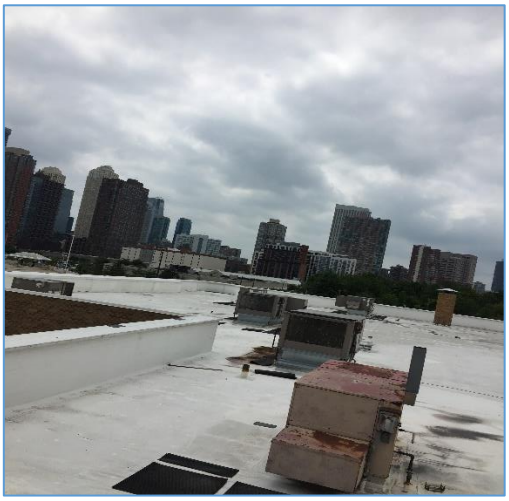
The offices at the Fire Headquarters function on weekdays from 7:30 AM to 5:30 PM and closed on the weekends. The apparatus floor and the dormitories, including the kitchen, are functional and occupied all year.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Headquarters offices	Weekday	7:30AM - 5:30PM
Headquarters offices	Weekend	No operation
Firehouse and Apparatus floor	Weekday	8AM - 8AM
Firehouse and Apparatus floor	Weekend	8AM - 8AM

2.4 Building Envelope

The building has a brick façade and the interior construction is wood and Stucco. It has a flat roof with black membrane which was redone only on one part of the roof. The main entrance has two (2) layers of framed glass doors which are in good condition. The side of the apparatus floor has two (2) garage doors for the access of the fire engines. The windows are old and show signs of excessive air infiltration.



Building Envelope (Exterior and roof)

2.5 Energy-Using Systems

Lighting System

Lighting is provided predominately by 4-foot and 8-foot, T12 linear fluorescent and 2-foot U-bent T12 lamps, all with magnetic ballasts, plus multiple incandescent lamp fixtures. The apparatus floor does not receive enough light during the day and hence has a set of light fixtures turned on 24 hours per day.

Lighting control in most spaces is provided by wall switches. It is recommended that the facility install occupancy sensors in many spaces, particularly in the hallways as they are dark. The occupancy sensors can be either wall or ceiling mounted depending on the space layout.

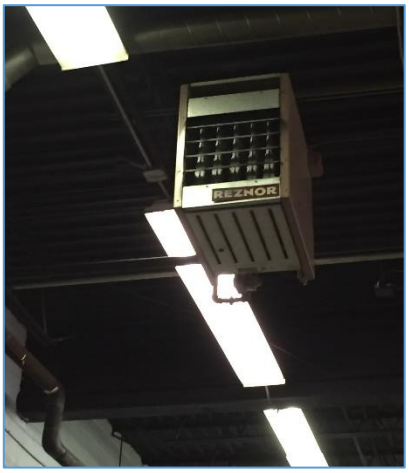
The building has inefficient exterior lighting, which primarily consists of high pressure sodium (HPS) fixtures and some metal halide (MH) fixtures which do not possess any automated lighting controls.

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

Hot Water / Steam System

The hot water system consists of a single non-condensing hot water boiler from Weil McLain with an output capacity of 1600 MBh and a thermal efficiency of 83%. The boiler is 15 years old and is well maintained and in decent working condition.

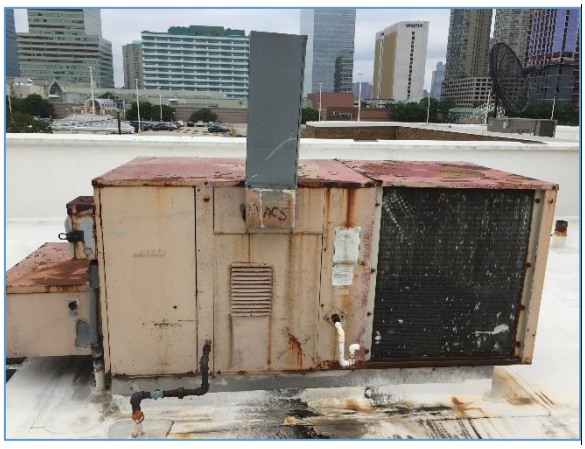
The firehouse engine bays have a separate warm air unit heater, manufactured by Reznor, with an output capacity of 165 MBh and thermal efficiency of 80%. The heater is only about eight (8) years old and is in good working condition. However, since this area has a high ceiling and heat is lost through the garage doors, the heating in this space may occasionally be inadequate. When this unit needs to be replaced, we recommend the installation of low intensity infrared (IR) tube heaters. These are more efficient because they do not heat the volume of air in large areas such as truck bays, instead they heat areas with occupants and the surfaces of objects in that space. They may also be concentrated on smaller areas instead of larger common areas as well.



Weil-Mclain Boiler (Left); Warm Air Unit heater (Right)

Air Conditioning (DX)

The building has four (4) 7.5 ton packaged roof top units and three (3) 2 ton packaged roof top units. With the exception of one (1) 7.5 ton Lennox unit, all others are five (5) years old and in good working condition. One (1) of the Lennox (7.5 ton) unit was found to be in poor condition and has been evaluated for replacement. With a more energy efficient building envelope (specifically losses due to constant opening and closing of doors), the capacity of units needed may be reduced as the need is currently based on energy loss.



