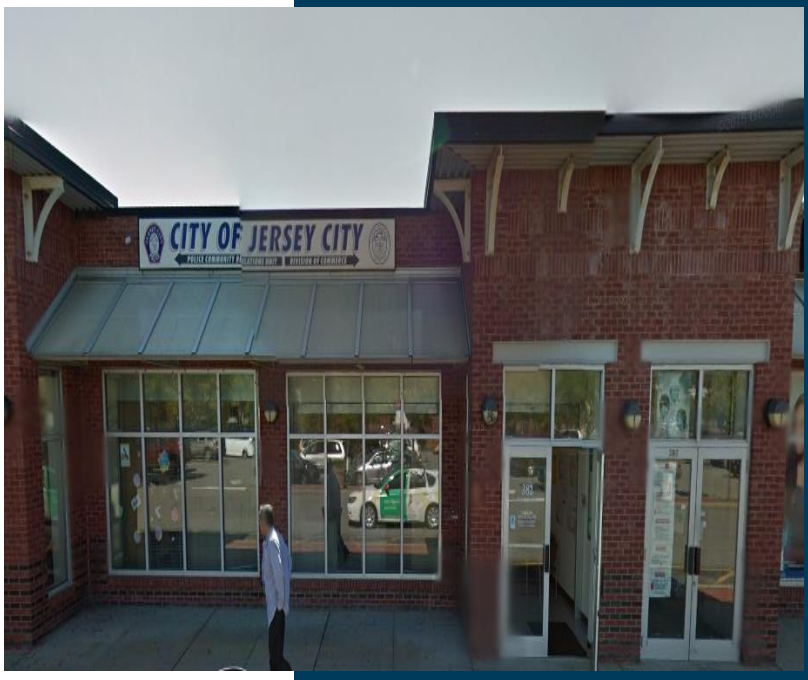
# Local Government Energy Audit:
## Energy Audit Report




## Commerce Division

**City of Jersey City**
382 Martin Luther King Drive
Jersey City, NJ 07306

October 5, 2017

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 Commerce Division. The goal of an 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's local governments in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

## 1.1 Facility Summary

Commerce Division is a 1,900 square foot facility, single level, and comprises of only office spaces, one restroom, and a storage space. The HVAC equipment on the rooftop provides both heating and cooling for the facility. The lighting at the facility is old and inefficient. 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 seven (7) projects that represent an opportunity for Commerce Division to reduce annual energy costs by roughly $1,746 and annual greenhouse gas emissions by 14,091 lbs $CO^2e$. The measures will pay for themselves in roughly 2.78 years. The breakdown of existing and potential utility costs is illustrated in Figure 1 and Figure 2, respectively. These projects represent an opportunity to reduce Commerce Division's annual energy use by 33.5%.

*Figure 1 – Previous 12 Month Utility Costs*

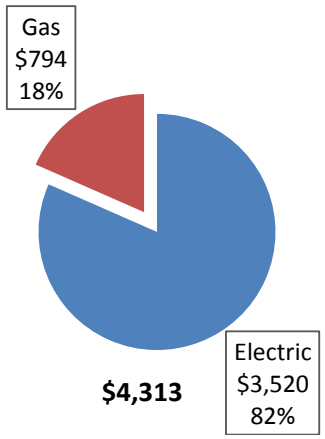
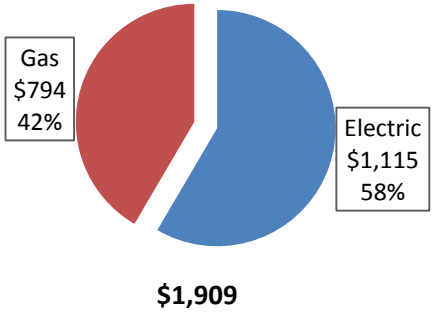



*Figure 2 – Potential Post-Implementation Costs*




A detailed description of Commerce Division's existing energy use can be found in Section 3.

The evaluated 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 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** | | | **9,843** | **2.7** | **0.0** | **$1,228.02** | **$3,964.82** | **$20.00** | **$3,944.82** | **3.21** | **9,911** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 8,859 | 2.4 | 0.0 | $1,105.31 | $3,623.36 | $0.00 | $3,623.36 | 3.28 | 8,921 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 584 | 0.2 | 0.0 | $72.83 | $233.91 | $20.00 | $213.91 | 2.94 | 588 |
| ECM 3 | Install LED Exit Signs | Yes | 400 | 0.0 | 0.0 | $49.87 | $107.56 | $0.00 | $107.56 | 2.16 | 403 |
| **Lighting Control Measures** | | | **1,139** | **0.3** | **0.0** | **$142.15** | **$464.00** | **$80.00** | **$384.00** | **2.70** | **1,147** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | Yes | 1,139 | 0.3 | 0.0 | $142.15 | $464.00 | $80.00 | $384.00 | 2.70 | 1,147 |
| **Electric Unitary HVAC Measures** | | | **779** | **0.7** | **0.0** | **$97.23** | **$10,692.63** | **$438.00** | **$10,254.63** | **105.47** | **785** |
| | Install High Efficiency Electric AC | No | 779 | 0.7 | 0.0 | $97.23 | $10,692.63 | $438.00 | $10,254.63 | 105.47 | 785 |
| **HVAC System Improvements** | | | **1,659** | **0.4** | **0.0** | **$206.99** | **$750.00** | **$250.00** | **$500.00** | **2.42** | **1,671** |
| ECM 5 | Install Dual Enthalpy Outside Economizer Control | Yes | 1,659 | 0.4 | 0.0 | $206.99 | $750.00 | $250.00 | $500.00 | 2.42 | 1,671 |
| **Domestic Water Heating Upgrade** | | | **1,353** | **0.0** | **0.0** | **$168.77** | **$21.51** | **$0.00** | **$21.51** | **0.13** | **1,362** |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | Yes | 1,353 | 0.0 | 0.0 | $168.77 | $21.51 | $0.00 | $21.51 | 0.13 | 1,362 |
| **TOTAL OF EVALUATED ECMS** | | | **14,773** | **4.0** | **0.0** | **$1,843.15** | **$15,892.97** | **$788.00** | **$15,104.97** | **8.20** | **14,876** |
| **TOTAL OF RECOMMENDED ECMS** | | | **13,993** | **3** | **0** | **$ 1,745.92** | **$ 5,200.33** | **$ 350.00** | **$ 4,850.33** | **2.78** | **14,091** |

