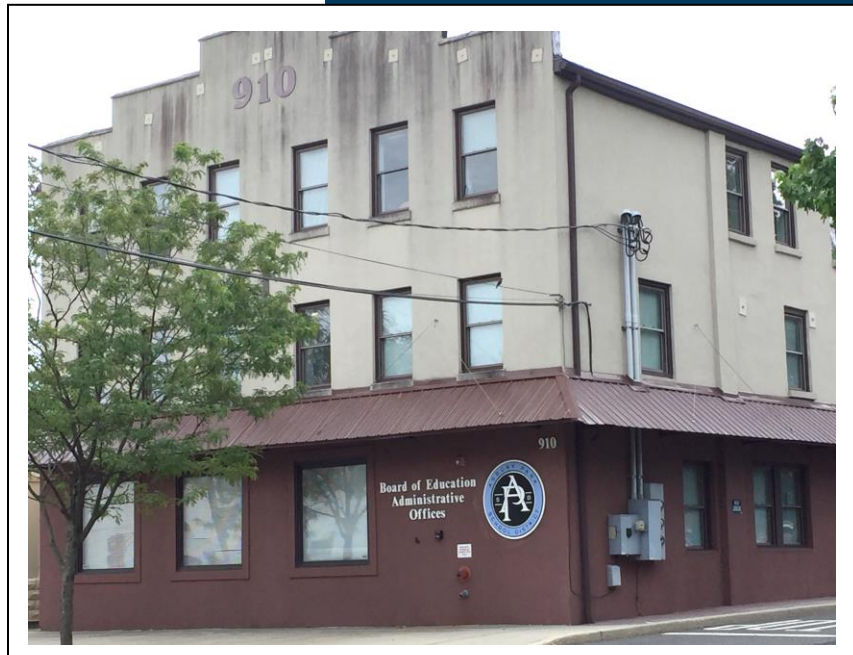




Local Government Energy Audit: Energy Audit Report



Administration Building
Asbury Park Board of Education
910 Fourth Ave.
Asbury Park, New Jersey 07712

October 11, 2018

Final Report by:
TRC Energy Services

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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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I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for the Administration Building.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey schools in controlling energy costs and help protect our environment by reducing energy usage statewide.

I.1 Facility Summary

Administration Building is a 13,900 square foot three-story office building. The building consists mostly of offices, conference rooms, restrooms, storage areas, and mechanical spaces. The building also includes a book storage warehouse area in the rear of the building. The original building was constructed in 1910, but it was renovated and turned into offices space in the early 2000s.

Lighting at the facility consists primarily of fixtures with T8 linear fluorescent tubes and electronic ballasts. The buildings also has fixtures containing compact fluorescent lamps and high intensity discharge (HID) lamps.

The entire facility is heated and cooled by six split system heat pumps. Each heat pumps also has a supplementary gas fired furnace. Domestic hot water is provided by small electric hot water heaters on each floor. A thorough description of the facility and our observations are located in Section 2.

I.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated five measures, which together represent an opportunity for the Administration Building to reduce its annual energy costs by about \$5,143 and its annual greenhouse gas emissions by about 34,907 lbs CO₂e. We estimate that if all measures are implemented as recommended, the project would pay for itself in energy savings alone in about 4.1 years. The breakdown of current costs is shown in Figure 1. The estimated savings following project implementation is shown Figure 2 below. Together these measures represent an opportunity to reduce the Administration Building's annual energy use by about 23% overall.

Figure 1 – Previous 12 Month Utility Costs

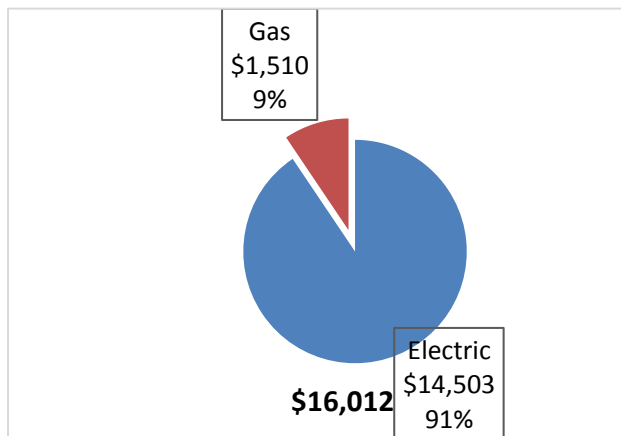
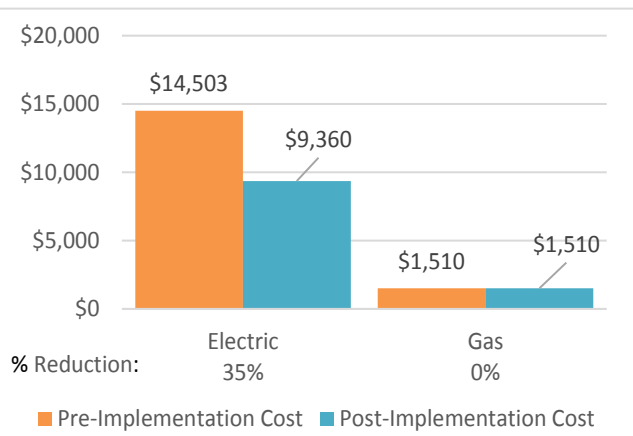