Air handling units on rooftop

Domestic Hot Water

The domestic hot water system for the facility consists of a water heater from AO Smith which has an input capacity of 670 MBh and 80% system efficiency. The heater is natural gas fired and is 15 years old and has a 115 gallon storage tank, manufactured by Rheem. The recirculation pumps also operate continuously. The unit has been maintained well and is in fair working condition.

Food Service & Laundry Equipment

The facility has a full commercial kitchen that is used to cook breakfast, lunch and dinner for the fire fighters on a regular basis. The kitchen has a six (6) burner, two (2) full over and a two (2) foot griddle unit

with a hood. All units are gas fired. Other equipment in the kitchen includes a refrigerator, microwave oven, coffee machines, and kettle.

Food service (Garland) and Laundry equipment at the facility

The site has laundry units comprising of a front load Whirlpool washing machine and a dryer unit running on electricity.

Plug Load & Vending Machines

The plug load in the office spaces consists primarily of work stations with computers (51), printers (22), paper shredders, air coolers and space heaters. The conference rooms contained projectors and the dormitories had televisions. There is no centralized PC power management software installed.

There is a server closest which has cooling provided by dedicated vents which are provided by AHU.

2.6 Water-Using Systems

There are five (5) restrooms located throughout this facility. A sampling of restrooms found that the faucets are rated for 2.5 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2.5 gpf, all of which are considered to be high flow. A simple measure for the faucets, would be to attach aerators which typically limit water flow through the faucets and reduce the water use.

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

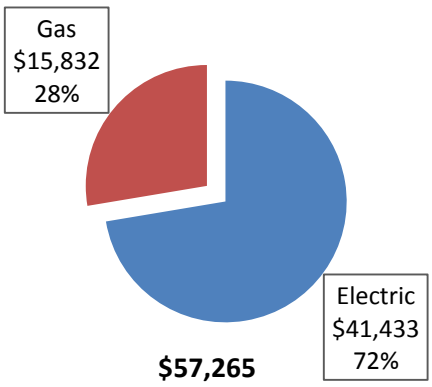
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Fire Headquarters		
Fuel	**Usage**	**Cost**
Electricity	294,720 kWh	$41,433
Natural Gas	17,437 Therms	$15,832
Total		**$57,265**

The current utility cost for this site is $57,265 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.131/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 third party supply is provided by Constellation Energy. The monthly electricity consumption and peak demand is shown in the chart below.

Figure 8 -Electric Usage & Demand

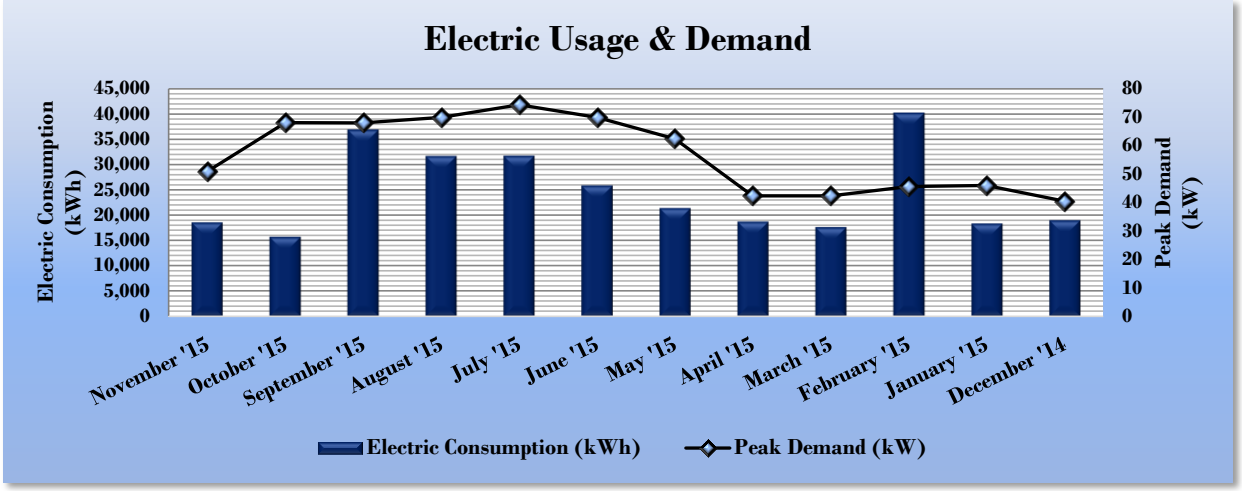


Figure 9 -Electric Usage & Demand

Electric Billing Data for Fire Headquarters					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
11/24/15	29	18,480	51	$223	$2,317
10/26/15	28	15,650	68	$297	$2,071
9/28/15	33	36,790	68	$297	$5,271
8/26/15	29	31,560	70	$303	$4,769
7/28/15	32	31,620	74	$323	$4,923
6/26/15	29	25,770	70	$303	$4,090
5/28/15	30	21,330	62	$271	$2,798
4/28/15	32	18,660	42	$184	$2,447
3/27/15	29	17,580	42	$184	$2,306
2/26/15	30	40,110	46	$198	$5,456
1/27/15	32	18,270	46	$198	$2,509
12/26/14	32	18,900	41	$176	$2,477
Totals	**365**	**294,720**	**74.4**	**$2,956**	**$41,433**
Annual	**365**	**294,720**	**74.4**	**$2,956**	**$41,433**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.908/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is represented graphically in the chart below.

