# Local Government Energy Audit:
## Energy Audit Report


## Keyport High School

**Keyport Board of Education**

351 Broad Street
Keyport, NJ 07735

September 12, 2018

Final Report by:

**TRC Energy Services**

# Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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# 1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Keyport High School.

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

## 1.1 Facility Summary

Keyport High School is comprised of an 84,948-square foot, three-story building that includes classrooms, offices, an indoor gymnasium, locker rooms, kitchen and central dining area. Roughly 17% of the total electric energy usage of the building is coming from the rooftop solar array that the school owns.

Lighting at Keyport High School consists of aging and inefficient systems, including T8 fluorescent, compact fluorescent (CFL), and incandescent sources. Heating is supplied by a natural gas fired hot water boiler and two older steam boilers. Cooling in the building is limited to only a few areas, and is provided mostly by split system air conditioners and heat pumps. A thorough description of the facility and our observations are located in Section 2.

## 1.2 Your Cost Reduction Opportunities

### Energy Conservation Measures

TRC evaluated 14 measures and recommends nine measures which together represent an opportunity for Keyport High School to reduce annual energy costs by roughly $24,463 and annual greenhouse gas emissions by 201,880 lbs $CO_2e$. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 5.5 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Keyport High School's annual energy use by 8%.

*Figure 1 – Previous 12 Month Utility Costs*

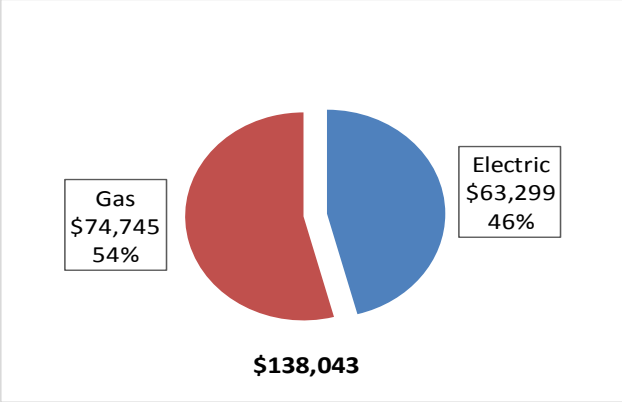
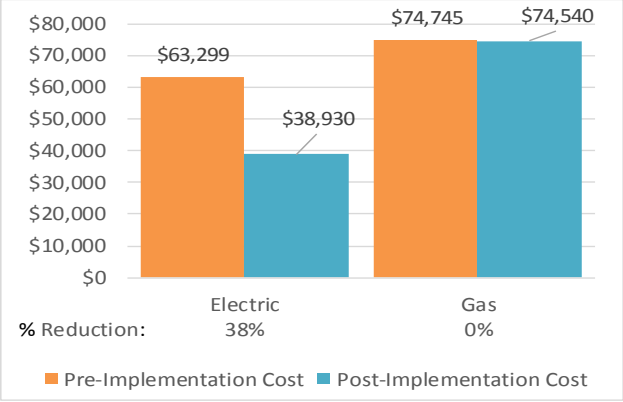



*Figure 2 – Potential Post-Implementation Costs*




*Note: The post-implementation electric cost is estimated assuming that all electric savings are coming from the utility.*

A detailed description of Keyport High School's existing energy use can be found in Section 3.

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

*Figure 3 – Summary of Energy Reduction Opportunities*

| Energy Conservation Measure | | Recommend? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **158,357** | **25.3** | **0.0** | **$19,363.44** | **$114,493.26** | **$14,485.00** | **$100,008.26** | **5.2** | **159,464** |
| ECM 1 | Install LED Fixtures | Yes | 47,116 | 7.4 | 0.0 | $5,761.24 | $59,810.82 | $6,400.00 | $53,410.82 | 9.3 | 47,446 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 418 | 0.1 | 0.0 | $51.11 | $234.00 | $20.00 | $214.00 | 4.2 | 421 |
| ECM 3 | Retrofit Fixtures with LED Lamps | Yes | 110,755 | 17.8 | 0.0 | $13,542.83 | $54,125.77 | $8,065.00 | $46,060.77 | 3.4 | 111,530 |
| ECM 4 | Install LED Exit Signs | Yes | 68 | 0.0 | 0.0 | $8.26 | $322.67 | $0.00 | $322.67 | 39.0 | 68 |
| **Lighting Control Measures** | | | **35,911** | **5.8** | **0.0** | **$4,391.04** | **$34,892.00** | **$3,770.00** | **$31,122.00** | **7.1** | **36,162** |
| ECM 5 | Install Occupancy Sensor Lighting Controls | Yes | 31,286 | 5.0 | 0.0 | $3,825.57 | $29,692.00 | $3,770.00 | $25,922.00 | 6.8 | 31,505 |
| ECM 6 | Install High/Low Lighitng Controls | Yes | 4,624 | 0.7 | 0.0 | $565.46 | $5,200.00 | $0.00 | $5,200.00 | 9.2 | 4,657 |
| **Motor Upgrades** | | | **2,666** | **0.6** | **0.0** | **$326.04** | **$24,496.37** | **$0.00** | **$24,496.37** | **75.1** | **2,685** |
| | Premium Efficiency Motors | No | 2,666 | 0.6 | 0.0 | $326.04 | $24,496.37 | $0.00 | $24,496.37 | 75.1 | 2,685 |
| **Electric Unitary HVAC Measures** | | | **4,082** | **2.7** | **0.0** | **$499.17** | **$10,473.54** | **$644.00** | **$9,829.54** | **19.7** | **4,111** |
| | Install High Efficiency Electric AC | No | 4,082 | 2.7 | 0.0 | $499.17 | $10,473.54 | $644.00 | $9,829.54 | 19.7 | 4,111 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **81.6** | **$930.93** | **$112,670.28** | **$6,062.00** | **$106,608.28** | **114.5** | **9,557** |
| | Install High Efficiency Steam Boilers | No | 0 | 0.0 | 81.6 | $930.93 | $112,670.28 | $6,062.00 | $106,608.28 | 114.5 | 9,557 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **20.8** | **$237.28** | **$19,141.98** | **$698.00** | **$18,443.98** | **77.7** | **2,436** |
| | Install High Efficiency Gas Water Heater | No | 0 | 0.0 | 0.7 | $8.13 | $11,500.21 | $398.00 | $11,102.21 | 1366.2 | 83 |
| | Install Tankless Water Heater | No | 0 | 0.0 | 2.2 | $24.58 | $7,541.39 | $300.00 | $7,241.39 | 294.6 | 252 |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | Yes | 0 | 0.0 | 17.9 | $204.58 | $100.38 | $0.00 | $100.38 | 0.5 | 2,100 |
| **Food Service Equipment & Refrigeration Measures** | | | **4,125** | **0.3** | **0.0** | **$504.39** | **$2,280.60** | **$155.00** | **$2,125.60** | **4.2** | **4,154** |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 1,966 | 0.2 | 0.0 | $240.39 | $606.60 | $80.00 | $526.60 | 2.2 | 1,980 |
| ECM 9 | Refrigeration Controls | Yes | 2,159 | 0.1 | 0.0 | $263.99 | $1,674.00 | $75.00 | $1,599.00 | 6.1 | 2,174 |
| **TOTALS FOR HIGH PRIORITY MEASURES** | | | **198,393** | **31.4** | **17.9** | **$24,463.44** | **$151,766.24** | **$18,410.00** | **$133,356.24** | **5.5** | **201,880** |
| **TOTALS FOR ALL EVALUATED MEASURES** | | | **205,141** | **34.7** | **102.4** | **$26,252.28** | **$318,448.02** | **$25,814.00** | **$292,634.02** | **11.1** | **218,568** |

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

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

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

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

**Motor Upgrades** generally involve replacing older standard efficiency motors with high efficiency standard (NEMA Premium). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

**Electric Unitary HVAC** measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

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

**Domestic Hot Water** upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems 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 reducing standby losses.

**Food Service Equipment & Refrigeration** measures generally involve improvements in the efficiency of cooking, food service, dishwashing, and food storage equipment. These measures may include more efficient convection ovens, steamers, ice machines, or refrigeration. These measures save energy by reducing the energy usage with more energy efficient equipment.

## Energy Efficient Practices

TRC also identified five 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 Keyport High School include:

- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Maintenance on Compressed Air Systems
- 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 Keyport High School. Based on the configuration of the site and its loads there is a low potential for installing additional PV or any combined heat and power self-generation measures.

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

## 1.3 Implementation Planning

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

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

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

- SmartStart
- 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 that SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 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** | | | |
| Anthony Rapolla | Business Administrator | arapolla@kpsdschools.org | 732-212-6100 ext. 1008 |
| **TRC Energy Services** | | | |
| Moussa Traore | Auditor | mtraore@trcsolutions.com | (732) 855-0033 |

## 2.2 General Site Information

On May 17, 2018, TRC performed an energy audit at Keyport High School located in Keyport, New Jersey. TRC's team met with Dylan Borders to review the facility operations and help focus our investigation on specific energy-using systems.

Keyport High School is comprised of an 84,948-square foot three-story building. It includes a library, classrooms, offices, an indoor gymnasium, locker rooms, kitchen and cafeteria.

The building was constructed in 1927.

## 2.3 Building Occupancy

The school building is open Monday through Friday. The typical schedule is presented in the table below. Typical occupancy of the school is 369 students and 59 staff. The entire facility is operational for 11 months out of the year.

*Figure 5 - Building Schedule*

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Keyport High School | Weekday | 6 AM - 11 PM |
| Keyport High School | Weekend | Closed |

## 2.4 Building Envelope

The building is constructed of concrete block, and structural steel with a brick facade. The building has flat roof sections covered with roofing membrane. The building has both clear and translucent double pane windows with aluminum frames which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of metal and glass and are in good condition.