* - 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 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 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.

**Domestic Water Heating** upgrade measures generally involve replacing old inefficient domestic water heating systems with modern energy efficient systems. New domestic water heating systems can provide equivalent or greater capacity as older systems, but use less energy. These measures save energy by reducing the fuel used by the domestic water heating systems due to improved efficiency or the removal of standby losses.

### Energy Efficient Practices

TRC Energy Services also identified four (4) no (or low) 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 Commerce Division include:

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- 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 the facility. 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 the self-generation potential, please refer to Section 6.

## 1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, the equipment changes outlined for each ECM need to be selected and installed through project implementation. One of the first considerations is if there is capital available for project implementation. Another consideration is whether to pursue individual ECMs, a group of ECMs, or a comprehensive approach wherein all ECMs are pursued, potentially in conjunction with other facility projects or improvements.

Rebates, incentives, and financing are available from the NJBPU, NJCEP, as well as some of the State's investor-owned utilities, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any project, please review the appropriate incentive program guidelines before proceeding. This is important because in most cases you will need to submit an application for the incentives before purchasing materials and beginning installation.

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

1. SmartStart
2. Direct Install
3. 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. 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 13, 2016, TRC performed an energy audit at Commerce Division located in Jersey City, New Jersey. TRC's team met with Jack Klein to review the facility operations and focus the investigation on specific energy-using systems.

Commerce Division is a 1,900 square foot facility, single level and comprises of only office spaces, one restroom, and a storage space. The HVAC equipment on the rooftop provides both heating and cooling for the facility. The building was constructed in 2000 and the lighting at the facility is old and inefficient.

## 2.3 Building Occupancy

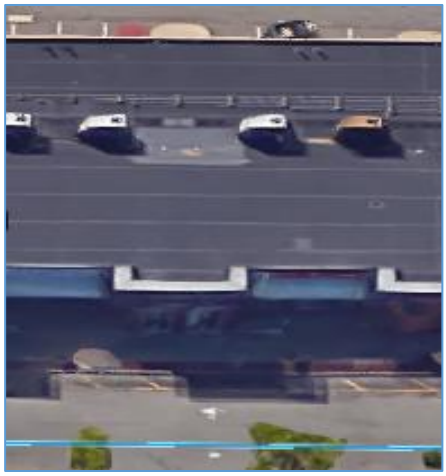
The typical schedule is presented in the table below.

*Figure 5 - Building Schedule*

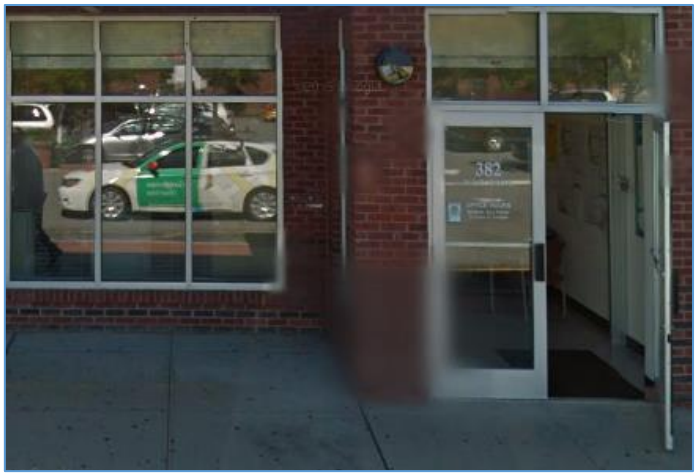
| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Commerce Division | Weekday | 07:00AM - 05:15PM |
| Commerce Division | Weekend | No operation |

## 2.4 Building Envelope

The building is constructed using sheetrock and a brick façade. The exterior door is made out of aluminum and is in good condition. The facility shares the walls on either side with other buildings and long windows along the front door. The windows are double pane and in good condition and do not show signs of excessive air infiltration. The building has a flat roof and is covered with a black membrane.



*Building Rooftop*



*Front doors and windows*

## 2.5 On-site Generation

Commerce Division does not have any on-site electric generation capacity.

## 2.6 Energy-Using Systems

### Lighting System

There are 4 foot, 44-Watt linear fluorescent T12 lamps and 2 foot 36-watt U-bent fluorescents that provide most lighting within the facility. Wall switches provide lighting control in most spaces.

The building has minimal exterior lighting, which primarily consists of wall mount CFL fixtures and a few 4 foot fluorescent fixtures.

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

### Heating and Air Conditioning

The facility is heated and cooled using the same rooftop package unit from Trane. This is a 6-ton system with a SEER of 10.20 and an output heating capacity of 121.50 MBH from the furnace. The unit is gas fired and the furnace has an efficiency of 81%.