Figure 10 -Natural Gas Usage

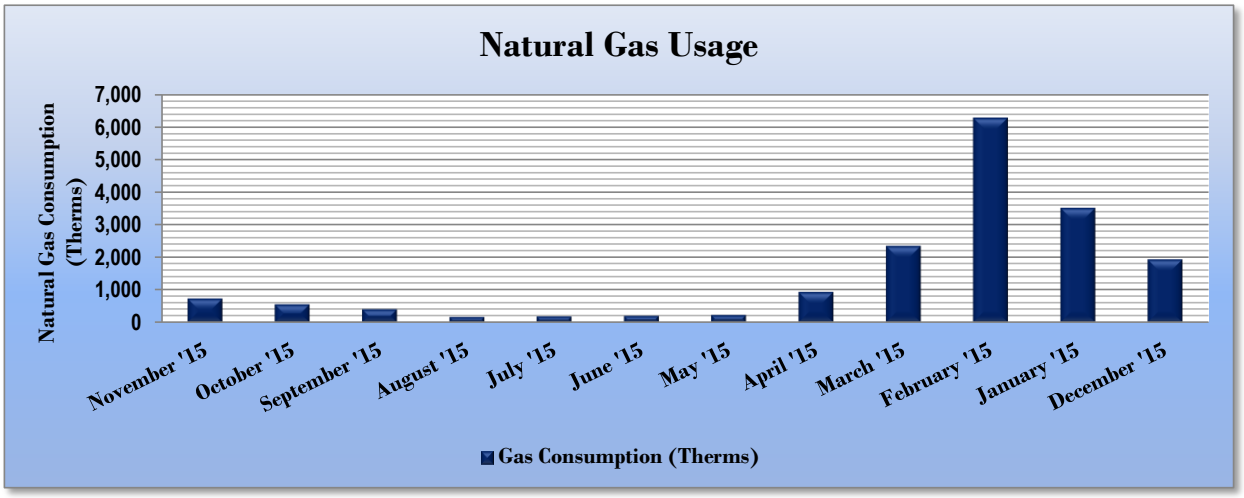


Figure 11 -Natural Gas Usage

Gas Billing Data for Fire Headquarters			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
11/24/15	29	729	$908
10/26/15	28	550	$515
9/28/15	33	400	$329
8/26/15	29	163	$198
7/28/15	32	183	$208
6/26/15	29	201	$219
5/28/15	30	224	$228
4/28/15	32	929	$631
3/27/15	29	2,347	$2,033
2/26/15	30	6,274	$5,422
1/27/15	32	3,509	$3,039
12/26/15	32	1,927	$2,102
Totals	**365**	**17,437**	**$15,832**
Annual	**365**	**17,437**	**$15,832**

3.4 Benchmarking

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

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

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Fire Headquarters	National Median Building Type: Fire/Police Station
Source Energy Use Intensity (kBtu/ft^2)	293.4	154.4
Site Energy Use Intensity (kBtu/ft^2)	161.7	88.3

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

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

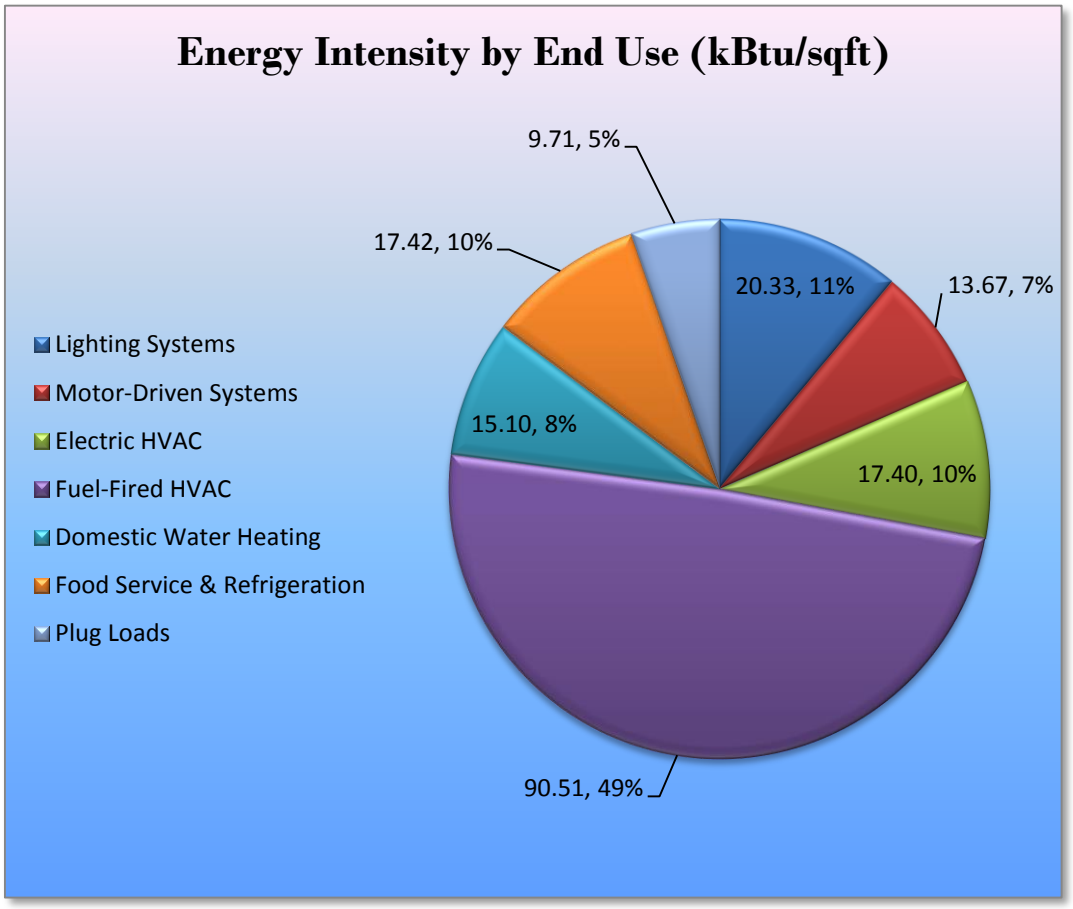
Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Fire Headquarters	National Median Building Type: Fire/Police Station
Source Energy Use Intensity (kBtu/ft^2)	248.6	154.4
Site Energy Use Intensity (kBtu/ft^2)	147.4	88.3