*Figure 6 - Aerial screenshot of the building*

## 2.5 On-Site Generation

Keyport High School has a 100-kW solar PV array system on the rooftop. The system provides roughly 17% of the electricity required by the facility. The school owns the PV array system. The majority of available space which could be allocated to PV is already in use, therefore, additional PV has not been recommended.

## 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 mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL), LED lamps and high intensity discharge (HID) fixtures. Most of the fixtures are 1, 2 or 3-lamp, 4-foot long troffers with diffusers. The interior HID lighting is mostly in gymnasiums and fitness room.

*Figure 7 - Pictures of various fluorescent & HID interior lighting throughout the building*

Service spaces and storage spaces are primarily lit with CFL and LED lamps in recessed can ceiling fixtures. Exit signs in the building are mainly LED.

Lighting is controlled by wall switches in most spaces and is turned on during operating hours of the building.

The building's exterior lighting is minimal and consists mainly of wall mounted fixtures. Sources include high pressure sodium (HPS) fixtures, metal halide (MH) fixtures and LED wall packs. All exterior lighting is controlled by daylight dimming sensors.

*Figure 8 - Pictures of the various exterior HID lighting*

## Hot Water & Steam Heating System

There are two heating loops serving the building, a heating hot water loop that serves the gym, fitness center, nine classrooms and a steam loop serving the rest of the building.

The hot water system consists of one forced draft hot water boiler with 2,724 kBtu/hr output. The boilers' nominal combustion efficiency is estimated to be approximately 80%. The boiler has a 1.5 hp forced draft fan. The hot water boiler loop is configured in a constant flow primary distribution with two hot water supply pumps and two hot water return pumps. This boiler provides hot water to air handlers, unit ventilators and radiators in the gym, fitness center and nine classrooms. The boiler was installed in 2005 and is in fairly good condition and well maintained.

*Figure 9 - Picture of the hot water boiler*

The steam system that serves the rest of the building consists of two old forced draft steam boilers rated at 3,031 kBtu/hr output each. The steam boilers have a nominal combustion efficiency of 78.85%. Each boiler has a 2 hp forced draft fan with discharge dampers to control the volume of combustion air. Each boiler also is equipped with a 0.5 hp feed water pump, a control valve that maintains water level in the boiler, and a 0.3 hp condensate return pump. Steam is supplied directly to unit ventilators and radiators.

The heating system is controlled by a Johnson Control Metasys Building Energy Management System (BEMS).

*Figure 10 - Picture of the steam boiler*

## Direct Expansion Air Conditioning System (DX)

About only 40% of the building is mechanically cooled. Systems include direct-expansion (DX) cooling split-system ACs, split-system heat pumps, and window AC units. Most of the units are located on the roof and serve various building spaces including offices, cafeteria, and a few classrooms. There are 23 split-system air conditioners and heat pumps throughout the building. The size of the units range from 0.75 ton to 10 tons. There are also two window air-conditioning units that serve the custodian and gym office areas which are approximately 1 ton each in capacity.

*Figure 11 - Pictures of some of the condenser units of heat pumps and air conditioning units*

Most of the units are controlled by programmable thermostats located in the areas they are serving. The bigger units are connected to the BEMS.

## Building Energy Management System (BEMS)

The facility has a Johnson Controls Metasys Building Energy Management System (BEMS) that monitors and controls the boilers and the hot water & steam loops, domestic hot water boilers as well as the bigger split-system heat pumps/air conditioners and some of the unit ventilators. The facility is interested in integrating all HVAC equipment into the BEMS so they have a fully centralized control system. This would help them achieve better energy management of the building, however, the incremental savings associated with adding control points for the smaller systems is not likely to be cost effective based on energy savings alone.

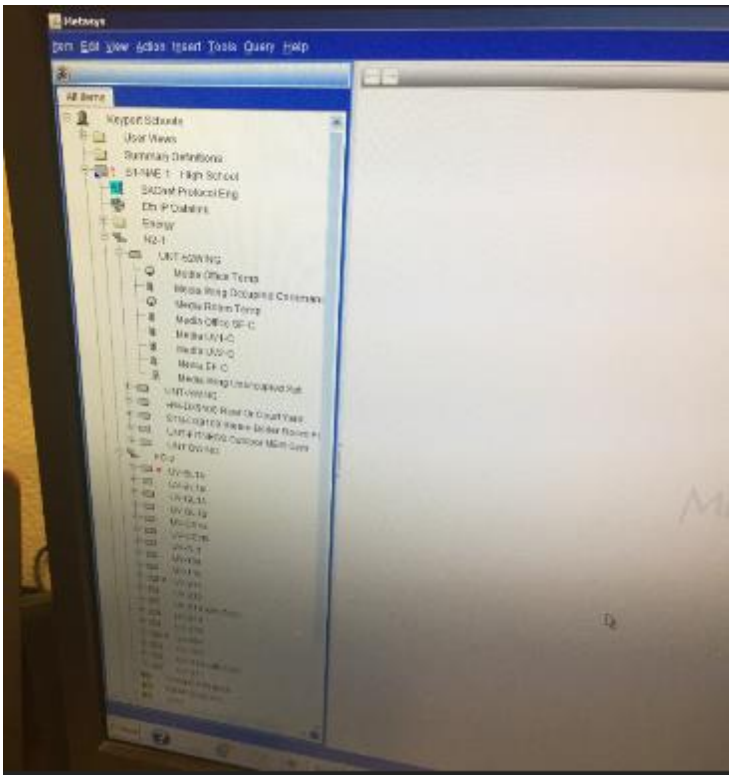


*Figure 12 - Metasys BEMS showing Keyport High School information*

## Domestic Hot Water Heating System

The main domestic hot water heating systems for the facility consist of two 70-gallon PVI gas fired condensing hot water heaters and one tankless Smith water heater. The condensing boiler's input rating is 399 MBh at a nominal efficiency of 90%. The tankless water heater has a rating of 577 MBH and an efficiency of 80%.

Additionally, the kitchen has a dedicated domestic condensing water heater that is rated at 199 MBH with an efficiency of 90%. The kitchen water heater was leaking and in need of repair.

## Food Service Equipment

The facility has a full commercial kitchen that is used to prepare lunch for the school. The ovens, range tops are gas fired and the warmers are all electric. The ovens and warmers are turned on when the kitchen staff arrive and turned off at 1:30 PM when lunch service stops.

*Figure 13 - Pictures of the gas cooking line and ovens*

## Refrigeration

The kitchen has a walk-in freezer that is used to store food prepared for school lunches. The freezer has a single 1.2 (approx.) ton air cooled compressor. The walk-in space temperature is maintained at -10°F. The kitchen also has six free standing commercial size refrigerators.

*Figure 14 - Pictures of the walk-in freezer and standing refrigerators*

### Building Plug Load

There are roughly 214 (estimated) computer work stations throughout the facility. There is no centralized PC power management software installed. The plug loads in the building also consist of refrigerators, microwaves, televisions, copy machines, printers and an electric kiln. The facility has three refrigerated and three non-refrigerated vending machines.

## 2.7 Water-Using Systems

There are nine restrooms and a kitchen at this facility. A sampling of restrooms and the kitchen found that the faucets are rated for 2.5 gallons per minute (gpm) or higher.

# 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

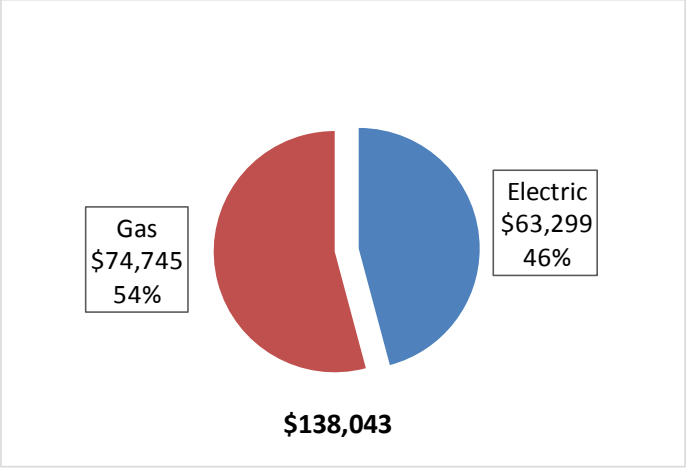
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

*Figure 15 - Utility Summary*

| Utility Summary for Keyport High School | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 627,018 kWh | $63,299 |
| Natural Gas | 65,533 Therms | $74,745 |
| **Total** | | **$138,043** |

The current annual energy cost for this facility is $138,043 as shown in the chart below.

*Figure 16 - Energy Cost Breakdown*



## 3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.122/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. *It is to be noted that this blended rate is taken from just the energy consumption and charges that are supplied by the utility from the grid.* The monthly electricity consumption & peak demand for electricity purchased from the utility is shown in Figure 17, while the electrical energy generated by the solar array is provided in Figure 18.