*Nameplate of the HVAC rooftop unit*

## Domestic Hot Water

The domestic hot water system consists of a Rheem Classic series water heater. This electric-fired unit is a 2kW system with a tank capacity of six (6) gallons and serves the building's hot water needs.

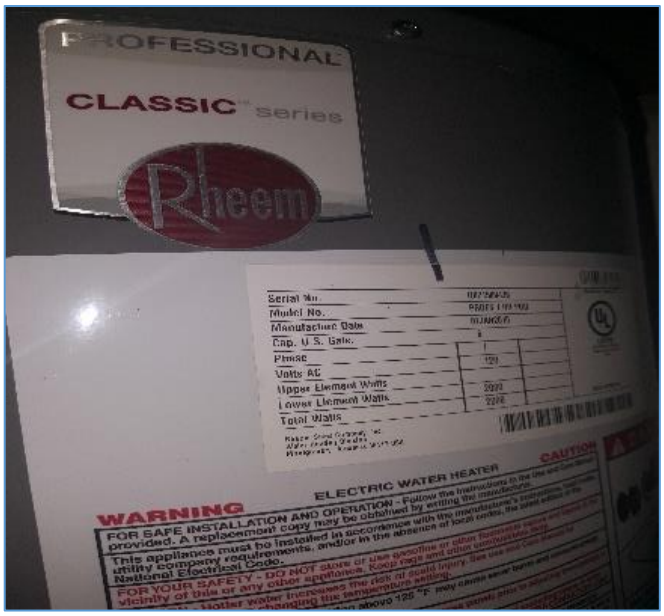



*Figure 6 Domestic Hot Water Heater Nameplate*

## Plug load & Vending Machines

There are nine (9) computers and three (3) printers. The facility also has a coffee machine, a water dispenser, and space heaters used by the employees. There is currently no centralized PC power management software installed.

*Figure 7 Space Heater*

## 2.7 Water-Using Systems

There are two (2) restrooms at this facility. The restroom 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 gpf.

# 3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost/ft$^2$ and energy use/ft$^2$. These energy use indices are indicative of the relative energy effectiveness of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy use for other facilities identified as: Office. Specific local climate conditions, daily occupancy hours of the facility, seasonal fluctuations in occupancy, daily operating hours of energy use systems, and the behavior of the occupants with regard to operating systems that impact energy use such as turning off appliances and leaving windows open. Please refer to the Benchmarking section within Section 3.4 for additional information.

## 3.1 Total Cost of Energy

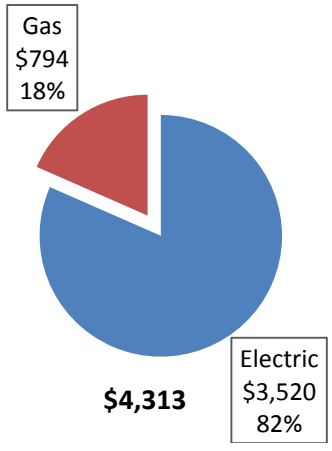
The following energy consumption and cost data is based on the last 12-month period of utility usage data that was provided for each utility. The annual consumption and cost were developed from this information.

*Figure 8 - Utility Summary*

| Utility Summary for Commerce Division | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 23,447 kWh | $3,520 |
| Natural Gas | 704 Therms | $794 |
| **Total** | | **$4,313** |

The current utility cost for this site is $4,313 as shown in the chart below.

*Figure 9 - Energy Cost Breakdown*



## 3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost (combined for commodity, transmission, and distribution) for the past 12 months is $0.125/kWh, which is the blended rate used throughout the analyses in this report. The third part supply is provided by Constellation Energy. The monthly electricity consumption and peak demand is represented graphically in the chart below.