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. Your building is not in one of the building categories that are eligible to receive a score. The Portfolio Manager, Statement of Energy Performance can be found in Appendix B: ENERGY STAR® Statement of Energy Performance.

3.5 Energy End-Use Breakdown

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

Figure 14 - Energy Balance (kBtu/SF and % of total)



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 City of Jersey City regarding financial incentives for which they may qualify for to help implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**63,655**	**15.0**	**0.0**	**$8,310.38**	**$31,935.15**	**$430.00**	**$31,505.15**	**3.79**	**64,100**
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ECM 3	Retrofit Fixtures with LED Lamps	820	0.6	0.0	$107.09	$698.79	$130.00	$568.79	5.31	826
ECM 4	Install LED Exit Signs	4,783	0.4	0.0	$624.43	$1,505.77	$0.00	$1,505.77	2.41	4,816
Lighting Control Measures		**4,649**	**1.4**	**0.0**	**$606.96**	**$3,248.00**	**$560.00**	**$2,688.00**	**4.43**	**4,682**
ECM 5	Install Occupancy Sensor Lighting Controls	4,649	1.4	0.0	$606.96	$3,248.00	$560.00	$2,688.00	4.43	4,682
HVAC System Improvements		**2,164**	**0.5**	**0.0**	**$282.51**	**$750.00**	**$250.00**	**$500.00**	**1.77**	**2,179**
ECM 6	Install Dual Enthalpy Outside Economizer Control	2,164	0.5	0.0	$282.51	$750.00	$250.00	$500.00	1.77	2,179
Domestic Water Heating Upgrade		**0**	**0.0**	**69.4**	**$630.51**	**$93.21**	**$0.00**	**$93.21**	**0.15**	**8,131**
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	69.4	$630.51	$93.21	$0.00	$93.21	0.15	8,131
TOTALS OF RECOMMENDED ECMS		**70,468**	**17**	**69**	**$ 9,830.35**	**$ 36,026.36**	**$ 1,240.00**	**$ 34,786.36**	**3.54**	**79,091**

* - 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

Recommended upgrades to existing lighting fixtures are summarized in Figure 16 below.

Figure 16 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**63,655**	**15.0**	**0.0**	**$8,310.38**	**$31,935.15**	**$430.00**	**$31,505.15**	**3.79**	**64,100**
ECM 1	Install LED Fixtures	Yes	2,108	0.4	0.0	$275.16	$2,005.11	$300.00	$1,705.11	6.20	2,122
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	55,944	13.6	0.0	$7,303.69	$27,725.48	$0.00	$27,725.48	3.80	56,335
ECM 3	Retrofit Fixtures with LED Lamps	Yes	820	0.6	0.0	$107.09	$698.79	$130.00	$568.79	5.31	826
ECM 4	Install LED Exit Signs	Yes	4,783	0.4	0.0	$624.43	$1,505.77	$0.00	$1,505.77	2.41	4,816

ECM 1: Install LED Fixtures

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0
Exterior	2,108	0.4	0.0	$275.16	$2,005.11	$300.00	$1,705.11	6.20	2,122

Measure Description

We recommend replacing existing fixtures containing linear fluorescent T12, U-bent T12 and HID lamps with new high performance LED light fixtures. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output.

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

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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	55,944	13.6	0.0	$7,303.69	$27,725.48	$0.00	$27,725.48	3.80	56,335
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

We recommend retrofitting existing fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used with 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 and more than ten (10) times longer than many incandescent lamps.

ECM 3: Retrofit Fixtures with LED Lamps

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	820	0.6	0.0	$107.09	$698.79	$130.00	$568.79	5.31	826
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

We recommend replacing incandescent screw-in or plug-in based lamps with LED lamps. This measure saves energy by installing LED sources 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 ten (10) times longer than many incandescent lamps.