Figure 2 – Potential Post-Implementation Costs



A detailed description of Administration Building’s existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

| Energy Conservation Measure | Recommend? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$)* | Estimated Net Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|---------------------------------------|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|---------------------------|-------------------------|-------------------------------|---|
| Lighting Upgrades | | 28,703 | 7.6 | 0.0 | \$4,258.61 | \$17,298.95 | \$3,855.00 | \$13,443.95 | 3.2 | 28,904 |
| ECM 1 | Install LED Fixtures | 9,589 | 1.5 | 0.0 | \$1,422.70 | \$5,139.44 | \$1,500.00 | \$3,639.44 | 2.6 | 9,656 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 19,114 | 6.2 | 0.0 | \$2,835.91 | \$12,159.51 | \$2,355.00 | \$9,804.51 | 3.5 | 19,248 |
| Lighting Control Measures | | 4,658 | 1.4 | 0.0 | \$691.01 | \$8,746.00 | \$1,165.00 | \$7,581.00 | 11.0 | 4,690 |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 4,122 | 1.3 | 0.0 | \$611.64 | \$8,146.00 | \$1,025.00 | \$7,121.00 | 11.6 | 4,151 |
| ECM 4 | Install High/Low Lighting Controls | 535 | 0.0 | 0.0 | \$79.38 | \$600.00 | \$140.00 | \$460.00 | 5.8 | 539 |
| Domestic Water Heating Upgrade | | 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |
| ECM 5 | Install Low-Flow Domestic Hot Water Devices | 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |
| TOTALS | | 34,665 | 9.0 | 0.0 | \$5,143.04 | \$26,087.97 | \$5,020.00 | \$21,067.97 | 4.1 | 34,907 |

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

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

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

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

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

Energy Efficient Practices

TRC also identified six low cost (or no-cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Administration Building include:

- Close Doors and Windows
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean and/or Replace HVAC Filters
- Perform Proper Furnace Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Administration Building. Based on the configuration of the site and its electric and thermal loads there appears to be a low potential to install a solar PV or combined heat and power self-generation measures on this site. A small PV array on the rooftop might be feasible, but the site is not ideal, because the rooftop area is a relatively small and not flat nor oriented to the south, which is preferred for solar generation.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- Energy Savings Improvement Program (ESIP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives 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.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

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

2.2 General Site Information

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

The Administration Building is a 13,900 square foot three-story office building. The building consists mostly of offices, conference rooms, restrooms, storage areas, and mechanical spaces. The building also includes a book storage warehouse area in the rear of the building. The original building was constructed in 1910, but it was renovated and turned into offices space in the early 2000s.

Lighting at the facility consists primarily of fixtures with T8 linear fluorescent tubes and electronic ballasts. The buildings also has fixtures containing compact fluorescent lamps and high intensity discharge (HID) lamps.

The entire facility is heated and cooled by six split system heat pumps. Each heat pumps also has a supplementary gas fired furnace. Domestic hot water is provided by small electric hot water heaters on each floor. The heat pumps are not as efficient as some newer high efficiency commercial equipment available today, but they do contribute to the good overall energy performance of the building.

2.3 Building Occupancy

The building is open Monday through Friday throughout the entire year. The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 35 staff.

Figure 5 - Building Schedule

| Building Name | Weekday/Weekend | Operating Schedule |
|-------------------------|-----------------|--------------------|
| Administration Building | Weekday | 8:15AM - 5:15PM |
| Administration Building | Weekend | Closed |

2.4 Building Envelope

The building is believed to be constructed of concrete block with a stucco facade. Both the main building and the warehouse have a low pitch wood framed roofs covered with a bitumen roof membrane. The building's windows are mostly are operable double pane. The exterior doors are constructed of aluminum. The warehouse has an aluminum roll-up door that had visible air gaps, leading to excessive infiltration.



2.5 On-Site Generation

The Administration Building does not have any electric generating capacity installed on site.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided almost exclusively by 32-Watt linear T8 fluorescent lamps with electronic ballasts. Most of the fixtures are 3-lamp 4-foot long troffers with diffusers, though lighting in the warehouse uses 2-lamp fixtures. The building also has a few scattered compact fluorescent bulbs, primarily used in the stairwells. Lighting control throughout the building is provided by manually operated wall switches.



Exterior lighting is mostly provided by compact fluorescent and metal halide lamps. These fixtures illuminate the building perimeter. The exterior security lighting is controlled by time clocks or photocells.

Heating Ventilation and Air Conditioning (HVAC)

Six York split system air source heat pumps are used to condition the main building. The units range in capacity from three to five tons. The fan and evaporator are located in a mechanical spaces throughout the building. The compressor and condensing unit are located on the ground behind the building. The units provides constant air volume with a single supply fan (each estimated to be 2 hp).



Each heat pump also has a high efficiency gas fired furnace that provides supplemental gas heating as needed. The furnaces all have an Annual Fuel Utilization Efficiency (AFUE) of 92%.



The unit are controlled by programmable thermostats located in the zones. The thermostats are contained in lock boxes. During our site visit, the thermostat were set to maintain a cooling setpoint of 73°F. Heating and reset schedules could not be reviewed.

The warehouse area is not occupied every day. It is conditioned only as needed by a through-the-wall AC unit and a ceiling mounted electrical resistance unit heater. These are manually control and only turned on when occupied.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of three Bradford White electrical resistance water heaters, each with an input rating of 1.5 kW. Each water heater has a 19 gallon storage tank.



Building Plug Load

There are roughly 38 computer work stations throughout the facility. The computers are desktop units with LCD monitors. A server rack was also observed. There is no centralized PC power management software installed.

In addition to the typical office equipment, we observed microwaves, refrigerators, and televisions.

2.7 Water-Using Systems

There are six restrooms at this facility. We sampled the restrooms and found all faucets to have a flow rate of 2.2 gallons per minute (gpm) or higher. Toilets and urinals appeared to all meet water conservation, low flow standards.



