# Local Government Energy Audit:
## Energy Audit Report


***Buena Regional Middle School***

175 Weymouth Road

Buena, NJ 08310

Buena Regional School District

October 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 saving 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 Buena Regional Middle 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

Buena Regional Middle School is a 92,335 square foot facility comprised of various space types within a single building connected by hallways. The school building is one floor and includes classrooms, offices, cafeteria, gym, library, media room, commercial kitchen, auditorium, and mechanical space.

Lighting at Buena Regional Middle School primarily consists of less efficient linear fluorescent lighting and larger central HVAC equipment controlled by a building energy management system. Heating is supplied through hot water produced by natural gas boilers, and cooling is supplied through chilled water produced by an air-cooled chiller. Ventilation is provided by rooftop air-handling units, some of which are part of a variable air volume system with zone reheat. A more thorough description of the facility and our observations are located in Section 2.

## 1.2 Your Cost Reduction Opportunities

### Energy Conservation Measures

TRC evaluated and recommends nine measures which together represent an opportunity for Buena Regional Middle School to reduce annual energy costs by $60,953 and annual greenhouse gas emissions by 371,183 lbs $CO_2e$. We estimate that if all measures were implemented as recommended, the project would pay for itself in 3.5 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 Buena Regional Middle School's annual energy use by 12%.

*Figure 1 – Previous 12 Month Utility Costs*

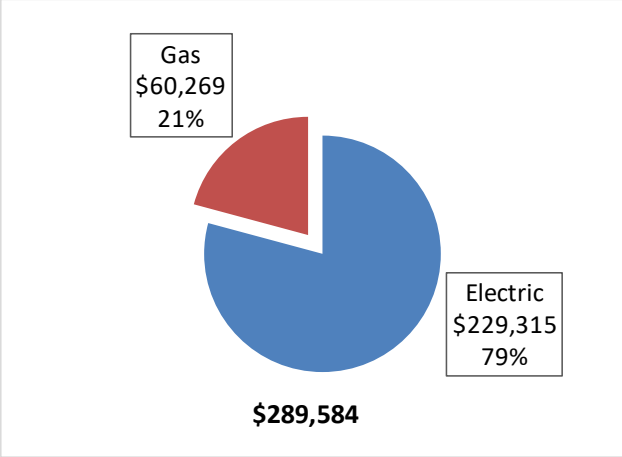
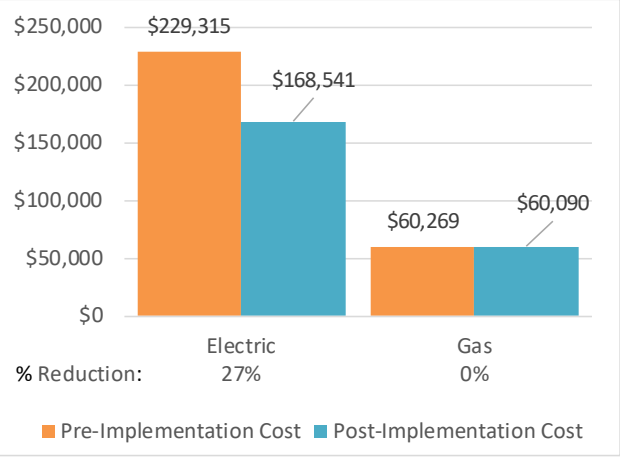