ECM 4: Install LED EXIT Signs

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	4,783	0.4	0.0	$624.43	$1,505.77	$0.00	$1,505.77	2.41	4,816
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

We recommend replacing all incandescent or compact fluorescent EXIT signs with LED EXIT signs. LED EXIT signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

4.1.2 Lighting Control Measures

The lighting control measures that we recommend for the facility are summarized in Figure 17 below.

Figure 17 – 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		**4,649**	**1.4**	**0.0**	**$606.96**	**$3,248.00**	**$560.00**	**$2,688.00**	**4.43**	**4,682**
ECM 5	Install Occupancy Sensor Lighting Controls	4,649	1.4	0.0	$606.96	$3,248.00	$560.00	$2,688.00	4.43	4,682

ECM 5: 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)
4,649	1.4	0.0	$606.96	$3,248.00	$560.00	$2,688.00	4.43	4,682

Measure Description

We recommend installing occupancy sensors to control light fixtures that are currently manually controlled in restrooms, hallways and private offices. Sensors detect occupancy using ultrasonic and/or infrared technologies. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Occupants will also be able to manually turn off fixtures. Energy savings result from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. Ceiling-mounted or remote-mounted sensors require the use of low voltage switching relays or a wireless signal to the switch. In general, use wall switch replacement sensors for single occupant offices and other small rooms. Install ceiling-mounted or remote mounted sensors in locations without local switching, in situations where the existing wall switches are not in the line-of-sight of the main work area, and in large spaces. 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.

4.1.3 HVAC System Improvements

Our recommendation for HVAC system improvement are summarized in Figure 18 below.

Figure 18 - Summary of HVAC System Improvement 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)
HVAC System Improvements		**2,164**	**0.5**	**0.0**	**$282.51**	**$750.00**	**$250.00**	**$500.00**	**1.77**	**2,179**
ECM 6	Install Dual Enthalpy Outside Economizer Control	2,164	0.5	0.0	$282.51	$750.00	$250.00	$500.00	1.77	2,179

ECM 6: Install Dual Enthalpy Outside Economizer Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,164	0.5	0.0	$282.51	$750.00	$250.00	$500.00	1.77	2,179

Measure Description

Dual enthalpy economizers are used to control a ventilation system's outside air intake in order to reduce a facility's total cooling load. A dual enthalpy economizer monitors the air temperature and humidity of both the outside and return air. The control supplies the lowest energy (temperature and humidity) air to the air handling system. When outside air conditions allow, outside air can be used for cooling in place of the air handling system's compressor. This reduces the demand on the cooling system, lowering its usage hours and saving energy.

Savings result from using outside air instead of mechanical cooling when outside air conditions permit.

4.1.4 Domestic Water Heating Upgrade

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		**0**	**0.0**	**69.4**	**$630.51**	**$93.21**	**$0.00**	**$93.21**	**0.15**	**8,131**
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	69.4	$630.51	$93.21	$0.00	$93.21	0.15	8,131

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 and low-flow showerheads 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.

4.2 ECMs Evaluated but Not Recommended

4.2.1 Electric Unitary HVAC Measures

Our evaluations for unitary HVAC measures are summarized in Figure 19 below.

Figure 19 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures			**1,062**	**0.3**	**0.0**	**$138.60**	**$13,365.79**	**$547.50**	**$12,818.29**	**92.48**	**1,069**
	Install High Efficiency Electric AC	No	1,062	0.3	0.0	$138.60	$13,365.79	$547.50	$12,818.29	92.48	1,069

Install High Efficiency Electric AC

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)
745	0.2	0.0	$97.20	$13,365.79	$547.50	$12,818.29	131.87	750

Measure Description

We evaluated replacing standard efficiency Lennox (7.5 ton) packaged air conditioning unit with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies in the past several years. Therefore, electricity savings can be achieved by replacing old units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the old and new unit, the cooling load, and the annual operating hours.

Reasons for not recommending

The payback period upon replacing this unit exceeds the useful life of the equipment itself. When this equipment is due for a replacement in the near future, we recommend that this be replaced with a higher efficiency unit.

5 ENERGY EFFICIENT PRACTICES

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

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.

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.

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 Boiler Maintenance

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

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.

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).

6 SELF-GENERATION MEASURES

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

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

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

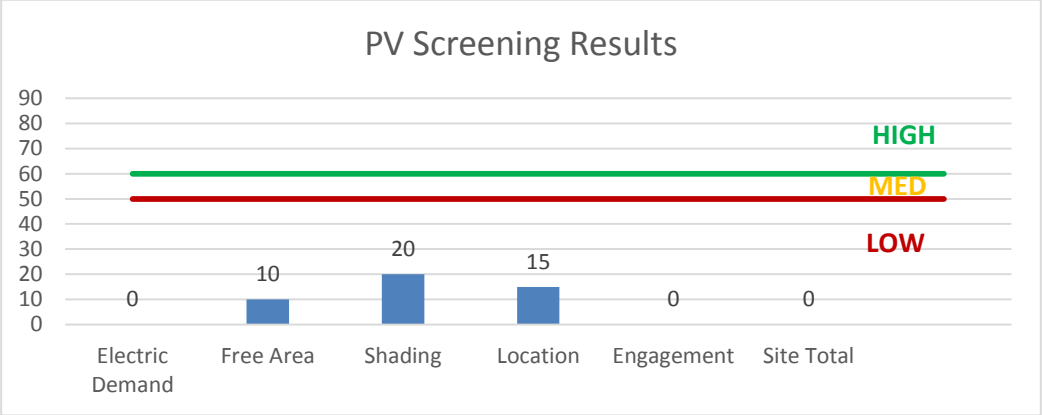
6.1 Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a Low potential for installing a PV array. The roof top on the building has a lot of space but the potential area for the installation of solar PV is unclear because of the obstacle caused by the existing air handling units. Structural integrity is also another issue that needs to be assessed in order to place generating equipment on the roof.