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

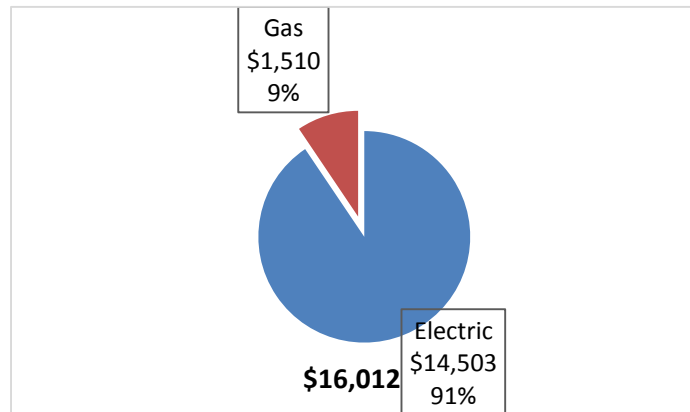
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

| Utility Summary for Administration Building | | |
|---|--------------|-----------------|
| Fuel | Usage | Cost |
| Electricity | 97,750 kWh | \$14,503 |
| Natural Gas | 1,704 Therms | \$1,510 |
| Total | | \$16,012 |

The current annual energy cost for this facility is \$16,012 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric rate over a recent 12 month period was found to be \$0.148/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

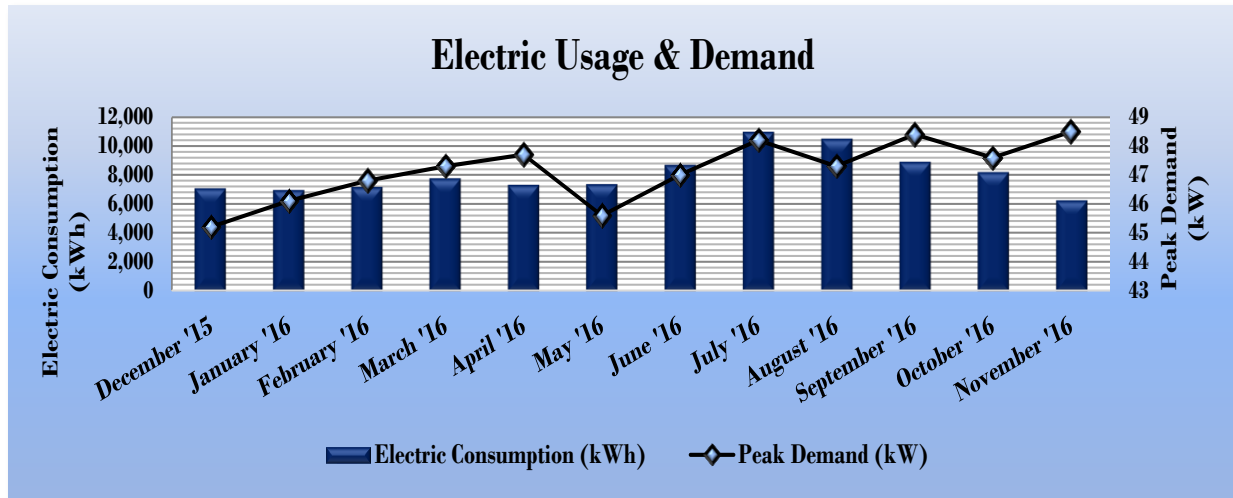


Figure 9 - Electric Usage & Demand

| Electric Billing Data for Administration Building | | | | |
|---|----------------|----------------------|-------------|---------------------|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Total Electric Cost |
| 12/28/15 | 33 | 7,090 | 45 | \$1,041 |
| 1/27/16 | 30 | 6,967 | 46 | \$1,023 |
| 2/25/16 | 29 | 7,178 | 47 | \$1,060 |
| 3/25/16 | 29 | 7,777 | 47 | \$1,058 |
| 4/25/16 | 31 | 7,314 | 48 | \$986 |
| 5/24/16 | 29 | 7,365 | 46 | \$1,104 |
| 6/23/16 | 30 | 8,705 | 47 | \$1,325 |
| 7/25/16 | 32 | 10,967 | 48 | \$1,651 |
| 8/24/16 | 30 | 10,487 | 47 | \$1,631 |
| 9/23/16 | 30 | 8,907 | 48 | \$1,339 |
| 10/25/16 | 32 | 8,192 | 48 | \$1,249 |
| 11/22/16 | 28 | 6,265 | 49 | \$958 |
| Totals | 363 | 97,214 | 48.5 | \$14,423 |
| Annual | 365 | 97,750 | 48.5 | \$14,503 |

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average rate for natural gas service for a recent 12 month period was found to be \$0.886/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