*Figure 10 - Electric Usage & Demand*

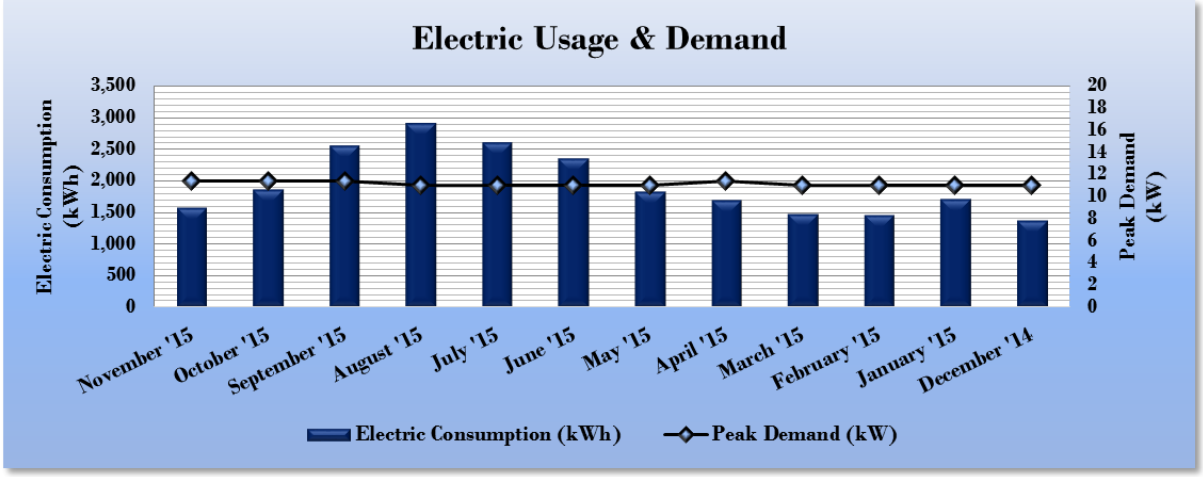



*Figure 11 - Electric Usage & Demand*

| Electric Billing Data for Commerce Division | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 11/17/15 | 32 | 1,566 | 11 | $50 | $200 |
| 10/16/15 | 29 | 1,859 | 11 | $50 | $238 |
| 9/21/15 | 30 | 2,556 | 11 | $50 | $436 |
| 8/18/15 | 31 | 2,895 | 11 | $49 | $486 |
| 7/20/15 | 30 | 2,597 | 11 | $49 | $451 |
| 6/18/15 | 30 | 2,350 | 11 | $49 | $418 |
| 5/19/15 | 28 | 1,819 | 11 | $49 | $243 |
| 4/21/15 | 33 | 1,680 | 11 | $49 | $225 |
| 3/19/15 | 26 | 1,463 | 11 | $49 | $196 |
| 2/23/15 | 29 | 1,451 | 11 | $49 | $195 |
| 1/23/15 | 34 | 1,711 | 11 | $49 | $228 |
| 12/22/14 | 31 | 1,372 | 11 | $49 | $184 |
| **Totals** | **363** | **23,319** | **11.4** | **$591** | **$3,500** |
| **Annual** | **365** | **23,447** | **11.4** | **$594** | **$3,520** |

## 3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $1.127/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 12 - Natural Gas Usage*

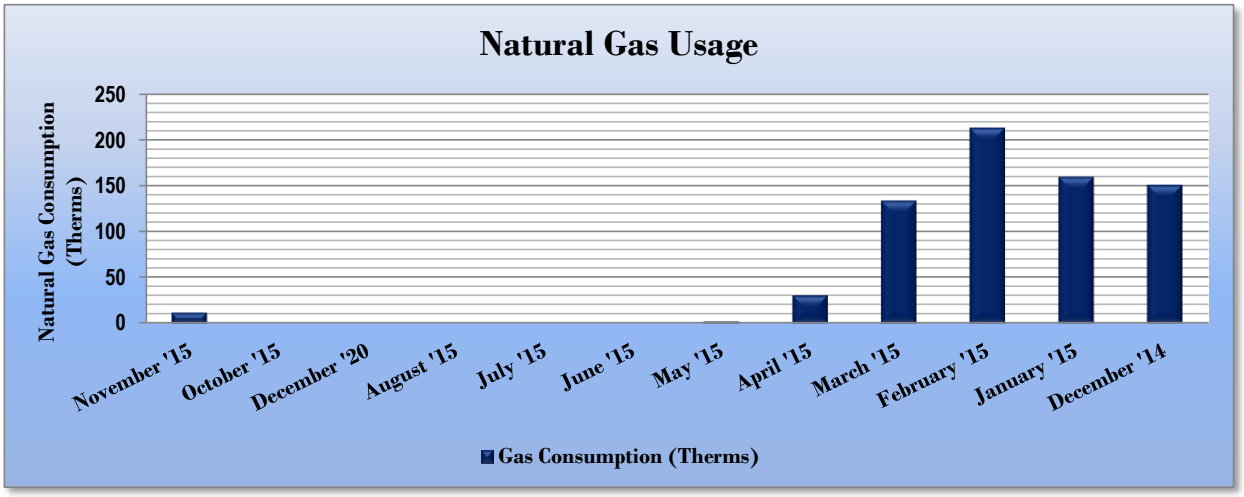



*Figure 13 - Natural Gas Usage*

| Gas Billing Data for Commerce Division | | | |
|---|---|---|---|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 11/17/15 | 32 | 12 | $21 |
| 10/16/15 | 29 | 0 | $12 |
| 9/21/15 | 30 | 0 | $11 |
| 8/18/15 | 31 | 0 | $11 |
| 7/20/15 | 30 | 0 | $11 |
| 6/18/15 | 30 | 0 | $11 |
| 5/19/15 | 28 | 2 | $13 |
| 4/21/15 | 33 | 31 | $35 |
| 3/19/15 | 26 | 133 | $129 |
| 2/23/15 | 29 | 213 | $204 |
| 1/23/15 | 34 | 159 | $166 |
| 12/22/14 | 31 | 151 | $165 |
| **Totals** | **363** | **700** | **$789** |
| **Annual** | **365** | **704** | **$794** |

## 3.4 Benchmarking

This facility was benchmarked through 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

compares its performance against a yearly baseline, national medians, or similar buildings in your portfolio. Metrics used in this comparison are the energy use intensity (EUI) and ENERGY STAR® score.

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 energy than similar buildings on a square foot basis or if that building performs better than the median. EUI is presented in both 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 is the raw fuel consumed to generate the energy consumed at the site, factoring in energy production and distribution losses.