*Figure 17 - Electric Usage & Demand (Utility Supplied)*

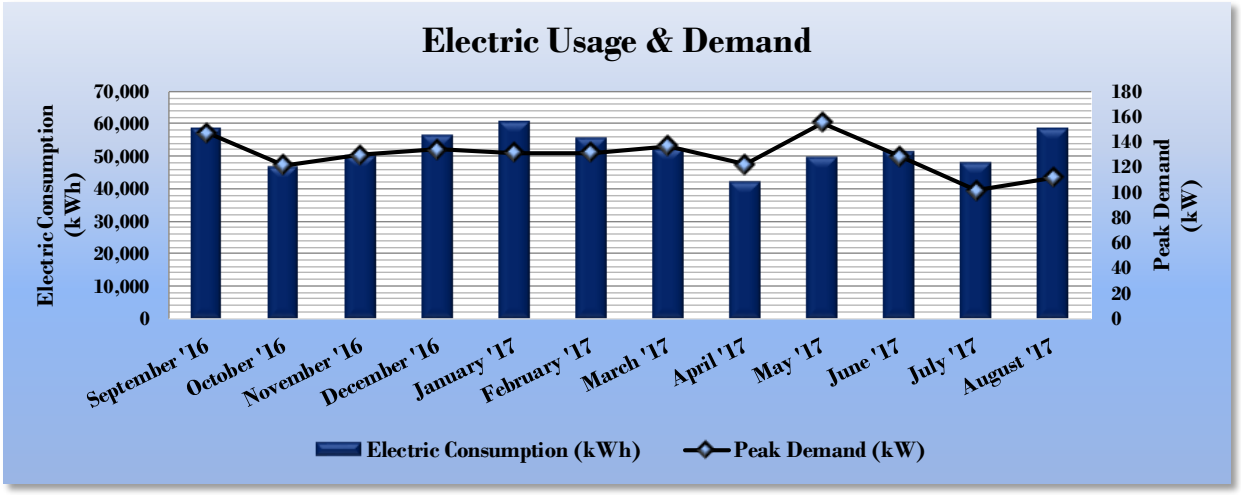



*Figure 18 - Electric Generation from the PV Array*

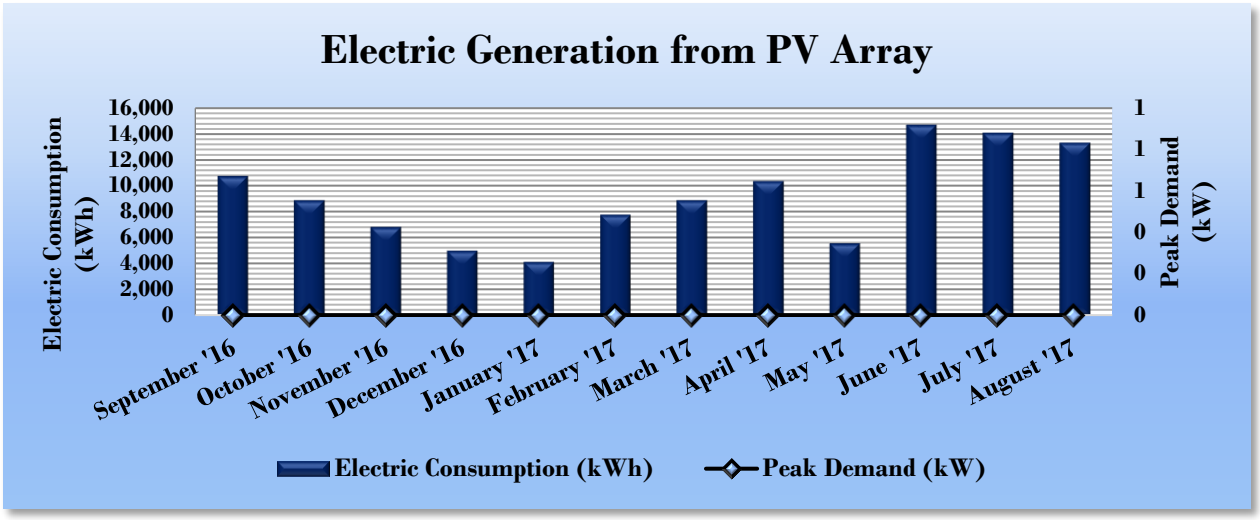


*Figure 19 - Electric Usage & Demand*

| Electric Billing Data for Keyport High School | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 9/26/16 | 32 | 58,914 | 147 | $883 | $5,954 |
| 10/24/16 | 28 | 46,783 | 121 | $680 | $4,694 |
| 11/23/16 | 30 | 50,495 | 129 | $726 | $5,340 |
| 12/23/16 | 30 | 56,517 | 134 | $751 | $6,183 |
| 1/26/17 | 34 | 60,919 | 131 | $838 | $6,857 |
| 2/24/17 | 29 | 55,762 | 131 | $870 | $6,018 |
| 3/24/17 | 28 | 52,557 | 137 | $904 | $5,603 |
| 4/21/17 | 28 | 42,206 | 122 | $806 | $5,125 |
| 5/26/17 | 35 | 49,713 | 155 | $1,026 | $4,899 |
| 6/27/17 | 32 | 51,352 | 129 | $913 | $4,339 |
| 7/27/17 | 30 | 48,341 | 101 | $720 | $3,870 |
| 8/28/17 | 32 | 58,613 | 112 | $794 | $4,937 |
| **Totals** | **368** | **632,172** | **155** | **$9,911** | **$63,819** |
| **Annual** | **365** | **627,018** | **155** | **$9,831** | **$63,299** |

## 3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.141/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

*Figure 20 - Natural Gas Usage*

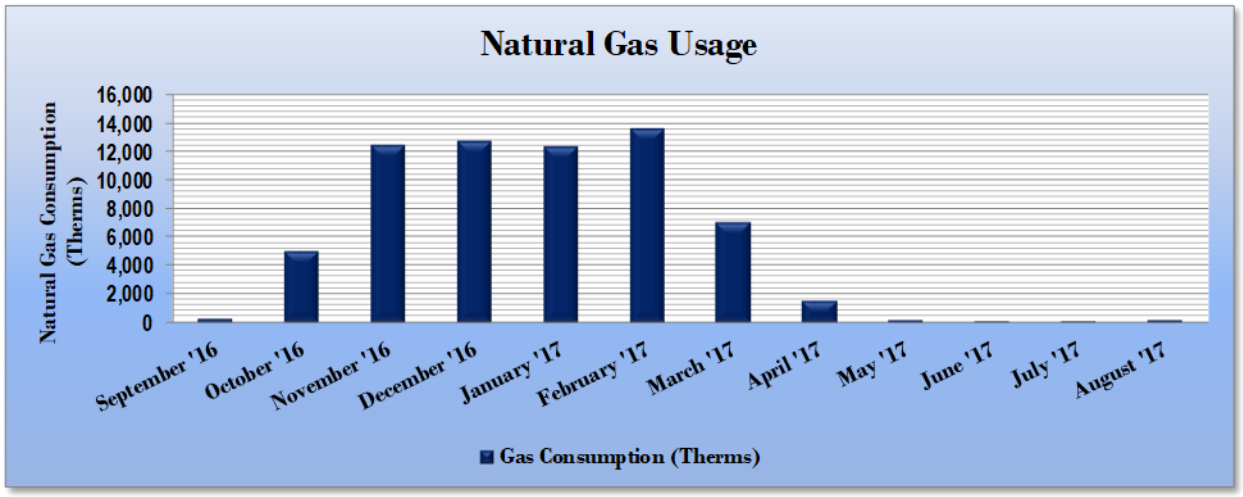



*Figure 21 - Natural Gas Usage*

| Gas Billing Data for Keyport High School | | | |
|---|---|---|---|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 10/14/16 | 30 | 263 | $1,609 |
| 11/14/16 | 31 | 5,064 | $5,507 |
| 12/19/16 | 35 | 12,425 | $12,288 |
| 1/18/17 | 30 | 12,751 | $13,965 |
| 2/15/17 | 28 | 12,386 | $13,849 |
| 3/20/17 | 33 | 13,595 | $14,160 |
| 4/18/17 | 29 | 7,065 | $7,359 |
| 5/17/17 | 29 | 1,581 | $1,789 |
| 6/16/17 | 30 | 238 | $1,190 |
| 7/20/17 | 34 | 95 | $1,063 |
| 8/16/17 | 27 | 60 | $1,029 |
| 9/15/17 | 30 | 191 | $1,142 |
| **Totals** | **366** | **65,713** | **$74,949** |
| **Annual** | **365** | **65,533** | **$74,745** |

## 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 22 - Energy Use Intensity Comparison – Existing Conditions*

| Energy Use Intensity Comparison - Existing Conditions | | |
|---|---|---|
| | Keyport High School | National Median<br>Building Type: School (K-12) |
| Source Energy Use Intensity (kBtu/ft$^2$) | 160.1 | 141.4 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 102.3 | 58.2 |

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

*Figure 23 - Energy Use Intensity Comparison – Following Installation of Recommended Measures*

| Energy Use Intensity Comparison - Following Installation of Recommended Measures | | |
|---|---|---|
| | Keyport High School | National Median<br>Building Type: School (K-12) |
| Source Energy Use Intensity (kBtu/ft$^2$) | 134.8 | 141.4 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 94.1 | 58.2 |

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is one of the building categories that are eligible to receive a score. This facility has a current score of 46.