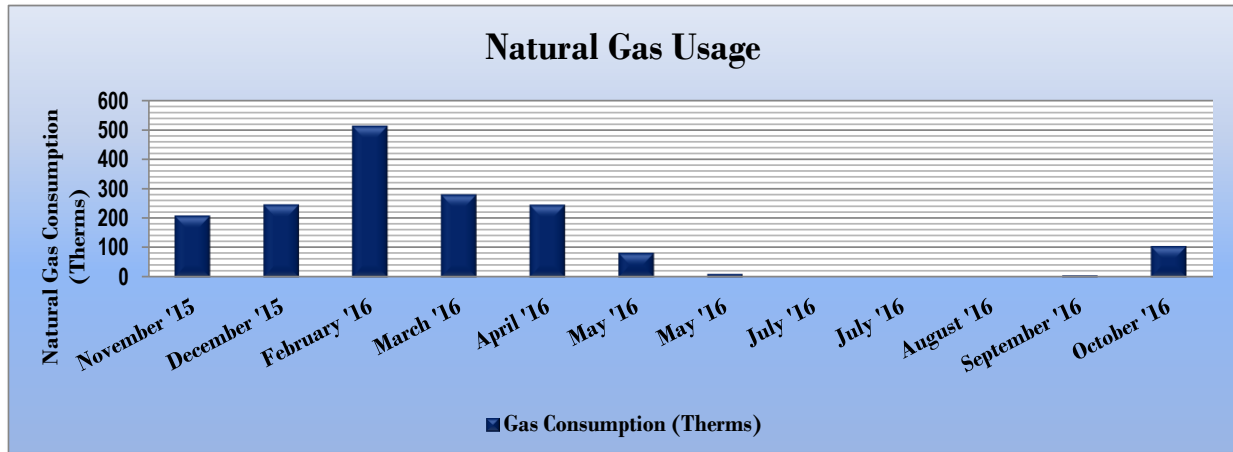


Figure 11 - Natural Gas Usage

| Gas Billing Data for Administration Building | | | |
|--|----------------|----------------------------|------------------|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 12/14/15 | 33 | 210 | \$153 |
| 1/15/16 | 32 | 248 | \$176 |
| 2/17/16 | 33 | 515 | \$339 |
| 3/17/16 | 29 | 281 | \$241 |
| 4/18/16 | 32 | 247 | \$241 |
| 5/16/16 | 28 | 84 | \$98 |
| 6/15/16 | 30 | 12 | \$35 |
| 7/18/16 | 33 | 0 | \$25 |
| 8/15/16 | 28 | 0 | \$25 |
| 9/13/16 | 29 | 0 | \$25 |
| 10/13/16 | 30 | 6 | \$32 |
| 11/11/16 | 29 | 106 | \$124 |
| Totals | 366 | 1,709 | \$1,514 |
| Annual | 365 | 1,704 | \$1,510 |

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 | | |
|---|-------------------------|---------------------------------------|
| | Administration Building | National Median Building Type: Office |
| Source Energy Use Intensity (kBtu/ft ²) | 88.2 | 148.1 |
| Site Energy Use Intensity (kBtu/ft ²) | 36.3 | 67.3 |

Implementation of all recommended measures in this report would improve the building’s estimated EUI significantly, 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 | | |
|--|-------------------------|---------------------------------------|
| | Administration Building | National Median Building Type: Office |
| Source Energy Use Intensity (kBtu/ft ²) | 61.5 | 148.1 |
| Site Energy Use Intensity (kBtu/ft ²) | 27.7 | 67.3 |

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 94.

A Portfolio Manager® Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

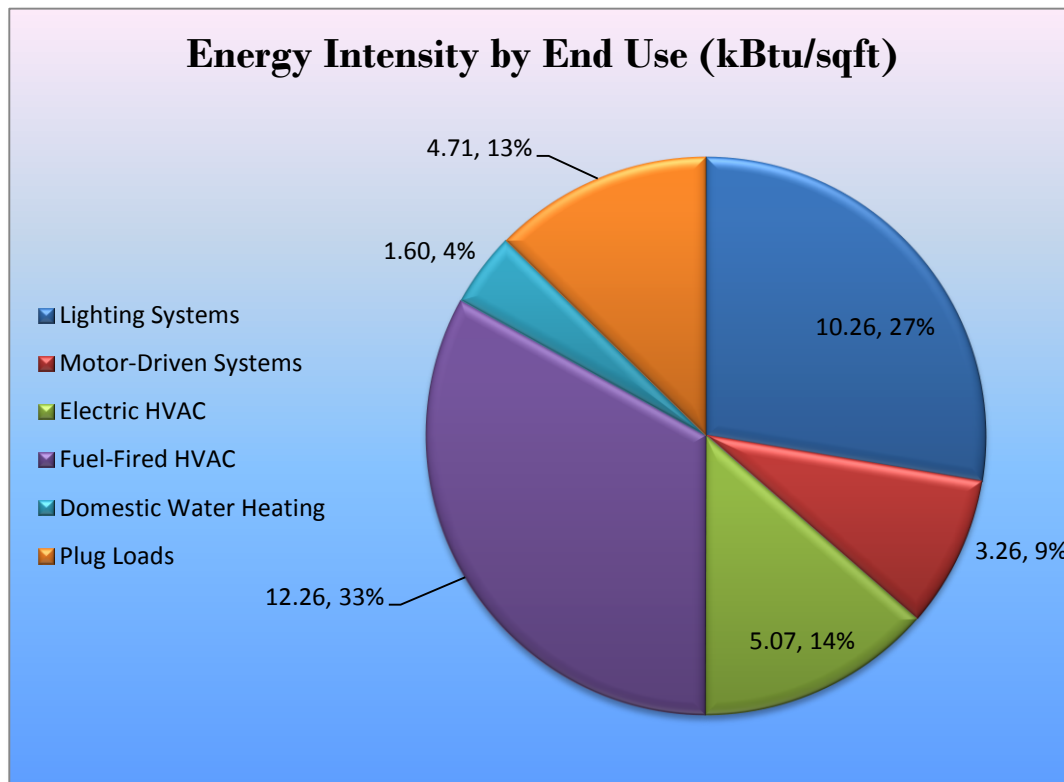
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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

3.5 Energy End-Use Breakdown

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

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



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 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 ₂ e Emissions Reduction (lbs) |
|---------------------------------------|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|---------------------------|-------------------------|-------------------------------|---|
| Lighting Upgrades | | 28,703 | 7.6 | 0.0 | \$4,258.61 | \$17,298.95 | \$3,855.00 | \$13,443.95 | 3.2 | 28,904 |
| ECM 1 | Install LED Fixtures | 9,589 | 1.5 | 0.0 | \$1,422.70 | \$5,139.44 | \$1,500.00 | \$3,639.44 | 2.6 | 9,656 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 19,114 | 6.2 | 0.0 | \$2,835.91 | \$12,159.51 | \$2,355.00 | \$9,804.51 | 3.5 | 19,248 |
| Lighting Control Measures | | 4,658 | 1.4 | 0.0 | \$691.01 | \$8,746.00 | \$1,165.00 | \$7,581.00 | 11.0 | 4,690 |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 4,122 | 1.3 | 0.0 | \$611.64 | \$8,146.00 | \$1,025.00 | \$7,121.00 | 11.6 | 4,151 |
| ECM 4 | Install High/Low Lighting Controls | 535 | 0.0 | 0.0 | \$79.38 | \$600.00 | \$140.00 | \$460.00 | 5.8 | 539 |
| Domestic Water Heating Upgrade | | 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |
| ECM 5 | Install Low-Flow Domestic Hot Water Devices | 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |
| TOTALS | | 34,665 | 9.0 | 0.0 | \$5,143.04 | \$26,087.97 | \$5,020.00 | \$21,067.97 | 4.1 | 34,907 |

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

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

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 16 below.