*Figure 2 – Potential Post-Implementation Costs*




A detailed description of Buena Regional Middle 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 | | | 246,303 | 44.0 | 0.0 | $40,839.74 | $181,028.52 | $19,605.00 | $161,423.52 | 4.0 | 248,025 |
| ECM 1 | Install LED Fixtures | Yes | 118,342 | 19.2 | 0.0 | $19,622.39 | $114,059.53 | $7,450.00 | $106,609.53 | 5.4 | 119,169 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 124,685 | 24.6 | 0.0 | $20,674.11 | $65,785.88 | $12,155.00 | $53,630.88 | 2.6 | 125,557 |
| ECM 3 | Install LED Exit Signs | Yes | 3,276 | 0.2 | 0.0 | $543.24 | $1,183.11 | $0.00 | $1,183.11 | 2.2 | 3,299 |
| Lighting Control Measures | | | 36,117 | 7.1 | 0.0 | $5,988.66 | $25,254.00 | $3,265.00 | $21,989.00 | 3.7 | 36,370 |
| ECM 4 | Install Occupancy Sensor Lighting Controls | Yes | 33,286 | 6.6 | 0.0 | $5,519.19 | $21,054.00 | $3,265.00 | $17,789.00 | 3.2 | 33,519 |
| ECM 5 | Install High/Low Lighitng Controls | Yes | 2,831 | 0.6 | 0.0 | $469.47 | $4,200.00 | $0.00 | $4,200.00 | 8.9 | 2,851 |
| Variable Frequency Drive (VFD) Measures | | | 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |
| ECM 6 | Install VFDs on Constant Volume (CV) HVAC | Yes | 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |
| Domestic Water Heating Upgrade | | | 0 | 0.0 | 17.9 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | Yes | 0 | 0.0 | 17.9 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |
| Food Service Equipment & Refrigeration Measures | | | 5,404 | 0.4 | 0.0 | $896.01 | $4,864.50 | $150.00 | $4,714.50 | 5.3 | 5,442 |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 2,635 | 0.3 | 0.0 | $436.97 | $1,516.50 | $0.00 | $1,516.50 | 3.5 | 2,654 |
| ECM 9 | Refrigeration Controls | Yes | 2,768 | 0.1 | 0.0 | $459.04 | $3,348.00 | $150.00 | $3,198.00 | 7.0 | 2,788 |
| TOTALS FOR HIGH PRIORITY MEASURES | | | 366,528 | 77.4 | 17.9 | $60,953.31 | $246,157.85 | $31,020.00 | $215,137.85 | 3.5 | 371,183 |

* - 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.

**Variable Frequency Drives (VFDs)** are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

**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.

**Plug Load Equipment** control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlet when not in use.

## Energy Efficient Practices

TRC also identified seven 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 Buena Regional Middle School include:

- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Ensure Economizers are Functioning Properly
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Water Conservation

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

## On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Buena Regional Middle School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array and a Microturbine CHP system.

*Figure 4 – Photovoltaic Potential*

| | | |
|---|---|---|
| Potential | High | |
| System Potential | 400 | kW DC STC |
| Electric Generation | 476,549 | kWh/yr |
| Displaced Cost | $41,460 | /yr |
| Installed Cost | $1,560,000 | |

*Figure 5 – Combined Heat and Power Potential*

| | | |
|---|---|---|
| Potential | High | |
| System Type | Microturbine | |
| System Potential | 90 | kW |
| Electric Generation | 693,260 | kWh/yr |
| Thermal Generation | 4,078,000 | MBtu/yr |
| Displaced Cost | $44,479 | /yr |
| Installed Cost | $321,000 | |

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
- Combined Heat and Power and Fuel Cell
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 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. You may also check the following website for more details: www.njcleanenergy.com/ci.

# 2 FACILITY INFORMATION AND EXISTING CONDITIONS

## 2.1 Project Contacts

*Figure 6 – Project Contacts*

| Name | Role | E-Mail | Phone # |
|---|---|---|---|
| Customer | | | |
| Joe Biluck Jr. | Interim Building & Grounds Supervisor | jbiluck@buena.k12.nj.us | 856-697-0800 |
| TRC Energy Services | | | |
| Vish Nimbalkar | Auditor | VNaikNimbalkar@trcsolutions.com | (732) 855-0033 |

## 2.2 General Site Information

On May 10, 2018, TRC performed an energy audit at Buena Regional Middle School located in Buena, New Jersey. TRC's team met with Kevin Warren to review the facility operations and help focus our investigation on specific energy-using systems.