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

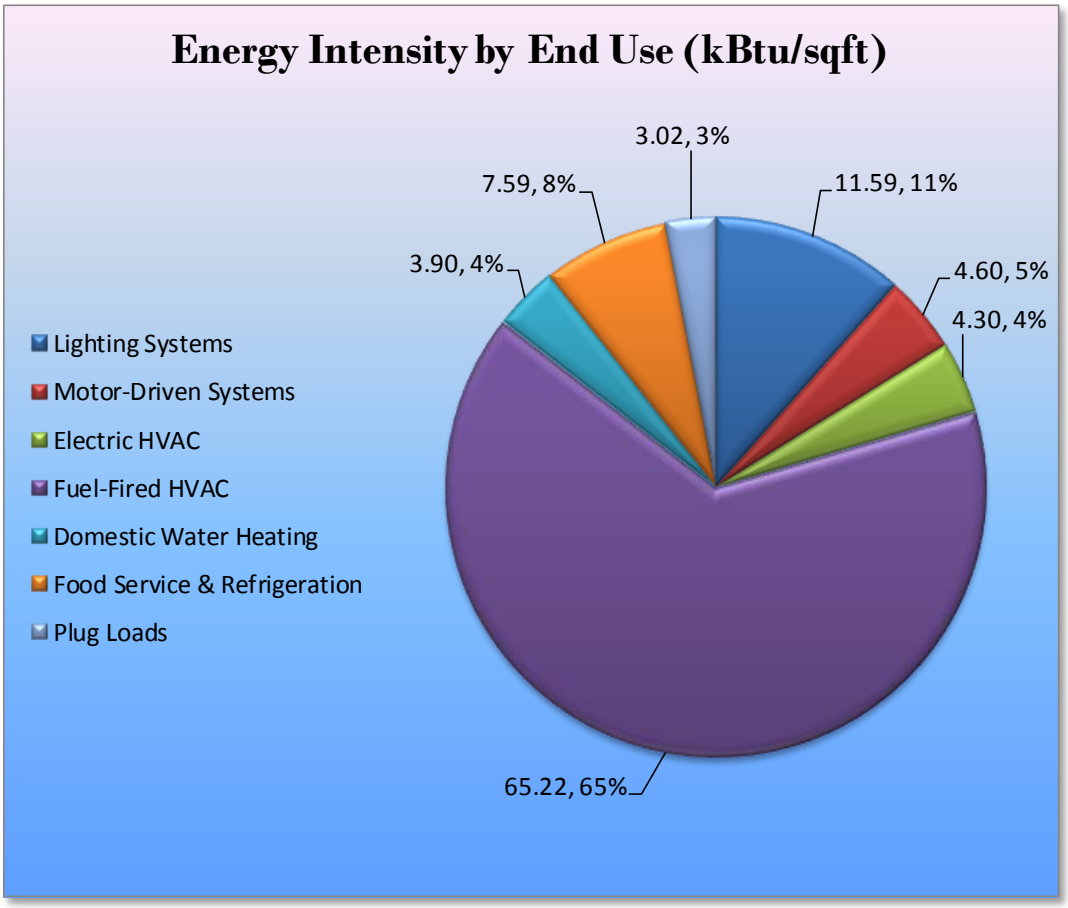
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 24 - 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 Keyport High School 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 25 – Summary of Recommended ECMs***

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **158,357** | **25.3** | **0.0** | **$19,363.44** | **$114,493.26** | **$14,485.00** | **$100,008.26** | **5.2** | **159,464** |
| ECM 1 | Install LED Fixtures | 47,116 | 7.4 | 0.0 | $5,761.24 | $59,810.82 | $6,400.00 | $53,410.82 | 9.3 | 47,446 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 418 | 0.1 | 0.0 | $51.11 | $234.00 | $20.00 | $214.00 | 4.2 | 421 |
| ECM 3 | Retrofit Fixtures with LED Lamps | 110,755 | 17.8 | 0.0 | $13,542.83 | $54,125.77 | $8,065.00 | $46,060.77 | 3.4 | 111,530 |
| ECM 4 | Install LED Exit Signs | 68 | 0.0 | 0.0 | $8.26 | $322.67 | $0.00 | $322.67 | 39.0 | 68 |
| **Lighting Control Measures** | | **35,911** | **5.8** | **0.0** | **$4,391.04** | **$34,892.00** | **$3,770.00** | **$31,122.00** | **7.1** | **36,162** |
| ECM 5 | Install Occupancy Sensor Lighting Controls | 31,286 | 5.0 | 0.0 | $3,825.57 | $29,692.00 | $3,770.00 | $25,922.00 | 6.8 | 31,505 |
| ECM 6 | Install High/Low Lighitng Controls | 4,624 | 0.7 | 0.0 | $565.46 | $5,200.00 | $0.00 | $5,200.00 | 9.2 | 4,657 |
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **17.9** | **$204.58** | **$100.38** | **$0.00** | **$100.38** | **0.5** | **2,100** |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | 0 | 0.0 | 17.9 | $204.58 | $100.38 | $0.00 | $100.38 | 0.5 | 2,100 |
| **Food Service Equipment & Refrigeration Measures** | | **4,125** | **0.3** | **0.0** | **$504.39** | **$2,280.60** | **$155.00** | **$2,125.60** | **4.2** | **4,154** |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | 1,966 | 0.2 | 0.0 | $240.39 | $606.60 | $80.00 | $526.60 | 2.2 | 1,980 |
| ECM 9 | Refrigeration Controls | 2,159 | 0.1 | 0.0 | $263.99 | $1,674.00 | $75.00 | $1,599.00 | 6.1 | 2,174 |
| **TOTALS** | | **198,393** | **31.4** | **17.9** | **$24,463.44** | **$151,766.24** | **$18,410.00** | **$133,356.24** | **5.5** | **201,880** |

* - 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 26 below.

*Figure 26 – Summary of Lighting Upgrade ECMs*

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **158,357** | **25.3** | **0.0** | **$19,363.44** | **$114,493.26** | **$14,485.00** | **$100,008.26** | **5.2** | **159,464** |
| ECM 1 | Install LED Fixtures | 47,116 | 7.4 | 0.0 | $5,761.24 | $59,810.82 | $6,400.00 | $53,410.82 | 9.3 | 47,446 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 418 | 0.1 | 0.0 | $51.11 | $234.00 | $20.00 | $214.00 | 4.2 | 421 |
| ECM 3 | Retrofit Fixtures with LED Lamps | 110,755 | 17.8 | 0.0 | $13,542.83 | $54,125.77 | $8,065.00 | $46,060.77 | 3.4 | 111,530 |
| ECM 4 | Install LED Exit Signs | 68 | 0.0 | 0.0 | $8.26 | $322.67 | $0.00 | $322.67 | 39.0 | 68 |

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

### ECM 1: Install LED Fixtures

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 41,426 | 6.7 | 0.0 | $5,065.43 | $53,951.45 | $5,700.00 | $48,251.45 | 9.5 | 41,715 |
| Exterior | 5,690 | 0.7 | 0.0 | $695.82 | $5,859.37 | $700.00 | $5,159.37 | 7.4 | 5,730 |

*Measure Description*

We recommend replacing existing fixtures containing HID lamps with new high-performance LED light fixtures. Replace the HPS and MH fixtures located along the building exterior and the metal halide fixtures serving the gymnasium and fitness room. Consider specifying interior LED fixtures with on-board occupancy controls for additional savings. 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 HID sources.

## ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 418 | 0.1 | 0.0 | $51.11 | $234.00 | $20.00 | $214.00 | 4.2 | 421 |
| Exterior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.0 | 0 |

*Measure Description*

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

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

## ECM 3: Retrofit Fixtures with LED Lamps

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 110,755 | 17.8 | 0.0 | $13,542.83 | $54,125.77 | $8,065.00 | $46,060.77 | 3.4 | 111,530 |
| Exterior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.0 | 0 |

*Measure Description*

We recommend retrofitting existing incandescent, halogen, HID or other lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

## ECM 4: Install LED Exit Signs

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 68 | 0.0 | 0.0 | $8.26 | $322.67 | $0.00 | $322.67 | 39.0 | 68 |
| Exterior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.0 | 0 |

*Measure Description*

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

### 4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 27 below.

***Figure 27 – Summary of Lighting Control ECMs***

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Control Measures** | | **35,911** | **5.8** | **0.0** | **$4,391.04** | **$34,892.00** | **$3,770.00** | **$31,122.00** | **7.1** | **36,162** |
| ECM 5 | Install Occupancy Sensor Lighting Controls | 31,286 | 5.0 | 0.0 | $3,825.57 | $29,692.00 | $3,770.00 | $25,922.00 | 6.8 | 31,505 |
| ECM 6 | Install High/Low Lighitng Controls | 4,624 | 0.7 | 0.0 | $565.46 | $5,200.00 | $0.00 | $5,200.00 | 9.2 | 4,657 |

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 5: Install Occupancy Sensor Lighting Controls

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 31,286 | 5.0 | 0.0 | $3,825.57 | $29,692.00 | $3,770.00 | $25,922.00 | 6.8 | 31,505 |

*Measure Description*

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in restrooms, storage rooms, classrooms, offices areas, gymnasium fitness room and locker rooms. As noted in ECM 1, consider on-board controls for new interior LED fixtures. 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 6: Install High/Low Lighting Controls

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 4,624 | 0.7 | 0.0 | $565.46 | $5,200.00 | $0.00 | $5,200.00 | 9.2 | 4,657 |

*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 are stairwells, interior corridors, parking lots, and parking garages.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. In parking lots with significant ambient lighting this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylighting. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

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

### 4.1.3 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 28 below.

***Figure 28 - Summary of Domestic Water Heating ECMs***

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **17.9** | **$204.58** | **$100.38** | **$0.00** | **$100.38** | **0.5** | **2,100** |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | 0 | 0.0 | 17.9 | $204.58 | $100.38 | $0.00 | $100.38 | 0.5 | 2,100 |

## ECM 7: Install Low-Flow DHW Devices

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 17.9 | $204.58 | $100.38 | $0.00 | $100.38 | 0.5 | 2,100 |

*Measure Description*

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy.

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

### 4.1.4 Food Service Equipment & Refrigeration Measures

Our recommendations for food service and refrigeration measures are summarized in Figure 29 below.