If Fire Headquarters is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 20 - Photovoltaic Screening



Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program 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

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

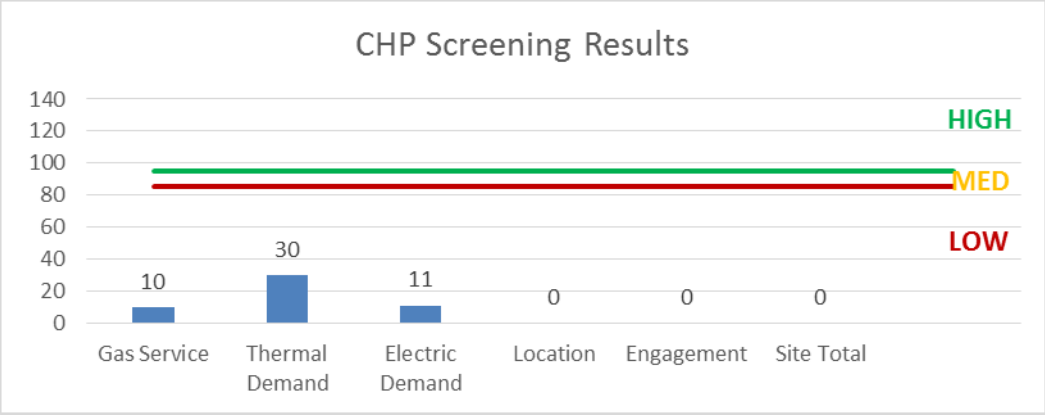
6.2 Combined Heat and Power

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

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

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

Figure 21 - CHP Screening



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

7 DEMAND RESPONSE

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

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

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

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

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

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

The Firehouse Headquarters does not appear to have sufficient electric load to be able to participate in a DR program.

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
ECM 1	Install LED Fixtures			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 LED Exit Signs			x
ECM 5	Install Occupancy Sensor Lighting Controls	x		x
ECM 6	Install Dual Enthalpy Outside Economizer Control	x		x
ECM 7	Install Low-Flow Domestic Hot Water Devices	x		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 or: 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 a 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 DI 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 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
Entrance - 1st Floor	1	Incandescent: Recessed Fixture	Wall Switch	100	2,470	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	18	2,470	0.07	229	0.0	$29.88	$53.75	$10.00	1.46
Front of the Elevator - 1st floor	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,470	Fixture Replacement	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,470	0.06	218	0.0	$28.42	$226.92	$0.00	7.98
Front of the Elevator - 1st floor	1	Exit Signs: Incandescent	Wall Switch	45	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	Wall Switch	6	8,760	0.03	386	0.0	$50.40	$107.56	$0.00	2.13
Machine Room	1	Incandescent: Wall mount fixture	Wall Switch	60	52	Relamp	No	1	LED Screw-In Lamps: Wall mount fixture	Wall Switch	9	52	0.04	3	0.0	$0.39	$53.75	$10.00	111.83
Hallway - 1st Floor	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	630	Fixture Replacement	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	441	0.12	104	0.0	$13.63	$456.38	$20.00	32.01
Boiler Room - 1st Floor	3	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	52	Fixture Replacement	No	3	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	52	0.21	15	0.0	$1.98	$546.63	$0.00	276.19
Storage Room - 1st Floor	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	108	Fixture Replacement	No	2	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	108	0.14	21	0.0	$2.74	$364.42	$0.00	132.98
Storage Closet - 1st Floor	1	Incandescent: Wall mount fixture	Wall Switch	100	52	Relamp	No	1	LED Screw-In Lamps: Wall mount fixture	Wall Switch	18	52	0.07	5	0.0	$0.63	$53.75	$10.00	69.55
Room 101 - office	11	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,470	Fixture Replacement	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,729	0.61	2,079	0.0	$271.36	$1,033.73	$20.00	3.74
Room 101 - server room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	52	Fixture Replacement	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.05	3	0.0	$0.45	$83.43	$0.00	184.33
Hallway - 1st Floor	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	630	Fixture Replacement	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	441	0.12	104	0.0	$13.63	$456.38	$20.00	32.01
Pantry	9	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.99	3,401	0.0	$444.04	$1,360.34	$20.00	3.02
Female firefighter locker	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	108	Fixture Replacement	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	108	0.38	58	0.0	$7.52	$553.04	$0.00	73.54
Men's Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,050	Fixture Replacement	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	735	0.33	482	0.0	$62.92	$616.58	$20.00	9.48
Men's Room	1	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.03	386	0.0	$50.40	$107.56	$0.00	2.13
Men's room closet	2	Incandescent: Wall mount fixture	Wall Switch	75	108	Relamp	No	2	LED Screw-In Lamps: Wall mount fixture	Wall Switch	11	108	0.10	16	0.0	$2.04	$107.51	$20.00	42.91
Men's Room - shower	1	Incandescent: Recessed Fixture	Wall Switch	100	1,050	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	18	1,050	0.07	97	0.0	$12.70	$53.75	$10.00	3.44
Locker Room	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,470	Fixture Replacement	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,470	0.13	435	0.0	$56.84	$453.84	$0.00	7.98
Locker Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,470	Fixture Replacement	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,729	0.33	1,134	0.0	$148.01	$616.58	$20.00	4.03
Locker Room	1	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.03	386	0.0	$50.40	$107.56	$0.00	2.13
Men's living	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,912	Fixture Replacement	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,038	0.16	644	0.0	$84.03	$449.72	$20.00	5.11
Men's living	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,912	Fixture Replacement	No	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,912	0.58	2,330	0.0	$304.15	$829.56	$0.00	2.73
Men's living	2	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.06	772	0.0	$100.80	$215.11	$0.00	2.13
Office Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.66	2,267	0.0	$296.03	$945.56	$20.00	3.13
Deputy Chief office	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.44	1,512	0.0	$197.35	$669.04	$20.00	3.29