Buena Regional Middle School is a 92,335 square foot facility comprised of various space types within a single building connected by hallways. The school building is one floor and includes classrooms, offices, cafeteria, gym, library, media room, commercial kitchen, auditorium, and mechanical space.

Lighting at Buena Regional Middle School primarily consists of less efficient linear fluorescent lighting and large central HVAC equipment controlled by a building energy management system. Heating is supplied through hot water produced by natural gas boilers, and cooling is supplied through chilled water produced by an air-cooled chiller. Ventilation is provided by rooftop air-handling units, some of which are part of a variable air volume system with zone reheat.

The building was constructed in 2009 and the lighting and mechanical equipment are original.

## 2.3 Building Occupancy

The school building is open Monday through Friday for classes, after school programs, and occasionally used for athletic or performing arts events. The typical schedule is presented in the table below. The entire facility is used to some extent year round by the community, students, or staff. During a typical day, the facility is occupied by 45 staff and 450 students.

*Figure 7 - Building Schedule*

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Buena Regional Middle School | Weekday | 5:30 AM - 9:00 PM |
| Buena Regional Middle School | Weekend | Closed |

## 2.4 Building Envelope

The building is constructed of concrete block and structural steel with a stone facade. The building has pitched roof sections covered with asphalt shingles in good condition. There are two areas of recessed white flat roof, where the air handlers are located. The buildings have double-pane windows which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of aluminum and in good condition.


*Figure 8 - Building Exterior*

## 2.5 Energy-Using Systems

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

### Lighting System

Lighting at the facility is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some 4-pin compact fluorescent lamps (CFL). Most of the T8 fixtures are 2-lamp or 3-lamp, 4-foot long troffers with diffusers. The gym has high-bay metal halide lighting, and there are a few inefficient incandescent lighting fixtures in the auditorium.

Lighting control in throughout the school is provided by manual wall switches.

The building's exterior lighting consists primarily of metal halide and compact fluorescent wall-mounted fixtures.

*Figure 9 – Lighting System Lamps*

## Chilled Water System

The facility is served by a single 350 ton Trane air-cooled rotary screw chiller located in a mechanical yard adjacent to the building. Chilled water is provided at a rated flow of 720 gallons per minute (gpm) through a primary-secondary pumping system. A 10 hp constant flow primary circuit pump (P-1) operates whenever the chiller is enabled, and a 20 hp variable flow secondary circuit pump (P-2) modulates to meet cooling needs. The chiller is set to be enabled when the outside air temperature is above 50°F, and is set to deliver chilled water to the cooling coils on the six air handlers on the roof at a chilled water supply temperature of 42°F.


*Figure 10 – Chilled Water System*

## Hot Water Heating System

The hot water system consists of three P-K Thermific 1,700 kBtu/hr output non-condensing boilers (BR1, 2, 3). The boilers have a nominal combustion efficiency of 85%. Hot water is distributed through a primary-secondary pumping configuration. Each boiler has a 2 hp constant flow primary circuit pump (P5, 6, & 7) which operate whenever the associated boiler is called to run. There are two 20 hp variable flow secondary circuit pumps (P3, 4) which operate in a lead/lag fashion to meet the building's heating needs. Hot water is supplied at 140°F, and hot water valves at the air handlers are enabled when the outside air temperature is below 100°F which causes the system to run a majority of the year. The boilers provide hot water to the air handlers and to VAV box reheat coils.

The boilers operate in a lead/lag/standby configuration. Only two boilers are required during cold weather. The boilers are in good condition and well maintained.