Figure 16 – 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 ₂ e Emissions Reduction (lbs) |
|-----------------------------|----------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Lighting Upgrades | | 28,703 | 7.6 | 0.0 | \$4,258.61 | \$17,298.95 | \$3,855.00 | \$13,443.95 | 3.2 | 28,904 |
| ECM 1 | Install LED Fixtures | 9,589 | 1.5 | 0.0 | \$1,422.70 | \$5,139.44 | \$1,500.00 | \$3,639.44 | 2.6 | 9,656 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 19,114 | 6.2 | 0.0 | \$2,835.91 | \$12,159.51 | \$2,355.00 | \$9,804.51 | 3.5 | 19,248 |

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$) | Estimated Net Cost (\$) | Simple Payback Period (yrs) | CO ₂ e Emissions Reduction (lbs) |
|--------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Interior | 0 | 0.0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | 0.0 | 0 |
| Exterior | 9,589 | 1.5 | 0.0 | \$1,422.70 | \$5,139.44 | \$1,500.00 | \$3,639.44 | 2.6 | 9,656 |

Measure Description

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

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

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$) | Estimated Net Cost (\$) | Simple Payback Period (yrs) | CO ₂ e Emissions Reduction (lbs) |
|-----------------------|--|-----------------------------------|--------------------------------------|--|-----------------------------------|--------------------------------|-------------------------------|--------------------------------------|--|
| Interior | 19,032 | 6.1 | 0.0 | \$2,823.74 | \$12,106.01 | \$2,355.00 | \$9,751.01 | 3.5 | 19,165 |
| Exterior | 82 | 0.0 | 0.0 | \$12.17 | \$53.50 | \$0.00 | \$53.50 | 4.4 | 83 |

Measure Description

We recommend retrofitting existing linear fluorescent and compact fluorescent lighting fixtures with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

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

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 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 ₂ e Emissions Reduction (lbs) |
|--|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Lighting Control Measures | 4,658 | 1.4 | 0.0 | \$691.01 | \$8,746.00 | \$1,165.00 | \$7,581.00 | 11.0 | 4,690 |
| ECM 3 Install Occupancy Sensor Lighting Controls | 4,122 | 1.3 | 0.0 | \$611.64 | \$8,146.00 | \$1,025.00 | \$7,121.00 | 11.6 | 4,151 |
| ECM 4 Install High/Low Lighting Controls | 535 | 0.0 | 0.0 | \$79.38 | \$600.00 | \$140.00 | \$460.00 | 5.8 | 539 |

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$) | Estimated Net Cost (\$) | Simple Payback Period (yrs) | CO ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 4,122 | 1.3 | 0.0 | \$611.64 | \$8,146.00 | \$1,025.00 | \$7,121.00 | 11.6 | 4,151 |

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all hallways, restrooms, conference rooms, and offices areas. Lighting is manually controlled in all interior spaces, so there is significant energy savings opportunity from installing sensor controls to turn out lighting in spaces when they are unoccupied.

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

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

ECM 4: Install High/Low Lighting Controls

Summary of Measure Economics

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$) | Estimated Net Cost (\$) | Simple Payback Period (yrs) | CO ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 535 | 0.0 | 0.0 | \$79.38 | \$600.00 | \$140.00 | \$460.00 | 5.8 | 539 |

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control includes stairwells. High/low lighting sensors are designed to keep lights on in main stairwells at a low level when it is unoccupied, but the quickly come up to full brightness whenever someone enters the stairs.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. Dual technology sensors are preferred for stairwell with at least one sensor installed above each land to provide full coverage. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches. Customers and contractors should check local fire and building codes to ensure compliance.

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

4.1.3 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 18 below.

Figure 18 - Summary of Domestic Water Heating ECMs

| Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$) | Estimated Net Cost (\$) | Simple Payback Period (yrs) | CO ₂ e Emissions Reduction (lbs) |
|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Domestic Water Heating Upgrade | 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |
| ECM 5 Install Low-Flow Domestic Hot Water Devices | 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |

ECM 5: 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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 1,304 | 0.0 | 0.0 | \$193.41 | \$43.02 | \$0.00 | \$43.02 | 0.2 | 1,313 |

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. We recommend installing faucets aerators in all restrooms with a flow rate of 1.0 gallon per minute to save energy by reducing hot water consumption.

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. This reduces the amount of water used per day, resulting in energy and water savings.

5 ENERGY EFFICIENT PRACTICES

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

Close Doors and Windows

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Clean and/or Replace HVAC Filters

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

Perform Proper Furnace Maintenance

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

Plug Load Controls

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

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 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 4.1.3 for any low-flow ECM recommendations.