*Figure 14 - Energy Use Intensity Comparison – Existing Conditions*

| Energy Use Intensity Comparison - Existing Conditions | | |
|---|---|---|
| | Commerce Division | National Median Building Type: Office |
| Source Energy Use Intensity (kBtu/ft$^2$) | 171.1 | 148.1 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 79.2 | 67.3 |

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

*Figure 15 - Energy Use Intensity Comparison – Following Installation of Recommended Measures*

| Energy Use Intensity Comparison - Following Installation of Recommended Measures | | |
|---|---|---|
| | Commerce Division | National Median Building Type: Office |
| Source Energy Use Intensity (kBtu/ft$^2$) | 87.8 | 148.1 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 52.6 | 67.3 |

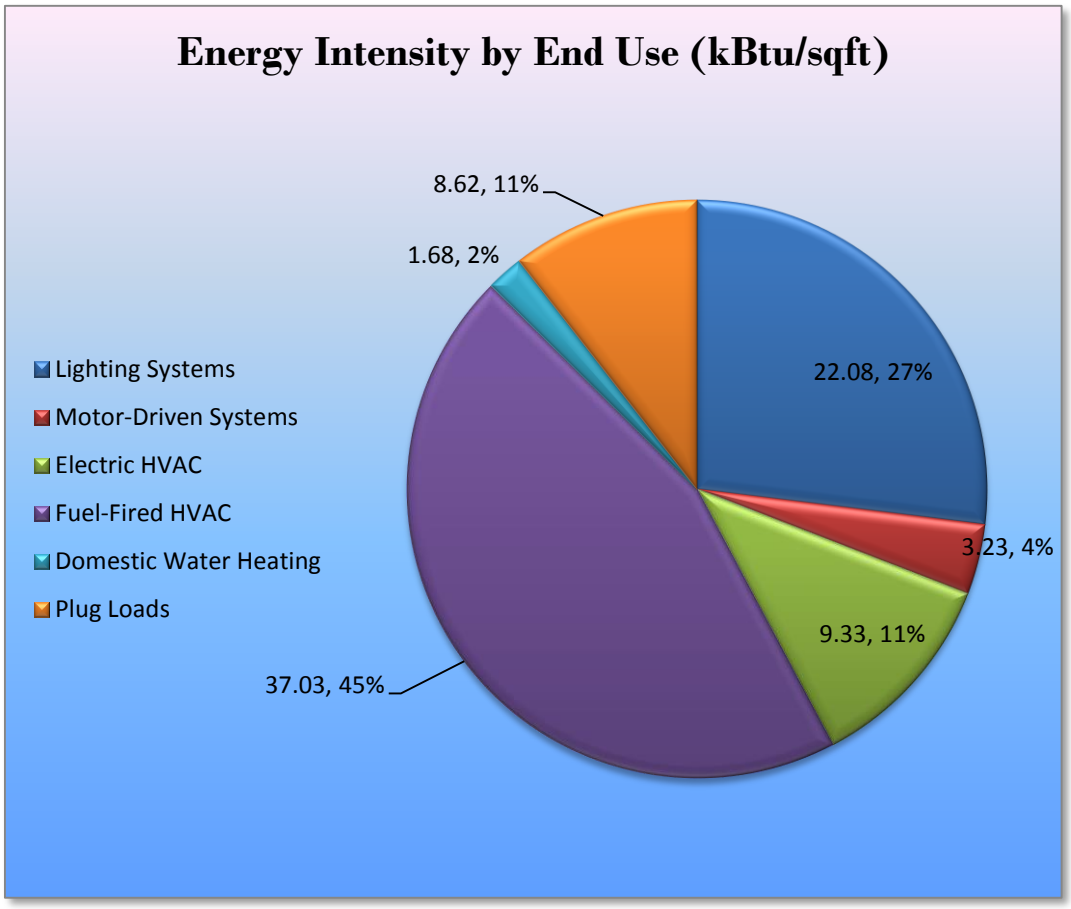
Many buildings can also receive a 1 – 100 ENERGY STAR® score. This score compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This building type does not currently qualify to receive a score. The Portfolio Manager, Statement of Energy Performance can be found in Appendix B: ENERGY STAR® Statement of Performance.

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

## 3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building and determine their proportional contribution to overall building energy usage. This visual representation of energy end uses highlights systems that may benefit most from energy efficiency projects.

*Figure 16 - Energy Balance (% and kBtu/SF)*



# 4 ENERGY CONSERVATION MEASURES

*Level of Analysis*

The goal of this audit report is to identify potential energy projects, help prioritize specific measures for implementation, and set Commerce Division on the path to receive financial incentives. 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 considered sufficient to make" decisions and to prioritize energy projects. Savings are based on the New Jersey Board of Public Utilities New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016. Further analysis or investigation may be required to calculate more accurate savings to support any custom SmartStart, Pay for Performance, or Large Energy Users incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJ prescriptive SmartStart program. Depending on your implementation strategy, the project may be eligible for more lucrative incentives through other programs as identified 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 17 – 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** | | **9,843** | **2.7** | **0.0** | **$1,228.02** | **$3,964.82** | **$540.00** | **$3,424.82** | **2.79** | **9,911** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 8,859 | 2.4 | 0.0 | $1,105.31 | $3,623.36 | $520.00 | $3,103.36 | 2.81 | 8,921 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 584 | 0.2 | 0.0 | $72.83 | $233.91 | $20.00 | $213.91 | 2.94 | 588 |
| ECM 3 | Install LED Exit Signs | 400 | 0.0 | 0.0 | $49.87 | $107.56 | $0.00 | $107.56 | 2.16 | 403 |
| **Lighting Control Measures** | | **1,139** | **0.3** | **0.0** | **$142.15** | **$464.00** | **$80.00** | **$384.00** | **2.70** | **1,147** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 1,139 | 0.3 | 0.0 | $142.15 | $464.00 | $80.00 | $384.00 | 2.70 | 1,147 |
| **Electric Unitary HVAC Measures** | | **779** | **0.7** | **0.0** | **$97.23** | **$10,692.63** | **$438.00** | **$10,254.63** | **105.47** | **785** |
| ECM 5 | Install High Efficiency Electric AC | 779 | 0.7 | 0.0 | $97.23 | $10,692.63 | $438.00 | $10,254.63 | 105.47 | 785 |
| **HVAC System Improvements** | | **1,659** | **0.4** | **0.0** | **$206.99** | **$750.00** | **$250.00** | **$500.00** | **2.42** | **1,671** |
| ECM 6 | Install Dual Enthalpy Outside Economizer Control | 1,659 | 0.4 | 0.0 | $206.99 | $750.00 | $250.00 | $500.00 | 2.42 | 1,671 |
| **Domestic Water Heating Upgrade** | | **1,353** | **0.0** | **0.0** | **$168.77** | **$21.51** | **$0.00** | **$21.51** | **0.13** | **1,362** |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | 1,353 | 0.0 | 0.0 | $168.77 | $21.51 | $0.00 | $21.51 | 0.13 | 1,362 |
| **TOTALS** | | **14,773** | **4.0** | **0.0** | **$1,843.15** | **$15,892.97** | **$1,308.00** | **$14,584.97** | **7.91** | **14,876** |