***Figure 29 - Summary of Food Service Equipment & Refrigeration ECMs***

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Food Service Equipment & Refrigeration Measures** | | **4,125** | **0.3** | **0.0** | **$504.39** | **$2,280.60** | **$155.00** | **$2,125.60** | **4.2** | **4,154** |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | 1,966 | 0.2 | 0.0 | $240.39 | $606.60 | $80.00 | $526.60 | 2.2 | 1,980 |
| ECM 9 | Refrigeration Controls | 2,159 | 0.1 | 0.0 | $263.99 | $1,674.00 | $75.00 | $1,599.00 | 6.1 | 2,174 |

## ECM 8: Freezer Case Electrically Commutated Motors

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 1,966 | 0.2 | 0.0 | $240.39 | $606.60 | $80.00 | $526.60 | 2.2 | 1,980 |

*Measure Description*

We recommend replacing shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in existing walk-in freezers. These fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By employing variable-speed technology, EC motors are able to optimize fan usage. Because these motors are brushless and utilize DC power, losses due to friction and phase shifting are eliminated. Savings for this measure take into account both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

## ECM 9: Walk-In Freezer Controls

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 2,159 | 0.1 | 0.0 | $263.99 | $1,674.00 | $75.00 | $1,599.00 | 6.1 | 2,174 |

*Measure Description*

We recommend the installation of additional controls to optimize the operation of the walk-in freezer.

Many walk-in freezers have continuously operating electric heaters on the doors to prevent condensation formation. This measure adds a control system feature to shut off the door heaters when the humidity level is low enough that condensation will not occur if the heaters are off. This is accomplished by measuring the ambient humidity and temperature of the store, comparing that to the dewpoint, and using pulse width modulation to control the anti-sweat door heaters.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, reducing annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric defrost mechanism.

Many walk-in freezers have evaporator fans which run continuously. The measure adds a control system feature to automatically shut off evaporator fans when the cooler's thermostat is not calling for cooling.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

## 4.2 ECMs Evaluated but Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility on the basis of energy savings alone. However, as the equipment have passed their useful service life and appear in poor condition, also taking into consideration the operation and maintenance costs, it is likely in the best interest of the school district to replace them prior to a catastrophic failure.

*Figure 30 – Summary of Measures Evaluated, But Not Recommended*

| Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| **Motor Upgrades** | **2,666** | **0.6** | **0.0** | **$326.04** | **$24,496.37** | **$0.00** | **$24,496.37** | **75.1** | **2,685** |
| Premium Efficiency Motors | 2,666 | 0.6 | 0.0 | $326.04 | $24,496.37 | $0.00 | $24,496.37 | 75.1 | 2,685 |
| **Electric Unitary HVAC Measures** | **4,082** | **2.7** | **0.0** | **$499.17** | **$10,473.54** | **$644.00** | **$9,829.54** | **19.7** | **4,111** |
| Install High Efficiency Electric AC | 4,082 | 2.7 | 0.0 | $499.17 | $10,473.54 | $644.00 | $9,829.54 | 19.7 | 4,111 |
| **Gas Heating (HVAC/Process) Replacement** | **0** | **0.0** | **81.6** | **$930.93** | **$112,670.28** | **$6,062.00** | **$106,608.28** | **114.5** | **9,557** |
| Install High Efficiency Steam Boilers | 0 | 0.0 | 81.6 | $930.93 | $112,670.28 | $6,062.00 | $106,608.28 | 114.5 | 9,557 |
| **Domestic Water Heating Upgrade** | **0** | **0.0** | **2.9** | **$32.70** | **$19,041.60** | **$698.00** | **$18,343.60** | **560.9** | **336** |
| Install High Efficiency Gas Water Heater | 0 | 0.0 | 0.7 | $8.13 | $11,500.21 | $398.00 | $11,102.21 | 1366.2 | 83 |
| Install Tankless Water Heater | 0 | 0.0 | 2.2 | $24.58 | $7,541.39 | $300.00 | $7,241.39 | 294.6 | 252 |
| **TOTALS** | **6,749** | **3.3** | **84.5** | **$1,788.84** | **$166,681.79** | **$7,404.00** | **$159,277.79** | **89.0** | **16,688** |

* - 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).

### Premium Efficiency Motors

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 2,666 | 0.6 | 0.0 | $326.04 | $24,496.37 | $0.00 | $24,496.37 | 75.1 | 2,685 |

*Measure Description*

The school district is considering replacing most of the old unit ventilators at this site. The primary savings from replacing unit ventilators will be from improved fan motor efficiency, however, those savings are unlikely to justify replacing the unit ventilators. The next potential savings would be from installing unit ventilators that provide for more optimal use of outside air than the existing unit ventilators.

The potential savings from installing new unit ventilators with electronically commutated (EC) motors was evaluated. EC motors are generally more efficient than other fractional hp motors and have the capability of operating at variable speeds, therefore, the savings from installing a premium efficiency motor is taken as a proxy for replacing the entire unit.

*Reasons for not Recommending*

The measure is not cost effective based on the energy savings. However, taking into consideration the operation and maintenance costs, is likely in the best interest of the school to replace the motors. Also, replacing the unit ventilators should be considered a capital improvement measure that has the potential to provide energy savings and improve occupant comfort.

## Install High Efficiency Air Conditioning Units

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 4,082 | 2.7 | 0.0 | $499.17 | $10,473.54 | $644.00 | $9,829.54 | 19.7 | 4,111 |

*Measure Description*

We evaluated replacing standard efficiency split system air conditioning units serving the media center with high efficiency split system air conditioning units when cost effective. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

*Reasons for not Recommending*

Although the school showed interest in implementing this measure, due to the long payback period, it is not recommended on the basis of energy savings alone. However, taking into consideration the operation and maintenance costs of the units, is likely in the best interest of the school to replace the split system air conditioners.

## Install High Efficiency Steam Boilers

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 81.6 | $930.93 | $112,670.28 | $6,062.00 | $106,608.28 | 114.5 | 9,557 |

*Measure Description*

We evaluated replacing older inefficient steam boilers with high efficiency steam boilers when cost effective. Significant improvements have been made in combustion technology resulting in increases in overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

*Reasons for not Recommending*

Replacing the boiler has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the boilers have reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. Therefore, we recommend that the facility staff consider purchasing a boiler that exceeds the code required efficiency when the boiler is replaced. Also, taking into consideration the operation and maintenance costs of the boilers, is likely in the best interest of the school to replace them prior to a catastrophic failure.

## Install High Efficiency Gas Water Heater

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 0.7 | $8.13 | $11,500.21 | $398.00 | $11,102.21 | 1366.2 | 83 |

*Measure Description*

We evaluated replacing the existing tank water heater serving the kitchen with a high efficiency tank water heater. Improvements in combustion efficiency and reductions in heat losses have improved the overall efficiency of storage water heaters. Energy savings results from using less gas to heat water, due to higher unit efficiency, and fewer run hours to maintain the tank water temperature.

*Reasons for not Recommending*

Since the existing water heater is a high efficiency condensing boiler which is leaking, we recommend the site evaluate repair rather than replacement of the unit. If it is not cost effective to repair the unit, replace the unit with a high efficiency unit.

## Install Tankless Water Heater

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 2.2 | $24.58 | $7,541.39 | $300.00 | $7,241.39 | 294.6 | 252 |

*Measure Description*

We evaluated replacing the existing old the Smith tankless water heater located in the main boiler room, which is at end of normal useful life, with a new tankless water heating system.

*Reasons for not Recommending*

Replacing the heater has a long payback based on energy savings and may not be justifiable based simply on energy considerations. The annual gas savings associated with this measure is insignificant. Therefore, it replacement will not be justifiable.

# 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.

## Clean Evaporator/Condenser Coils on AC Systems

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

## Clean and/or Replace HVAC Filters

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

## Perform Maintenance on Compressed Air Systems

Like all electro-mechanical equipment, compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan should be developed for process related compressed air systems to include inspection, cleaning, and replacement of inlet filter cartridges, cleaning of drain traps, daily inspection of lubricant levels to reduce unwanted friction, inspection of belt condition and tension, checking for system leaks and adjustment of loose connections, and overall system cleaning. Contact a qualified technician for help with setting up periodic maintenance schedule.

## 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.

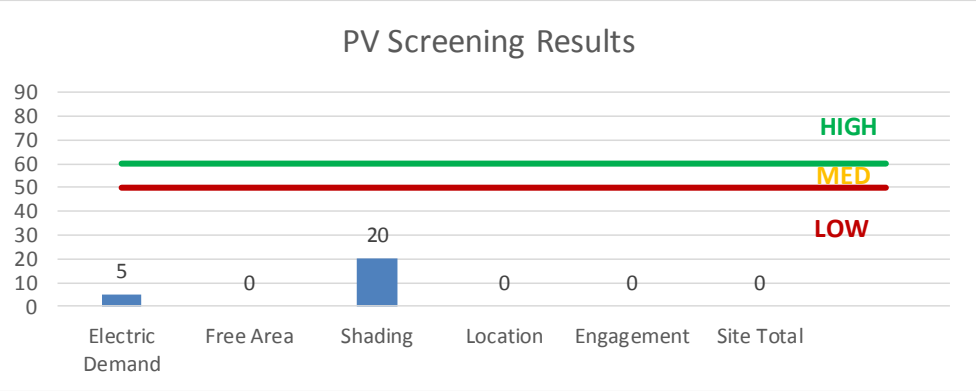
## 6.1 Photovoltaic

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.

This site has existing PV system that takes up much of the roof area and supplies about 17% of the facility electrical needs. A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a **Low** potential for installing additional PV arrays.