6 ON-SITE GENERATION MEASURES

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

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

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

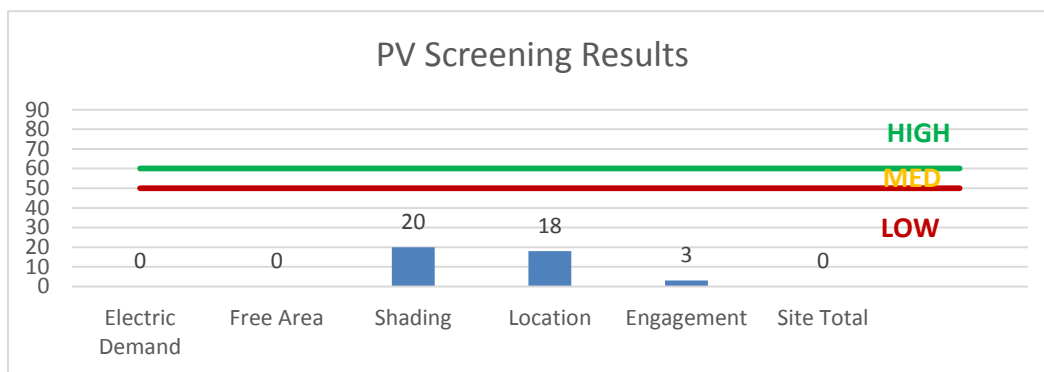
6.1 Photovoltaic

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

A preliminary screening based on the facility’s electric demand, size and location of free area, and shading elements shows that the facility has a **Low Potential** for installing a cost-effective PV array. A small rooftop solar array might be feasible and the building’s electric demand is not large. So, the Administration Building might be able to reduce its electric purchases by a significant amount if a solar array were installed there. However, the roof slopes to the east and west, which is not ideal for solar installations.

In order to be cost-effective, a solar PV array needs enough free area and serve sufficient building load. In our opinion, the facility does appear not meet those minimum criteria. Other buildings owned by the school district would likely have a lower cost per kWh of electric power produced.

Figure 19 - 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-fags>
- **Approved Solar Installers in the NJ Market:** http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

6.2 Combined Heat and Power

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

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

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

Low and infrequent thermal load, and lack of existing boilers are the most significant factors contributing to the low potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

7 DEMAND RESPONSE

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

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

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

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

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

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (<http://www.pjm.com/markets-and-operations/demand-response/csps.aspx>). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (<http://www.pjm.com/training/training%20material.aspx>), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

This facility has a low potential for demand response participation, because it does not have a large electric demand and its demand does not vary significantly throughout the year.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 20 for a list of the eligible programs identified for each recommended ECM.

Figure 20 - ECM Incentive Program Eligibility

| Energy Conservation Measure | | SmartStart Prescriptive | SmartStart Custom | Direct Install | Pay For Performance Existing Buildings |
|-----------------------------|---|-------------------------|-------------------|----------------|--|
| ECM 1 | Install LED Fixtures | X | | X | |
| ECM 2 | Retrofit Fixtures with LED Lamps | X | | X | |
| ECM 3 | Install Occupancy Sensor Lighting Controls | X | | X | |
| ECM 4 | Install High/Low Lighting Controls | | | X | |
| ECM 5 | Install Low-Flow Domestic Hot Water Devices | | | X | |

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers

Electric Unitary HVAC

Gas Cooling

Gas Heating

Gas Water Heating

Ground Source Heat Pumps

Lighting

Lighting Controls

Refrigeration Doors

Refrigeration Controls

Refrigerator/Freezer Motors

Food Service Equipment

Variable Frequency Drives

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

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

How to Participate

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

Since 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

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|-----------------------------|---------------------|---|----------------|-------------------|------------------------|------------------------|---------------|------------------|----------------------------------|------------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | 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 |
| 3rd Floor Mechanical Closet | 1 | Linear Fluorescent - T8: 2' T8 (17W) - 1L | Wall Switch | 22 | 500 | Relamp | No | 1 | LED - Linear Tubes: (1) 2' Lamp | Wall Switch | 9 | 500 | 0.01 | 8 | 0.0 | \$1.17 | \$31.90 | \$5.00 | 22.96 |
| Mop Closet | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 500 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 500 | 0.05 | 39 | 0.0 | \$5.73 | \$117.00 | \$20.00 | 16.93 |
| Men's Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$15.00 | 7.21 |
| Women's Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$15.00 | 7.21 |
| 3rd Floor Hallway | 17 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 17 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.85 | 2,799 | 0.0 | \$415.32 | \$2,088.40 | \$360.00 | 4.16 |
| Office 40 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$266.40 | \$50.00 | 4.43 |
| Office 39 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$15.00 | 7.21 |
| Office 38 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$15.00 | 7.21 |
| Office 37 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$266.40 | \$50.00 | 4.43 |
| Office 36 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$15.00 | 7.21 |
| Office 35 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$15.00 | 7.21 |
| Conference Room 31 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,500 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,050 | 0.30 | 659 | 0.0 | \$97.72 | \$567.20 | \$110.00 | 4.68 |
| Office 32 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.30 | 988 | 0.0 | \$146.58 | \$721.20 | \$125.00 | 4.07 |
| Conference Room 34 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,500 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,050 | 0.30 | 659 | 0.0 | \$97.72 | \$567.20 | \$110.00 | 4.68 |
| 3rd Floor Hallway | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Mechanical Closet 2 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 500 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 500 | 0.04 | 29 | 0.0 | \$4.30 | \$75.20 | \$15.00 | 14.01 |
| Back Stairwell | 1 | Compact Fluorescent: 23W Spotlight 2 Lamp per fixture | Wall Switch | 46 | 8,760 | Relamp | No | 1 | LED Screw-In Lamps: 15W Lamps | Wall Switch | 30 | 8,760 | 0.01 | 164 | 0.0 | \$24.33 | \$97.71 | \$10.00 | 3.60 |
| Back Stairwell | 2 | Compact Fluorescent: 13W CFL | Wall Switch | 13 | 8,760 | Relamp | No | 2 | LED Screw-In Lamps: 9W Lamps | Wall Switch | 9 | 8,760 | 0.01 | 82 | 0.0 | \$12.17 | \$107.51 | \$10.00 | 8.02 |
| Main Stairwell | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 8,760 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 6,132 | 0.20 | 2,564 | 0.0 | \$380.46 | \$900.80 | \$200.00 | 1.84 |
| Elevator | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,250 | 0.08 | 261 | 0.0 | \$38.67 | \$150.40 | \$30.00 | 3.11 |
| 2nd Floor Hallway | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.75 | 2,470 | 0.0 | \$366.46 | \$1,938.00 | \$330.00 | 4.39 |
| Men's Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,125 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 788 | 0.05 | 82 | 0.0 | \$12.22 | \$191.20 | \$15.00 | 14.42 |
| Women's Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,125 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 788 | 0.05 | 82 | 0.0 | \$12.22 | \$191.20 | \$15.00 | 14.42 |
| Mop Closet | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 500 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 500 | 0.05 | 39 | 0.0 | \$5.73 | \$117.00 | \$20.00 | 16.93 |
| Conference Room 29 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,500 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,050 | 0.20 | 439 | 0.0 | \$65.15 | \$416.80 | \$80.00 | 5.17 |