	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
Deputy Chief office - storage room	1	Incandescent: Wall mount fixture	Wall Switch	60	2,470	Relamp	No	1	LED Screw-In Lamps: Wall mount fixture	Wall Switch	9	2,470	0.04	142	0.0	$18.58	$53.75	$10.00	2.35
Deputy Chief office - living room	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,470	0.29	988	0.0	$128.99	$414.78	$0.00	3.22
Deputy Chief office - bathroom	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	366	Fixture Replacement	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	366	0.05	24	0.0	$3.19	$83.43	$0.00	26.19
Deputy chief office - shower	1	Incandescent: Recessed Fixture	Wall Switch	60	2,470	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	9	2,470	0.04	142	0.0	$18.58	$53.75	$10.00	2.35
Watch Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	4,368	Fixture Replacement	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	4,368	0.10	582	0.0	$76.04	$138.26	$0.00	1.82
Watch Room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	4,368	Fixture Replacement	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,368	0.03	192	0.0	$25.13	$113.46	$0.00	4.51
Apparatus area	26	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	8,030	Fixture Replacement	No	26	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,030	1.82	20,289	0.0	$2,648.84	$4,737.46	$0.00	1.79
Apparatus area	3	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.10	1,158	0.0	$151.20	$322.67	$0.00	2.13
Apparatus area	2	Incandescent: Wall mount fixture	Wall Switch	60	2,470	Relamp	No	2	LED Screw-In Lamps: Wall mount fixture	Wall Switch	9	2,470	0.08	285	0.0	$37.17	$107.51	$20.00	2.35
2nd Floor - Reception Area	6	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,470	Fixture Replacement	No	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,470	0.19	653	0.0	$85.27	$680.76	$0.00	7.98
2nd Floor - Reception Area	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,470	0.10	329	0.0	$43.00	$138.26	$0.00	3.22
2nd Floor - Reception Area	3	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.10	1,158	0.0	$151.20	$322.67	$0.00	2.13
Conference Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,729	0.31	1,078	0.0	$140.73	$533.40	$20.00	3.65
Women's room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	20	Fixture Replacement	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	14	0.11	3	0.0	$0.40	$282.86	$20.00	657.97
Telephone room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	52	Fixture Replacement	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	52	0.03	2	0.0	$0.30	$113.46	$0.00	379.23
Director's office	8	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.88	3,023	0.0	$394.71	$1,222.08	$20.00	3.05
Room 201 A	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,729	0.16	546	0.0	$71.27	$569.84	$20.00	7.71
Room 201 A	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,470	Fixture Replacement	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,470	0.10	329	0.0	$43.00	$166.86	$0.00	3.88
Room 201 B	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.44	1,512	0.0	$197.35	$669.04	$20.00	3.29
Room 201 C	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.66	2,267	0.0	$296.03	$945.56	$20.00	3.13
Room 201D	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,470	0.19	659	0.0	$86.00	$276.52	$0.00	3.22
Hallway - 2nd floor	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,729	0.16	546	0.0	$71.27	$569.84	$20.00	7.71
Hallway - 2nd floor	2	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.06	772	0.0	$100.80	$215.11	$0.00	2.13
Pantry	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.33	1,134	0.0	$148.01	$530.78	$20.00	3.45
Room 209	12	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	1.32	4,535	0.0	$592.06	$1,775.12	$20.00	2.96