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

***Figure 31 - Photovoltaic Screening***




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

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

## 6.2 Combined Heat and Power

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

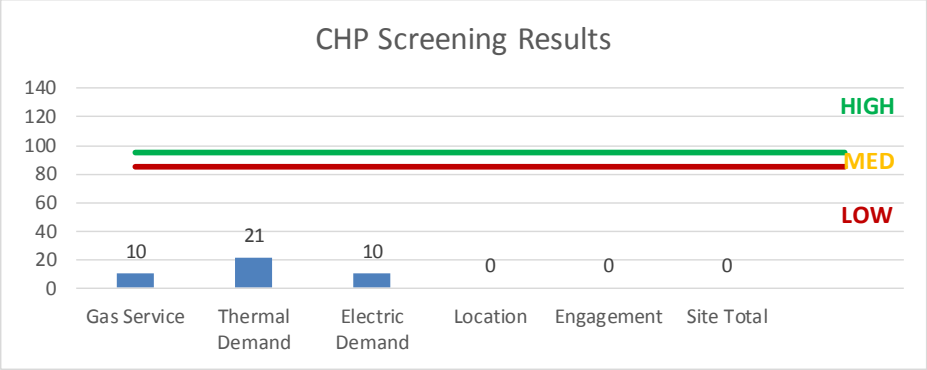
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

*Figure 32 - Combined Heat and Power Screening*



# 7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion, DR is not applicable to this facility.

# 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 33 for a list of the eligible programs identified for each recommended ECM.

*Figure 33 - ECM Incentive Program Eligibility*

| Energy Conservation Measure | | SmartStart Prescriptive | SmartStart Custom | Direct Install | Pay For Performance Existing Buildings | Large Energy Users Program | Combined Heat & Power and Fuel Cell |
|---|---|---|---|---|---|---|---|
| ECM 1 | Install LED Fixtures | x | | x | | | |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | x | | x | | | |
| ECM 3 | Retrofit Fixtures with LED Lamps | x | | x | | | |
| ECM 4 | Install LED Exit Signs | | | x | | | |
| ECM 5 | Install Occupancy Sensor Lighting Controls | x | | x | | | |
| ECM 6 | Install High/Low Lighitng Controls | | | x | | | |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | | | x | | | |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | x | | x | | | |
| ECM 9 | Refrigeration Controls | x | | x | | | |

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

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

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

## 8.1 SmartStart

**Overview**

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

**Equipment with Prescriptive Incentives Currently Available:**

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

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

**Incentives**

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

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

**How to Participate**

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

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

## 8.2 Direct Install

**Overview**

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

**Incentives**

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

**How to Participate**

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

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

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

## 8.3 Energy Savings Improvement Program

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

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

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

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

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

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

# 9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

## 9.1 Retail Electric Supply Options

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

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

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

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

## 9.2 Retail Natural Gas Supply Options

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

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

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

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

# Appendix A: Equipment Inventory & Recommendations

## Lighting Inventory & Recommendations

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room 1 | 5 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | No | 5 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 2 | 6 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | No | 6 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 2 | 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 |
| 1st Floor Corridor | 37 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 37 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,479 | 1.01 | 6,285 | 0.0 | $768.47 | $3,564.50 | $0.00 | 4.64 |
| 1st Floor Corridor | 8 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 8 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| 1st Floor Corridor | 12 | LED - Fixtures: LED Fixture | Wall Switch | 50 | 3,542 | None | Yes | 12 | LED - Fixtures: LED Fixture | High/Low Control | 50 | 2,479 | 0.12 | 733 | 0.0 | $89.65 | $400.00 | $0.00 | 4.46 |
| Custodian | 1 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | No | 1 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Mens Restroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.11 | 679 | 0.0 | $83.08 | $504.00 | $35.00 | 5.65 |
| Womens Restroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.11 | 679 | 0.0 | $83.08 | $504.00 | $35.00 | 5.65 |
| Room 105 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 104 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 102 | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 14 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.38 | 2,378 | 0.0 | $290.77 | $1,089.00 | $175.00 | 3.14 |
| Room 103 | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 14 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.38 | 2,378 | 0.0 | $290.77 | $1,089.00 | $175.00 | 3.14 |
| Tech Room | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.29 | 1,794 | 0.0 | $219.35 | $840.80 | $155.00 | 3.13 |
| Electrical Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 3,542 | Relamp | No | 3 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 3,542 | 0.03 | 214 | 0.0 | $26.15 | $107.70 | $15.00 | 3.55 |
| Electrical Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.11 | 679 | 0.0 | $83.08 | $504.00 | $75.00 | 5.16 |
| Electrical Room | 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 |
| Part Closet | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $20.00 | 8.84 |
| Room 100 | 24 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 24 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.66 | 4,077 | 0.0 | $498.47 | $1,944.00 | $310.00 | 3.28 |
| Storage Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | 0.02 | 134 | 0.0 | $16.44 | $58.50 | $10.00 | 2.95 |
| Storage Room | 1 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | No | 1 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Nurse Office | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.16 | 1,019 | 0.0 | $124.62 | $621.00 | $95.00 | 4.22 |
| Facility Manager Office | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.19 | 1,196 | 0.0 | $146.23 | $650.53 | $115.00 | 3.66 |
| Storage Room | 3 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | Yes | 3 | LED Screw-In Lamps: LED Screw-in Lamp | Occupancy Sensor | 10 | 2,479 | 0.01 | 37 | 0.0 | $4.48 | $116.00 | $0.00 | 25.88 |
| Room 106 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.37 | 2,293 | 0.0 | $280.39 | $946.80 | $170.00 | 2.77 |

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Room 107 | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 7 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.19 | 1,189 | 0.0 | $145.39 | $679.50 | $105.00 | 3.95 |
| Elevator Room | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 3,542 | Relamp & Reballast | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | 0.04 | 240 | 0.0 | $29.39 | $117.00 | $10.00 | 3.64 |
| Room 108 | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.74 | 4,586 | 0.0 | $560.78 | $1,623.60 | $305.00 | 2.35 |
| Room 108 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $117.00 | $55.00 | 1.49 |
| Electrical Room | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 3,542 | Relamp & Reballast | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | 0.04 | 240 | 0.0 | $29.39 | $117.00 | $10.00 | 3.64 |
| Mens Restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $0.00 | 9.32 |
| Room 109 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Closet | 3 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | Yes | 3 | LED Screw-In Lamps: LED Screw-in Lamp | Occupancy Sensor | 10 | 2,479 | 0.01 | 37 | 0.0 | $4.48 | $116.00 | $0.00 | 25.88 |
| Womens Restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $0.00 | 9.32 |
| Room110 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 111 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 9 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.43 | 2,691 | 0.0 | $329.03 | $1,126.20 | $215.00 | 2.77 |
| Vice Principal's Office | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.29 | 1,794 | 0.0 | $219.35 | $840.80 | $155.00 | 3.13 |
| Cafeteria | 76 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 76 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 2.08 | 12,909 | 0.0 | $1,578.49 | $5,526.00 | $900.00 | 2.93 |
| Cafeteria | 3 | Exit Signs: Fluorescent | None | 9 | 8,760 | Fixture Replacement | No | 3 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.01 | 78 | 0.0 | $9.50 | $322.67 | $0.00 | 33.96 |
| Cafeteria | 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 |
| 2nd Floor Corridor | 39 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 39 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,479 | 1.07 | 6,624 | 0.0 | $810.01 | $3,681.50 | $0.00 | 4.54 |
| 2nd Floor Corridor | 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 |
| 2nd Floor Corridor | 19 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | None | Yes | 19 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,479 | 0.11 | 673 | 0.0 | $82.33 | $600.00 | $0.00 | 7.29 |
| 2nd Floor Corridor | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Room 201 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.29 | 1,794 | 0.0 | $219.35 | $840.80 | $155.00 | 3.13 |
| Room 202 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 8 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.38 | 2,392 | 0.0 | $292.47 | $1,031.07 | $195.00 | 2.86 |
| Custodian Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.14 | 897 | 0.0 | $109.68 | $555.40 | $95.00 | 4.20 |
| Restroom | 1 | Linear Fluorescent - T8: 2' T8 (17W) - 2L | Wall Switch | 33 | 3,542 | Relamp | Yes | 1 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | 17 | 2,479 | 0.01 | 86 | 0.0 | $10.51 | $164.20 | $10.00 | 14.67 |
| Tender Room | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 203 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 8 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.38 | 2,392 | 0.0 | $292.47 | $1,031.07 | $195.00 | 2.86 |