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|-----------------------------|---------------------|---|------------------|-------------------|------------------------|------------------------|---------------|------------------|----------------------------------|------------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Mechanical Closet 1 | 1 | Linear Fluorescent - T8: 2' T8 (17W) - 1L | Wall Switch | 22 | 500 | Relamp | No | 1 | LED - Linear Tubes: (1) 2' Lamp | Wall Switch | 9 | 500 | 0.01 | 8 | 0.0 | \$1.17 | \$31.90 | \$5.00 | 22.96 |
| Mechanical Closet 2 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 500 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 500 | 0.04 | 29 | 0.0 | \$4.30 | \$75.20 | \$15.00 | 14.01 |
| Office 28 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$266.40 | \$50.00 | 4.43 |
| Office 27 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$35.00 | 6.39 |
| Office 26 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$35.00 | 6.39 |
| Office 25 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$35.00 | 6.39 |
| Office 24 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$35.00 | 6.39 |
| Office 23 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$35.00 | 6.39 |
| Office 22 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.05 | 165 | 0.0 | \$24.43 | \$191.20 | \$35.00 | 6.39 |
| Break Room 21 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$266.40 | \$50.00 | 4.43 |
| Server Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 500 | Relamp | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 500 | 0.08 | 58 | 0.0 | \$8.59 | \$150.40 | \$30.00 | 14.01 |
| Office Room 20 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$420.40 | \$65.00 | 7.27 |
| 2nd Floor Hallway | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| 1st Floor Record Storage | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Occupancy Sensor | 62 | 788 | Relamp | No | 15 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 788 | 0.39 | 456 | 0.0 | \$67.67 | \$877.50 | \$150.00 | 10.75 |
| 1st Floor Record Storage | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Security Desk | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,250 | 0.04 | 130 | 0.0 | \$19.33 | \$75.20 | \$15.00 | 3.11 |
| Security Desk | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| 1st Floor Hallway | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.60 | 1,976 | 0.0 | \$293.16 | \$1,712.40 | \$285.00 | 4.87 |
| 1st Floor Mechanical Closet | 1 | Linear Fluorescent - T8: 2' T8 (17W) - 1L | Wall Switch | 22 | 500 | Relamp | No | 1 | LED - Linear Tubes: (1) 2' Lamp | Wall Switch | 9 | 500 | 0.01 | 8 | 0.0 | \$1.17 | \$31.90 | \$5.00 | 22.96 |
| Men's Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,125 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 788 | 0.05 | 82 | 0.0 | \$12.22 | \$191.20 | \$35.00 | 12.79 |
| Mop Closet | 1 | Linear Fluorescent - T8: 2' T8 (17W) - 1L | Wall Switch | 22 | 500 | Relamp | No | 1 | LED - Linear Tubes: (1) 2' Lamp | Wall Switch | 9 | 500 | 0.01 | 8 | 0.0 | \$1.17 | \$31.90 | \$5.00 | 22.96 |
| 1st Floor Hallway | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 14 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.70 | 2,305 | 0.0 | \$342.02 | \$1,862.80 | \$315.00 | 4.53 |
| 1st Floor Copyroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.20 | 659 | 0.0 | \$97.72 | \$570.80 | \$95.00 | 4.87 |
| Office Room 19 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$420.40 | \$65.00 | 7.27 |
| Office Room 12 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.20 | 659 | 0.0 | \$97.72 | \$570.80 | \$95.00 | 4.87 |

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|--------------------|---------------------|---|----------------|-------------------|------------------------|------------------------|---------------|------------------|---|------------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Office Room 18 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.10 | 329 | 0.0 | \$48.86 | \$420.40 | \$65.00 | 7.27 |
| 1st Floor Hallway | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Office Room 13 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.20 | 659 | 0.0 | \$97.72 | \$570.80 | \$95.00 | 4.87 |
| File Room 16 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,125 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 788 | 0.10 | 165 | 0.0 | \$24.43 | \$266.40 | \$50.00 | 8.86 |
| Office Room 14 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,250 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,575 | 0.15 | 494 | 0.0 | \$73.29 | \$341.60 | \$65.00 | 3.77 |
| Conference Room 15 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,500 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,050 | 0.10 | 220 | 0.0 | \$32.57 | \$266.40 | \$50.00 | 6.64 |
| Elevator Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 500 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 500 | 0.04 | 29 | 0.0 | \$4.30 | \$75.20 | \$15.00 | 14.01 |
| Electrical Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 500 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 500 | 0.03 | 19 | 0.0 | \$2.86 | \$58.50 | \$10.00 | 16.93 |
| Women's Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,125 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 788 | 0.05 | 82 | 0.0 | \$12.22 | \$191.20 | \$35.00 | 12.79 |
| Exterior | 7 | Metal Halide: (1) 100W Lamp | Wall Switch | 128 | 4,380 | Fixture Replacement | No | 7 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Wall Switch | 20 | 4,380 | 0.60 | 3,874 | 0.0 | \$574.80 | \$2,386.37 | \$700.00 | 2.93 |
| Exterior | 7 | Metal Halide: (1) 150W Lamp | Wall Switch | 190 | 4,380 | Fixture Replacement | No | 7 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Wall Switch | 38 | 4,380 | 0.84 | 5,438 | 0.0 | \$806.85 | \$2,336.53 | \$700.00 | 2.03 |
| Exterior | 1 | Compact Fluorescent: 100W CFL Bulbs | Wall Switch | 100 | 4,380 | Fixture Replacement | No | 1 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Wall Switch | 46 | 4,380 | 0.04 | 277 | 0.0 | \$41.06 | \$416.54 | \$100.00 | 7.71 |
| Exterior | 1 | Compact Fluorescent: 23W CFL Spots | Wall Switch | 23 | 4,380 | Relamp | No | 1 | LED Screw-In Lamps: 15W LED Lamp Spot | Wall Switch | 15 | 4,380 | 0.01 | 41 | 0.0 | \$6.08 | \$26.75 | \$0.00 | 4.40 |
| Exterior | 1 | Compact Fluorescent: 23W CFL Bulbs | Wall Switch | 23 | 4,380 | Relamp | No | 1 | LED Screw-In Lamps: 15W LED Lamp | Wall Switch | 15 | 4,380 | 0.01 | 41 | 0.0 | \$6.08 | \$26.75 | \$0.00 | 4.40 |