* - 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

Lighting Upgrades include several *submeasures* as outlined in Figure 18 below.

***Figure 18 – 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** | | **9,843** | **2.7** | **0.0** | **$1,228.02** | **$3,964.82** | **$540.00** | **$3,424.82** | **2.79** | **9,911** |
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 8,859 | 2.4 | 0.0 | $1,105.31 | $3,623.36 | $520.00 | $3,103.36 | 2.81 | 8,921 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 584 | 0.2 | 0.0 | $72.83 | $233.91 | $20.00 | $213.91 | 2.94 | 588 |
| ECM 3 | Install LED Exit Signs | 400 | 0.0 | 0.0 | $49.87 | $107.56 | $0.00 | $107.56 | 2.16 | 403 |

#### ECM 1: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

*Measure Description*

We recommend retrofitting existing fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs bulbs 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 fluorescent tubes and more than ten (10) times longer than many incandescent lamps.

#### ECM 2: Retrofit Fixtures with LED Lamps

*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 fluorescent tubes and more than ten (10) times longer than many incandescent lamps.

#### ECM 3: Install LED Exit Signs

*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

Lighting control measures include several *submeasures* as outlined in Figure 19 below.

***Figure 19 – 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** | | **1,139** | **0.3** | **0.0** | **$142.15** | **$464.00** | **$80.00** | **$384.00** | **2.70** | **1,147** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 1,139 | 0.3 | 0.0 | $142.15 | $464.00 | $80.00 | $384.00 | 2.70 | 1,147 |

### ECM 4: Install Occupancy Sensor Lighting Controls

*Measure Description*

We recommend installing occupancy sensors to control light fixtures that are currently manually controlled in restrooms 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.

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.

## 4.1.3 HVAC System Improvements

HVAC system improvement measures include several *submeasures* as outlined in Figure 20 below.

***Figure 20 - Summary of HVAC System Improvement 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **HVAC System Improvements** | | | **1,659** | **0.4** | **0.0** | **$206.99** | **$750.00** | **$250.00** | **$500.00** | **2.42** | **1,671** |
| ECM 5 | Install Dual Enthalpy Outside Economizer Control | Yes | 1,659 | 0.4 | 0.0 | $206.99 | $750.00 | $250.00 | $500.00 | 2.42 | 1,671 |

## ECM 5: 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) |
|---|---|---|---|---|---|---|---|---|
| 1,659 | 0.4 | 0.0 | $206.99 | $750.00 | $250.00 | $500.00 | 2.42 | 1,671 |

*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, saving energy.

Savings result from using outside air instead of mechanical cooling whenever possible.

### 4.1.4 Domestic Water Heating Upgrade

Domestic water heating measures include several submeasures as outlined in Figure 21 below.

***Figure 21 - Summary of Domestic Water Heating 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic Water Heating Upgrade** | | | **1,353** | **0.0** | **0.0** | **$168.77** | **$21.51** | **$0.00** | **$21.51** | **0.13** | **1,362** |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | Yes | 1,353 | 0.0 | 0.0 | $168.77 | $21.51 | $0.00 | $21.51 | 0.13 | 1,362 |

## ECM 6: Install Low-Flow DHW Devices

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 1,353 | 0.0 | 0.0 | $168.77 | $21.51 | $0.00 | $21.51 | 0.13 | 1,362 |

*Measure Description*

This measure evaluates the savings from installing low-flow domestic water devices to reduce overall water flow in general and hot water flow in particular. Installing low flow faucets or faucet aerators, low flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and 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.

All of the low flow devices reduce the overall water flow from the fixture, which generally reduces the amount of hot water used resulting in energy and water savings.

## 4.2 ECMs Evaluated and Not Recommended

### 4.2.1 Electric Unitary HVAC Measures

Unitary HVAC measures include several *submeasures* as outlined in Figure 22 below.

***Figure 22 - 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** | | **779** | **0.7** | **0.0** | **$97.23** | **$10,692.63** | **$438.00** | **$10,254.63** | **105.47** | **785** |
| Install High Efficiency Electric AC | No | 779 | 0.7 | 0.0 | $97.23 | $10,692.63 | $438.00 | $10,254.63 | 105.47 | 785 |

#### Install High-Efficiency Electric AC

| 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) |
|---|---|---|---|---|---|---|---|---|
| 779 | 0.7 | 0.0 | $97.23 | $10,692.63 | $438.00 | $10,254.63 | 105.47 | 785 |

*Measure Description*

We evaluated replacing standard efficiency packaged air conditioning units 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.

*Reasons for not recommending*

Although the unit is approximately 16 years old and have been evaluated for replacement, the payback period of this investment is more than the useful life of the unit itself. When the unit is due for replacement we suggest that the unit be replaced with a higher efficiency packaged 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.