	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
Room 208	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.44	1,512	0.0	$197.35	$669.04	$20.00	3.29
Room 208A	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.44	1,512	0.0	$197.35	$669.04	$20.00	3.29
Hallway	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	630	Fixture Replacement	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	441	0.12	104	0.0	$13.63	$455.78	$20.00	31.96
Room 207A	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.44	1,512	0.0	$197.35	$669.04	$20.00	3.29
Room 207	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.44	1,512	0.0	$197.35	$669.04	$20.00	3.29
Room 206	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.22	756	0.0	$98.68	$392.52	$20.00	3.78
Room 211 &212 - Storage	2	Incandescent: Wall mount fixture	Wall Switch	60	52	Relamp	No	2	LED Screw-In Lamps: Wall mount fixture	Wall Switch	9	52	0.08	6	0.0	$0.78	$107.51	$20.00	111.83
Roof stairs	1	CFL Screw-In Lamps: Wall mount fixture	Wall Switch	40	52	Relamp	No	1	LED Screw-In Lamps: Wall mount fixture	Wall Switch	7	52	0.03	2	0.0	$0.25	$53.75	$10.00	172.83
Stairwell	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	8,760	Fixture Replacement	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	8,760	0.10	1,158	0.0	$151.20	$340.38	$0.00	2.25
Stairwell	1	Exit Signs: Incandescent	None	45	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.03	386	0.0	$50.40	$107.56	$0.00	2.13
Storage Closet - 2nd floor	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,470	Fixture Replacement	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,470	0.08	279	0.0	$36.44	$138.26	$0.00	3.79
Men's Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,050	Fixture Replacement	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	735	0.22	321	0.0	$41.95	$392.52	$20.00	8.88
Men's Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,050	Fixture Replacement	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,050	0.10	140	0.0	$18.28	$226.92	$0.00	12.41
Room 205	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.22	756	0.0	$98.68	$392.52	$20.00	3.78
Room 203, 204	12	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	1.32	4,535	0.0	$592.06	$1,775.12	$20.00	2.96
Office 213	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	2,470	Fixture Replacement	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,729	0.22	756	0.0	$98.68	$392.52	$20.00	3.78
Office 213	2	Linear Fluorescent - T12: 2' T12 (20W) - 2L	Wall Switch	50	2,470	Fixture Replacement	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,470	0.03	117	0.0	$15.30	$166.86	$0.00	10.90
Exterior lights	3	Metal Halide: (1) 150W Lamp	Wall Switch	190	3,416	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	89	3,416	0.25	1,170	0.0	$152.70	$1,172.03	$300.00	5.71
Exterior lights	2	High-Pressure Sodium: (1) 200W Lamp	Wall Switch	250	3,416	Fixture Replacement	No	2	LED - Fixtures: Wall pack fixture	Wall Switch	93	3,416	0.26	1,212	0.0	$158.24	$833.08	$0.00	5.26

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
1st Floor Mechanical room	Firehouse offices	1	Boiler Feed Water Pump	1.0	85.5%	No	2,745	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1st Floor Mechanical room	Firehouse offices	1	Heating Hot Water Pump	0.1	69.5%	No	2,745	No	69.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1st floor elevator room	Elevator for HQ	1	Other	25.0	91.7%	No	4,067	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	AHU exhaust motors	2	Exhaust Fan	1.0	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Apparatus floor	Reznor unit heater - motor	1	Supply Fan	0.1	69.5%	No	2,745	No	69.5%	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
Rooftop Unit	fire house offices	1	Packaged AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop Unit	fire house offices	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop Unit	fire house offices	1	Packaged AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop Unit	fire house offices	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop Unit	fire house offices	1	Packaged AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop Unit	fire house offices	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop Unit	fire house offices	1	Packaged AC	7.50		Yes	1	Packaged AC	7.50		11.50		Yes	0.83	3,226	0.0	$421.11	$14,115.79	$797.50	31.63

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
1st Floor Mechanical room	Fire house offices	1	Non-Condensing Hot Water Boiler	1,600.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Apparatus floor	Apparatus Floor	1	Warm Air Unit Heater	165.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
1st Floor mechanical room	Firehouse headquarters	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	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
Pantry	2	Gas Convection Oven (Full Size)	No	No	0.00	0	0.0	$0.00	$18,580.09	$1,000.00	0.00
Pantry	3	Gas Griddle (≤2 Feet Width)	No	No	0.00	0	0.0	$0.00	$4,085.45	$375.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Pantry	1	Under Counter (High Temp)	Natural Gas	N/A	Yes	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?
Firehouse	51	Computers	75.0	Yes
Firehouse	14	Printer - Small	20.0	No
Firehouse	8	Printer - Big	515.0	No
Firehouse	2	Microwave	1,000.0	No
Firehouse	2	Television	74.8	No
Firehouse	8	Paper shredder	360.0	No
Firehouse	5	Coffee Machine	400.0	No
Firehouse	3	Refrigerator - big	600.0	No
Firehouse	2	Water dispenser	500.0	No
Firehouse	1	Projector	200.0	No
Firehouse	2	Fan	100.0	No
firehouse	1	Washer	900.0	No
Firehouse	1	Dryer	1,500.0	No
Firehouse	8	Television	239.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Fire Headquarters

Primary Property Type: Fire Station
Gross Floor Area (ft²): 17,000
Built: 1982

For Year Ending: October 31, 2015
Date Generated: October 20, 2016

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
Fire Headquarters 465 Marin Blvd Jersey City, New Jersey 07302	_____ , (___)___-_____	___ _____ , (___)___-_____ _____

Property ID: 5082923

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
168.8 kBtu/ft²

Source EUI
310.5 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,083,629 (38%)
Natural Gas (kBtu)	1,786,800 (62%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	83.9
National Median Source EUI (kBtu/ft²)	154.4
% Diff from National Median Source EUI	101%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	240

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)