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Front Entrance | 4 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | Yes | 4 | LED Screw-In Lamps: LED Screw-in Lamp | High/Low Control | 10 | 2,479 | 0.01 | 49 | 0.0 | $5.98 | $200.00 | $0.00 | 33.46 |
| Front Entrance | 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 |
| Main Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $55.00 | 7.99 |
| Main Office | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.29 | 1,794 | 0.0 | $219.35 | $840.80 | $155.00 | 3.13 |
| Conference Room | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.27 | 1,699 | 0.0 | $207.70 | $855.00 | $135.00 | 3.47 |
| Office | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.14 | 897 | 0.0 | $109.68 | $555.40 | $95.00 | 4.20 |
| Room 208 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.29 | 1,794 | 0.0 | $219.35 | $840.80 | $155.00 | 3.13 |
| Guidance | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 8 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.38 | 2,392 | 0.0 | $292.47 | $1,031.07 | $195.00 | 2.86 |
| Guidance | 4 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 2,479 | 0.10 | 634 | 0.0 | $77.50 | $522.80 | $35.00 | 6.29 |
| Room 209 | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 14 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.67 | 4,186 | 0.0 | $511.82 | $1,601.87 | $315.00 | 2.51 |
| Room 210 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 9 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.43 | 2,691 | 0.0 | $329.03 | $1,126.20 | $215.00 | 2.77 |
| Room 210 | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 2,479 | 0.05 | 317 | 0.0 | $38.75 | $126.40 | $35.00 | 2.36 |
| Room 211 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 212 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Mens Restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $0.00 | 9.32 |
| Room 213 | 9 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,156 | None | No | 9 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,156 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| High School | 7 | Compact Fluorescent: CFL Screw-In | Wall Switch | 14 | 3,542 | Relamp | Yes | 7 | LED Screw-In Lamps: (1) 10W LED Lamp | Occupancy Sensor | 10 | 2,479 | 0.03 | 204 | 0.0 | $24.89 | $423.67 | $20.00 | 16.22 |
| Womens Restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $0.00 | 9.32 |
| Rooom 214 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 215 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.62 | 3,822 | 0.0 | $467.32 | $1,398.00 | $260.00 | 2.44 |
| 3rd Floor Corridor | 33 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 33 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,479 | 0.90 | 5,605 | 0.0 | $685.40 | $3,130.50 | $0.00 | 4.57 |
| 3rd Floor Corridor | 6 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 6 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Room 300 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.37 | 2,293 | 0.0 | $280.39 | $946.80 | $170.00 | 2.77 |
| Storage Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.16 | 1,019 | 0.0 | $124.62 | $570.80 | $95.00 | 3.82 |
| Room 302 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.58 | 3,588 | 0.0 | $438.70 | $1,411.60 | $275.00 | 2.59 |

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Storage | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.12 | 764 | 0.0 | $93.46 | $495.60 | $45.00 | 4.82 |
| Room 301 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.12 | 764 | 0.0 | $93.46 | $495.60 | $80.00 | 4.45 |
| Room 301 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | 0.02 | 134 | 0.0 | $16.44 | $58.50 | $10.00 | 2.95 |
| Room 303 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 15 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.62 | 3,822 | 0.0 | $467.32 | $1,398.00 | $260.00 | 2.44 |
| Room 304 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.14 | 897 | 0.0 | $109.68 | $285.40 | $95.00 | 1.74 |
| Room 304 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 11 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.30 | 1,868 | 0.0 | $228.47 | $913.50 | $145.00 | 3.36 |
| Room 305 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 8 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.22 | 1,359 | 0.0 | $166.16 | $738.00 | $115.00 | 3.75 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 3,542 | 0.04 | 228 | 0.0 | $27.89 | $95.13 | $20.00 | 2.69 |
| Room 306 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | Yes | 8 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,479 | 0.38 | 2,392 | 0.0 | $292.47 | $1,031.07 | $195.00 | 2.86 |
| Room 307 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Room 308 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.33 | 2,038 | 0.0 | $249.23 | $972.00 | $155.00 | 3.28 |
| Tender Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.16 | 1,019 | 0.0 | $124.62 | $570.80 | $95.00 | 3.82 |
| Tender Room | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 2,479 | 0.05 | 317 | 0.0 | $38.75 | $126.40 | $35.00 | 2.36 |
| Room 309 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.37 | 2,293 | 0.0 | $280.39 | $946.80 | $170.00 | 2.77 |
| Room 310 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 11 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.45 | 2,803 | 0.0 | $342.70 | $1,097.20 | $200.00 | 2.62 |
| Room 311 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.37 | 2,293 | 0.0 | $280.39 | $946.80 | $170.00 | 2.77 |
| Media Center | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 3,542 | Relamp | Yes | 16 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,479 | 0.66 | 4,077 | 0.0 | $498.47 | $1,473.20 | $275.00 | 2.40 |
| Media Center | 9 | Compact Fluorescent: (1) 4-Pin CFL Lamp | Wall Switch | 26 | 3,542 | Relamp | Yes | 9 | LED Screw-In Lamps: (1) 18W 4-Pin LED Lamp | Occupancy Sensor | 18 | 2,479 | 0.08 | 486 | 0.0 | $59.44 | $886.08 | $35.00 | 14.32 |
| Cafeteria | 6 | Compact Fluorescent: (1) 4-Pin CFL Lamp | Wall Switch | 26 | 3,542 | Relamp | Yes | 6 | LED Screw-In Lamps: (1) 18W 4-Pin LED Lamp | Occupancy Sensor | 18 | 2,479 | 0.05 | 324 | 0.0 | $39.63 | $680.72 | $35.00 | 16.30 |
| Stairwell | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 3,542 | Relamp | No | 16 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 3,542 | 0.59 | 3,650 | 0.0 | $446.27 | $1,522.13 | $0.00 | 3.41 |
| Stairwell | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 18 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.49 | 3,057 | 0.0 | $373.85 | $1,593.00 | $250.00 | 3.59 |
| Kitchen | 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 |
| Kitchen | 4 | Incandescent: (1) Incandescent Screw-in Lamp | Wall Switch | 65 | 3,542 | Relamp | Yes | 4 | LED Screw-In Lamps: (1) 10W LED Lamp | Occupancy Sensor | 10 | 2,479 | 0.15 | 948 | 0.0 | $115.90 | $291.81 | $20.00 | 2.35 |
| Gymnasium | 26 | Metal Halide: (1) 400W Lamp | Wall Switch | 458 | 3,542 | Fixture Replacement | Yes | 26 | LED - Fixtures: Low-Bay | Occupancy Sensor | 137 | 2,479 | 6.17 | 38,319 | 0.0 | $4,685.51 | $42,634.15 | $4,810.00 | 8.07 |

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Gymnasium | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Fitness Room | 12 | Metal Halide: (1) 350W Lamp | Wall Switch | 400 | 3,542 | Fixture Replacement | Yes | 12 | LED - Fixtures: Low-Bay | Occupancy Sensor | 120 | 2,479 | 2.49 | 15,446 | 0.0 | $1,888.69 | $19,677.30 | $2,220.00 | 9.24 |
| Gym Lobby | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.11 | 679 | 0.0 | $83.08 | $504.00 | $75.00 | 5.16 |
| Storage Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | 0.04 | 269 | 0.0 | $32.87 | $117.00 | $20.00 | 2.95 |
| Mens Locker Room | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 16 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.44 | 2,718 | 0.0 | $332.31 | $1,476.00 | $230.00 | 3.75 |
| Mens Locker Room | 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 |
| Restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $0.00 | 9.32 |
| Shower Room | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.16 | 1,019 | 0.0 | $124.62 | $621.00 | $95.00 | 4.22 |
| Girls Locker Room | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 16 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.44 | 2,718 | 0.0 | $332.31 | $1,476.00 | $230.00 | 3.75 |
| Girls Locker Room | 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 |
| Restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.05 | 340 | 0.0 | $41.54 | $387.00 | $0.00 | 9.32 |
| Shower Room | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.16 | 1,019 | 0.0 | $124.62 | $621.00 | $95.00 | 4.22 |
| Storage Room | 4 | LED Screw-In Lamps: LED Screw-in Lamp | Wall Switch | 10 | 3,542 | None | Yes | 4 | LED Screw-In Lamps: LED Screw-in Lamp | Occupancy Sensor | 10 | 2,479 | 0.01 | 49 | 0.0 | $5.98 | $116.00 | $0.00 | 19.41 |
| Gym Office | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,479 | 0.11 | 679 | 0.0 | $83.08 | $504.00 | $75.00 | 5.16 |
| Gym Office | 2 | Incandescent: (1) Incandescent Screw-in Lamp | Wall Switch | 65 | 3,542 | Relamp | Yes | 2 | LED Screw-In Lamps: (1) 10W LED Lamp | Occupancy Sensor | 10 | 2,479 | 0.08 | 474 | 0.0 | $57.95 | $203.91 | $30.00 | 3.00 |
| Closet | 1 | Incandescent: (1) Incandescent Screw-in Lamp | Wall Switch | 65 | 3,542 | Relamp | No | 1 | LED Screw-In Lamps: (1) 10W LED Lamp | Wall Switch | 10 | 3,542 | 0.04 | 225 | 0.0 | $27.52 | $43.95 | $5.00 | 1.42 |
| Storage Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 3,542 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,542 | 0.02 | 134 | 0.0 | $16.44 | $58.50 | $10.00 | 2.95 |
| Exterior Wallpack | 5 | High-Pressure Sodium: (1) 150W Lamp | Daylight Dimming | 188 | 4,380 | Fixture Replacement | No | 5 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Daylight Dimming | 56 | 4,380 | 0.43 | 3,314 | 0.0 | $405.27 | $1,953.39 | $500.00 | 3.59 |
| Exterior Wallpack | 3 | LED - Fixtures: (25)W LED Wallpack | Daylight Dimming | 25 | 4,380 | None | No | 3 | LED - Fixtures: (25)W LED Wallpack | Daylight Dimming | 25 | 4,380 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Exterior Wallpack | 6 | LED - Fixtures: (1) 11W LED Screw-in Lamp | Daylight Dimming | 11 | 4,380 | None | No | 6 | LED - Fixtures: (1) 11W LED Screw-in Lamp | Daylight Dimming | 11 | 4,380 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Parking Lot | 2 | Metal Halide: (1) 400W Lamp | Daylight Dimming | 458 | 4,380 | Fixture Replacement | No | 2 | LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture | Daylight Dimming | 137 | 4,380 | 0.42 | 3,230 | 0.0 | $394.92 | $3,905.99 | $200.00 | 9.38 |