## Perform Proper Lighting Maintenance

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

## Develop a Lighting Maintenance Schedule

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

## Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper setback 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.

## Water Conservation

Installing dual flush or low flow toilets and low-flow or waterless urinals are additional ways to reduce the site's 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).

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

# 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.

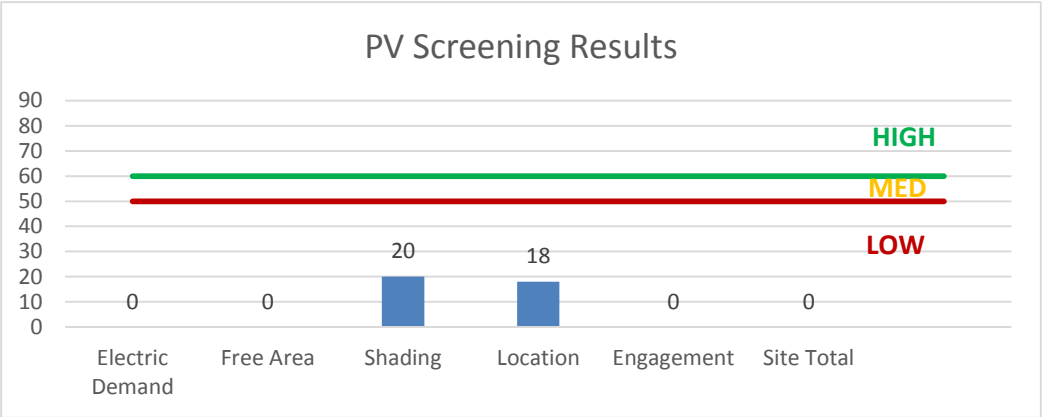
## 6.1 Photovoltaic

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.

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 23 - 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

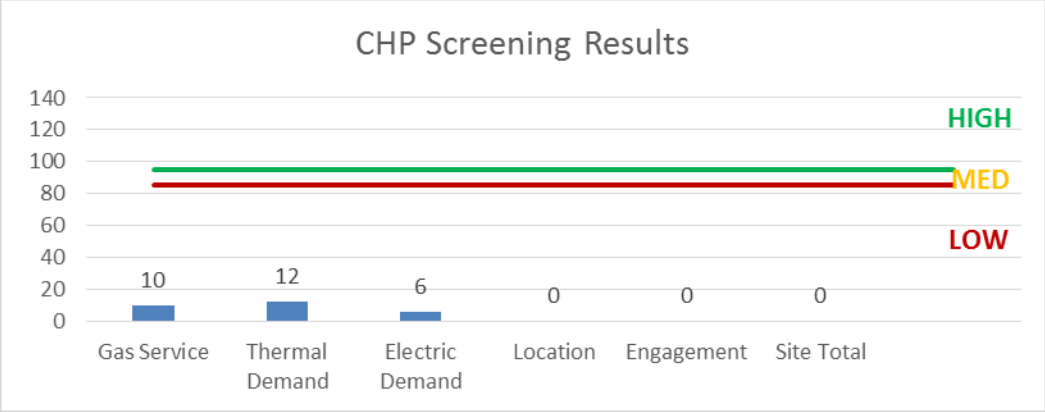
## 6.2 Combined Heat and Power

In non-industrial settings, 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 24 CHP Screening*



# 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 Division of Commerce building 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 others, 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 this charge on their monthly energy bills. As a contributor to the fund you were able to participate in the LGEA program and are also eligible to utilize the equipment incentive programs. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 25 for a list of the eligible programs identified for each recommended ECM.

*Figure 25 - ECM Incentive Program Eligibility*

| Energy Conservation Measure | | SmartStart Prescriptive | SmartStart Custom | Direct Install |
|---|---|---|---|---|
| ECM 1 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | x | | x |
| ECM 2 | Retrofit Fixtures with LED Lamps | | | x |
| ECM 3 | Install LED Exit Signs | | | x |
| ECM 4 | Install Occupancy Sensor Lighting Controls | x | | x |
| ECM 5 | Install Dual Enthalpy Outside Economizer Control | x | | x |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | | | x |

SmartStart is generally well suited for implementation of individual or small sets of measures, with the flexibility to install projects at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities to bundle measures and simplify participation, 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 and 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; applicants can use in-house staff or preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent comparison of available incentives.

Brief descriptions of all relevant alternative financing and incentive programs are located in the sections below or: www.njcleanenergy.com/ci.

## 8.1 SmartStart

**Overview**

The SmartStart program is comprised of new construction and retrofit components that offer incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives for various energy efficiency equipment based on national/market trends, new technologies or changes in efficiency baselines.

**Prescriptive Equipment Incentives 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*

All customer sizes and types may be served by this program. This program provides an effective mechanism for securing incentives for individual projects that may be completed at once or over several years.

**Incentives**

The prescriptive path provides fixed incentives for specific energy efficiency measures whereas the custom measure path provides incentives for unique or specialized technologies that are not addressed through prescriptive offerings.

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 the lesser of 50% of the total installed incremental project cost, or a buy down to a one year payback. 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 mid-sized facilities with a peak electric demand that did not exceed 200 kW in the preceding 12 months. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and install those 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 DI program you will need to contact the participating contractor assigned to the county where your facility is located; a complete list is provided on the Direct Install website identified below. The contractor will be paid the program incentive directly 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 mentioned above, and the remaining 30% of the cost is your responsibility to the contractor.