Motor Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|----------------|--------------------------|---------------------|-------------------|--------------|----------------------|--------------|------------------------|---------------------------------|----------------------|---------------|----------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | 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 |
| Admin Building | HP Indoor Fans | 6 | Supply Fan | 2.0 | 85.5% | No | 2,250 | No | 85.5% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin Building | Restrooms | 6 | Exhaust Fan | 0.1 | 80.0% | No | 60 | No | 80.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |

Electric HVAC Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | | |
|----------|--------------------------|---------------------|----------------------------|----------------------------------|-------------------------------------|---------------------------------|-----------------|-------------|----------------------------------|-------------------------------------|------------------------------------|-------------------------------|------------------------------------|-----------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | 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 |
| Admin | Admin Area | 3 | Split-System Air-Source HP | 3.00 | 29.80 | No | | | | | | | No | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin | Admin Area | 1 | Split-System Air-Source HP | 4.00 | 42.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin | Admin Area | 1 | Split-System Air-Source HP | 5.00 | 58.10 | No | | | | | | | No | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin | Admin Area | 1 | Split-System Air-Source HP | 5.00 | 58.10 | No | | | | | | | No | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin | Garage | 1 | Window AC | 1.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |

Fuel Heating Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | | Proposed Conditions | | | | | | Energy Impact & Financial Analysis | | | | | | | |
|----------|--------------------------|---------------------|-------------|--------------------------------|---------------------------------|-----------------|-------------|--------------------------------|--------------------|--------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|------|
| | | 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 | |
| Admin | Admin Area | 3 | Furnace | 29.80 | No | | | | | | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin | Admin Area | 1 | Furnace | 42.00 | No | | | | | | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Admin | Admin Area | 2 | Furnace | 58.10 | No | | | | | | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |

DHW Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | Proposed Conditions | | | | | | Energy Impact & Financial Analysis | | | | | | |
|----------|--------------------------|---------------------|--------------------------------------|---------------------|-----------------|-------------|-----------|-------------------|------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | 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 |
| Admin | Floor | 3 | Storage Tank Water Heater (≤ 50 Gal) | No | | | | | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |


Low-Flow Device Recommendations

| Location | Recommendation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|-----------|-----------------------|---------------------------|--------------------------|--------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | 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 |
| Restrooms | 6 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 1,304 | 0.0 | \$193.41 | \$43.02 | \$0.00 | 0.22 |

Plug Load Inventory

| Location | Existing Conditions | | | |
|-----------|---------------------|-----------------------|-----------------|------------------------|
| | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Various | 38 | Desktop Computers | 120.0 | Yes |
| Various | 38 | Computer Monitors | 28.0 | Yes |
| Various | 1 | Sm. Printers | 13.0 | Yes |
| Various | 3 | Lg. Copiers | 380.0 | Yes |
| Various | 2 | TVs (~27" ea.) | 150.0 | No |
| Various | 3 | Sm. Microwaves | 800.0 | No |
| Various | 2 | Refrigerator | 750.0 | Yes |
| Server Rm | 3 | Server | 120.0 | Yes |

Appendix B: ENERGY STAR® Statement of Energy Performance



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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR®
Score¹

Asbury Park BOE Administration Building

Primary Property Type: Office
Gross Floor Area (ft²): 13,934
Built: 1900

For Year Ending: October 31, 2016
Date Generated: October 27, 2017

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|--|--|---|
| Asbury Park BOE Administration Building 910 4th Avenue Asbury Park, New Jersey 07712 | Asbury Park Board of Education 910 4th Avenue Asbury Park, NJ 07712 (732) 776-2606 x 2426 | Geoffrey Hastings 910 4th Avenue Asbury Park, NJ 07712 (732) 776-2606 x 2426 hastingsg@asburypark.k12.nj.us |

Property ID: 6049371

Energy Consumption and Energy Use Intensity (EUI)

| Site EUI | Annual Energy by Fuel | National Median Comparison |
|---------------------------|--|--|
| 36.2 kBtu/ft ² | Natural Gas (kBtu) 170,186 (34%) Electric - Grid (kBtu) 333,747 (66%) | National Median Site EUI (kBtu/ft ²) 72.4 National Median Source EUI (kBtu/ft ²) 176.4 % Diff from National Median Source EUI -50% |
| Source EUI | | Annual Emissions |
| 88 kBtu/ft ² | | Greenhouse Gas Emissions (Metric Tons CO ₂ e/year) 46 |

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)