## Motor Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Annual Operating Hours | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room 2 | Air Compressor | 2 | Air Compressor | 0.5 | 78.0% | No | 2,479 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 2 | Combustion Air | 1 | Combustion Air Fan | 1.5 | 84.0% | No | 3,431 | No | 84.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 2 | Heating Hot Water Loop | 4 | Heating Hot Water Pump | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | Condensate Pump | 2 | Process Pump | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | Boiler Feed Water Pump | 2 | Boiler Feed Water Pump | 0.5 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | Combustion Air Fan | 2 | Combustion Air Fan | 2.0 | 87.0% | No | 3,431 | No | 87.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 2 | Sump Pump | 5 | Other | 0.5 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | Air Compressor | 1 | Air Compressor | 1.0 | 82.5% | No | 2,479 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | Air Compressor | 1 | Air Compressor | 1.0 | 82.5% | No | 2,479 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | Combustion Air | 1 | Combustion Air Fan | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler Room 1 | DHW Recirculation | 2 | Heating Hot Water Pump | 0.3 | 78.0% | No | 4,380 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Roof | Exhaust | 15 | Exhaust Fan | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Roof | Kitchen Class | 1 | Exhaust Fan | 0.8 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Roof | Medication | 2 | Exhaust Fan | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Room 106 | Condensate Pump | 1 | Other | 0.5 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Elevator Room | Elevator | 1 | Process Pump | 40.0 | 92.4% | No | 1,200 | No | 92.4% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Closet | Condensate Pump | 1 | Other | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | Kitchen | 2 | Exhaust Fan | 0.3 | 78.0% | No | 3,431 | No | 78.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Gymnasium | Gymnasium | 2 | Exhaust Fan | 2.0 | 86.5% | No | 3,431 | No | 86.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Gymnasium | Gymnasium AHU | 1 | Supply Fan | 5.0 | 87.5% | No | 3,431 | No | 87.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

| | | Existing Conditions | | | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Annual Operating Hours | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Fitness Room | Fitness Room AHU | 1 | Supply Fan | 2.0 | 86.5% | No | 3,431 | No | 86.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Highschool | Unit Ventillators | 40 | Supply Fan | 0.1 | 60.0% | No | 3,431 | Yes | 80.0% | No | | 0.58 | 2,666 | 0.0 | $326.04 | $24,496.37 | $0.00 | 75.13 |

## Electric HVAC Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Cooling Mode Efficiency (SEER/EER) | Heating Mode Efficiency (COP) | Install Dual Enthalpy Economizer? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Room 301 | 1 | Split-System AC | 1.50 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Roof | Teacher Room | 1 | Split-System Air-Source HP | 2.00 | 24.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Roof | 3rd Floor Teacher Room | 1 | Split-System Air-Source HP | 2.00 | 27.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Roof | Media Center | 2 | Split-System AC | 3.50 | | Yes | 2 | Split-System AC | 3.50 | | 14.00 | | No | 2.74 | 4,082 | 0.0 | $499.17 | $10,473.54 | $644.00 | 19.69 |
| Gym Storage | Gym Storage | 1 | Window AC | 1.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Nurse Office | 2 | Split-System AC | 0.75 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Facility Manager Office | 1 | Split-System AC | 0.75 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Main Office + Guidance Office | 2 | Split-System Air-Source HP | 8.00 | 9.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Room 108 | 1 | Split-System AC | 4.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Room 213, 310 | 1 | Split-System Air-Source HP | 7.67 | 8.58 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Cafeteria | 4 | Split-System AC | 3.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Vice Principal Office | 1 | Split-System Air-Source HP | 2.00 | 24.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Room 110 | 1 | Split-System Air-Source HP | 2.00 | 24.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Fitness Room | 1 | Split-System AC | 10.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Room 201, 209 | 1 | Split-System Air-Source HP | 7.67 | 8.58 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Tech Office | 1 | Split-System AC | 2.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Ground Floor | Room 103 | 1 | Split-System AC | 3.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Wall Mounted | Room 203 | 1 | Split-System Air-Source HP | 2.00 | 24.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Custodian Closet | Custodian Closet | 1 | Window AC | 0.83 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Fuel Heating Inventory & Recommendations

| | | Existing Conditions | | | Proposed Conditions | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Output Capacity per Unit (MBh) | Install High Efficiency System? | System Quantity | System Type | Output Capacity per Unit (MBh) | Heating Efficiency | Heating Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room | Heating Hot Water | 2 | Forced Draft Steam Boiler | 3,031.00 | Yes | 2 | Forced Draft Steam Boiler | 3,031.00 | 81.00% | Et | 0.00 | 0 | 81.6 | $930.93 | $112,670.28 | $6,062.00 | 114.52 |
| Boiler Room 2 | Heating Hot Water | 1 | Non-Condensing Hot Water Boiler | 2,724.00 | No | | | | | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## DHW Inventory & Recommendations

| | | Existing Conditions | | Proposed Conditions | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Replace? | System Quantity | System Type | Fuel Type | System Efficiency | Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room | Domestic Hot Water | 1 | Tankless Water Heater | Yes | 1 | Tankless Water Heater | Natural Gas | 82.00% | EF | 0.00 | 0 | 2.2 | $24.58 | $7,541.39 | $300.00 | 294.65 |
| Boiler Room 2 | Domestic Hot Water | 2 | Storage Tank Water Heater (> 50 Gal) | No | | | | | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | Kitchen | 1 | Storage Tank Water Heater (> 50 Gal) | Yes | 1 | Storage Tank Water Heater (> 50 Gal) | Natural Gas | 93.00% | Et | 0.00 | 0 | 0.7 | $8.13 | $11,500.21 | $398.00 | 1366.23 |

## Low-Flow Device Recommendations

| | Recommedation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Restrooms | 11 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 0 | 17.0 | $194.00 | $78.87 | $0.00 | 0.41 |
| Kitchen | 3 | Faucet Aerator (Kitchen) | 2.50 | 2.20 | 0.00 | 0 | 0.9 | $10.58 | $21.51 | $0.00 | 2.03 |

## Walk-In Cooler/Freezer Inventory & Recommendations

| | Existing Conditions | | Proposed Conditions | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Cooler/ Freezer Quantity | Case Type/Temperature | Install EC Evaporator Fan Motors? | Install Electric Defrost Control? | Install Evaporator Fan Control? | 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 |
| Kitchen | 1 | Medium Temp Freezer (0F to 30F) | Yes | No | Yes | 0.33 | 4,125 | 0.0 | $504.39 | $2,280.60 | $155.00 | 4.21 |

## Commercial Refrigerator/Freezer Inventory & Recommendations

| | Existing Conditions | | | Proposed Condi | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Refrigerator/ Freezer Type | ENERGY STAR Qualified? | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | Yes | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 2 | Refrigerator Chest | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 1 | Stand-Up Refrigerator, Solid Door (>50 cu. ft.) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 1 | Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 1 | Stand-Up Freezer, Solid Door (>50 cu. ft.) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Cooking Equipment Inventory & Recommendations

| | Existing Conditions | | | Proposed Conditions | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Type | High Efficiency Equipement? | Install High Efficiency Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Gas Combination Oven/Steam Cooker (<15 Pans) | Yes | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 1 | Gas Rack Oven (Double) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 2 | Insulated Food Holding Cabinet (3/4 Size) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 2 | Insulated Food Holding Cabinet (3/4 Size) | Yes | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Plug Load Inventory

| | Existing Conditions | | | |
|---|---|---|---|---|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Basement | 3 | Washing Machine | 500.0 | No |
| Basement | 3 | Dryer | 300.0 | No |
| Room | 1 | Kiln | 7,987.2 | No |
| Throughout Building | 14 | Printer | 20.0 | Yes |
| Throughout Building | 12 | TVs | 71.0 | |
| Throughout Building | 7 | Copy Machine | 600.0 | |
| Throughout Building | 1 | Water Cooler | 92.0 | |
| Throughout Building | 6 | Small Freezer | 207.0 | |
| Throughout Building | 5 | Coffee Machine | 900.0 | |
| Throughout Building | 5 | Refrigerator | 172.0 | |
| Throughout Building | 8 | Microwave | 1,000.0 | |
| Throughout Building | 4 | Electric Range | 100.0 | |
| Throughout Building | 214 | Computer + LCD Monitor | 150.0 | |

## Vending Machine Inventory & Recommendations

| | Existing Conditions | | Proposed Conditions | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Vending Machine Type | Install Controls? | 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 |
| Corridor 1st Floor | 1 | Refrigerated | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Corridor 1st Floor | 1 | Non-Refrigerated | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Cafeteria | 1 | Refrigerated | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Cafeteria | 1 | Non-Refrigerated | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Teachers Room | 1 | Refrigerated | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Teachers Room | 1 | Non-Refrigerated | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

# *Appendix B: ENERGY STAR® Statement of Energy Performance*

## ENERGY STAR® Statement of Energy Performance

**46**

ENERGY STAR® Score[1]

### Keyport High School

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 84,948
**Built:** 1927

**For Year Ending:** July 31, 2017
**Date Generated:** June 08, 2018

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

### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Keyport High School<br>351 Broad Street<br>Keyport, New Jersey 07735 | Keyport Board of Education<br>370 Broad Street<br>Keyport, NJ 07735<br>732-212-6100 | Anthony Rapolla<br>370 Broad Street<br>Keyport, NJ 07735<br>732-212-6100 Ext. 1008<br>arapolla@kpsdschools.org |

**Property ID:** 6377919

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

**Site EUI**
104.2 kBtu/ft²

**Source EUI**
152.5 kBtu/ft²

| Annual Energy by Fuel | |
|---|---|
| Electric - Solar (kBtu) | 378,857 (4%) |
| Electric - Grid (kBtu) | 1,760,816 (20%) |
| Natural Gas (kBtu) | 6,708,027 (76%) |

| National Median Comparison | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 101.4 |
| National Median Source EUI (kBtu/ft²) | 148.4 |
| % Diff from National Median Source EUI | 3% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 552 |

### 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)**