Since Direct Install offers a free assessment, LGEA applicants that do not meet the audit program eligibility requirements, but do meet the DI requirements, may be moved directly into this program.

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 into contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

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

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

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by

the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

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

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize the incentive programs to help further reduce costs when compiling 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 | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | None | 176 | 2,665 | Fixture Replacement | No | 2 | LED - Linear Tubes: (4) 4' Lamps | None | 58 | 2,665 | 0.19 | 736 | 0.0 | $91.81 | $276.52 | $40.00 | 2.58 |
| Entrance | 1 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 1 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.03 | 400 | 0.0 | $49.87 | $107.56 | $0.00 | 2.16 |
| Office Space | 15 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | None | 176 | 2,665 | Fixture Replacement | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,866 | 1.62 | 6,333 | 0.0 | $790.12 | $2,189.90 | $320.00 | 2.37 |
| Supervisor of Accounts office | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | None | 176 | 2,665 | Fixture Replacement | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,866 | 0.22 | 844 | 0.0 | $105.35 | $392.52 | $60.00 | 3.16 |
| Directors office | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | None | 176 | 2,665 | Fixture Replacement | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,866 | 0.22 | 844 | 0.0 | $105.35 | $392.52 | $60.00 | 3.16 |
| Assistant Directors office | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | None | 176 | 2,665 | Fixture Replacement | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,866 | 0.22 | 844 | 0.0 | $105.35 | $392.52 | $60.00 | 3.16 |
| Storage Room | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | None | 176 | 104 | Fixture Replacement | No | 2 | LED - Linear Tubes: (4) 4' Lamps | None | 58 | 104 | 0.19 | 29 | 0.0 | $3.58 | $276.52 | $40.00 | 66.01 |
| Men's Room | 1 | U-Bend Fluorescent - T12: U T12 (34W) - 2L | None | 72 | 520 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | None | 33 | 520 | 0.03 | 24 | 0.0 | $2.96 | $63.20 | $0.00 | 21.35 |
| Women's Room | 1 | U-Bend Fluorescent - T12: U T12 (34W) - 2L | None | 72 | 520 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | None | 33 | 520 | 0.03 | 24 | 0.0 | $2.96 | $63.20 | $0.00 | 21.35 |
| Exterior Lights | 2 | Incandescent: Wall mount fixtures | None | 100 | 2,665 | Relamp | No | 2 | LED Screw-In Lamps: Wall mount fixtures | None | 14 | 2,665 | 0.14 | 536 | 0.0 | $66.91 | $107.51 | $20.00 | 1.31 |
| Exterior Lights | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | None | 88 | 2,665 | Fixture Replacement | No | 2 | LED - Linear Tubes: (2) 4' Lamps | None | 29 | 2,665 | 0.09 | 368 | 0.0 | $45.91 | $166.86 | $20.00 | 3.20 |

## 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 |
| Rooftop | Commerce division | 1 | Other | 1.0 | 85.5% | No | 2,745 | No | 85.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Electric HVAC Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Cooling Mode Efficiency (SEER/EER) | Heating Mode Efficiency (COP) | Install Dual Enthalpy Economizer? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Rooftop | Commerce Division | 1 | Packaged AC | 6.00 | | Yes | 1 | Packaged AC | 6.00 | | 12.00 | | Yes | 1.08 | 2,438 | 0.0 | $304.22 | $11,442.63 | $688.00 | 35.35 |

## 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 |
| Rooftop | Commerce Division | 1 | Furnace | 121.50 | 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 |
| Attic | Commerce Division | 1 | Storage Tank Water Heater (≤ 50 Gal) | No | | | | | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Low-Flow Device Recommendations

| | Recommedation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Men's and women's restroom | 2 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 902 | 0.0 | $112.51 | $14.34 | $0.00 | 0.13 |
| Storage Room | 1 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 451 | 0.0 | $56.26 | $7.17 | $0.00 | 0.13 |

## Plug Load Inventory

| | Existing Conditions | | | |
|---|---|---|---|---|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Office Area | 4 | Computers | 75.0 | No |
| Office Area | 2 | Printers - big | 515.0 | No |
| Supervisor of accounts office | 1 | Computer | 75.0 | No |
| Cubes | 3 | Computers | 75.0 | No |
| Cubes | 1 | Keurig coffee machine | 400.0 | No |
| Director's office | 1 | Computer | 75.0 | No |
| Director's office | 1 | Printer - small | 20.0 | No |
| Assistant Director | 1 | Computer | 75.0 | No |
| Storage room | 1 | Water dispenser | 500.0 | No |
| Storage room | 1 | Refrigerator - small | 11.0 | 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]

### Commerce Division

**Primary Property Type:** Office
**Gross Floor Area (ft²):** 1,900
**Built:** 2000

**For Year Ending:** October 31, 2015
**Date Generated:** December 15, 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 |
|---|---|---|
| Commerce Division<br>382 MLK Drive<br>Jersey City, New Jersey 07305 | _____<br>,<br>(___)___-_____ | ___ _____<br>,<br>(___)___-_____<br>_____ |

**Property ID**: 5082918

### Energy Consumption and Energy Use Intensity (EUI)

**Site EUI**
79.5 kBtu/ft²

**Source EUI**
171.4 kBtu/ft²

| Annual Energy by Fuel | |
|---|---|
| Natural Gas (kBtu) | 71,225 (47%) |
| Electric - Grid (kBtu) | 79,896 (53%) |

| National Median Comparison | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 68.7 |
| National Median Source EUI (kBtu/ft²) | 148.1 |
| % Diff from National Median Source EUI | 16% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 13 |

### 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)**