*Figure 11 – Hot Water Heating System*

## Air Conditioning and Distribution System

There are six roof-mounted air handling units (AHU1, 2, 3, 4, 5, and 6) that serve the cooling and heating needs of the entire school. The HVAC system is set on an occupied schedule to operate from 5:30 AM to 9:00 PM, five days per week, and an unoccupied schedule at all other times. Each AHU draws air from its own return air shaft and supplies air to its own air shaft. All AHUs have supply and return fans. Supply fans range from 20 to 60 hp, and return fans range from 10 to 30 hp. AHUs 2, 3, and 5 have VFDs on both supply and return fans, and serve VAV boxes equipped with hot water reheat coils and zone dampers. The other three air handlers are constant volume with hot water reheat. The constant volume supply fans maintain a constant duct static pressure of 1 inch W.G. and the variable volume supply fans maintain between 3 and 3.5 inch W.G of static duct pressure.

The cooling supply air setpoint is 55°F and the heating setpoint is 90°F. AHUs 2, 3, and 5 utilize supply air temperature resets to adjust supply air temperature according to outside air conditions. The AHUs serving the gym and auditorium utilize demand control ventilation, monitoring $CO_2$ levels to modulate ventilation according to occupancy. All six air handlers are equipped with economizers.

VAV boxes modulate dampers and hot water reheat valves to meet temperature setpoints, which vary based on occupancy schedules set by the BEMS, including evening setbacks.

*Figure 12 – Chilled Water Air Conditioning System*

## Building Energy Management System (BEMS)

The facility's HVAC equipment is controlled with a CM3 Building Solutions building energy management system (BEMS). The BEMS aggregates the DDC points from throughout the building. The system is capable of providing occupied and unoccupied schedules for different equipment, alarm and status information, and trends for individual DDC points. The CM3 system does not provide control for the lighting systems.

The BEMS maintains the facility at an occupied space temperature setpoint of 70°F, and an unoccupied temperature between 60°F and 85°F. If during any unoccupied periods the spaces fall below 60°F, the system provides heating until the space maintains a temperature of 65°F for 15 minutes. Similarly, should the temperature go above 85°F, the system provides cooling until the space maintains a temperature of 80°F for 15 minutes.

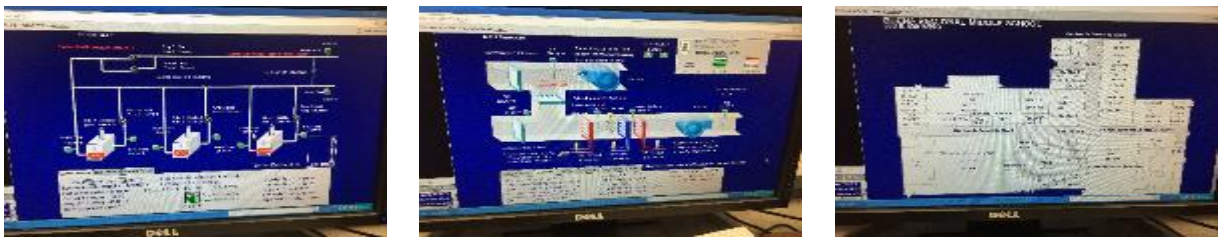


*Figure 13 – Building Energy Management System Dashboards*

## Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of one AO Smith Genesis gas-fired non-condensing hot water heater and associated 750 gallon storage tank with an input rating of 650 kBtu/hr and a nominal efficiency of 83.7%. A recirculation pump distributes water to the entire site. The recirculation pumps operate continuously.


*Figure 14 – Domestic Hot Water System*

## Food Service Equipment

The facility has a commercial kitchen that is used to prepare meals for the students. The convection ovens and combination oven/steam cooker are gas fired. There are also insulated warming ovens to hold prepared food and warming trays to serve food. The school has a single-tank, low-temperature dish washer.

*Figure 15 – Food Service Equipment*

## Refrigeration

The kitchen has a walk-in refrigerator and a walk-in freezer that are used to store food prepared for school meals. Both walk-ins have single 3 hp compressor units. The kitchen also has a two large free standing pass-through commercial refrigerators, and a milk cooler. There are also two refrigerated beverage cases in the cafeteria and 4 medium or large standard refrigerators throughout the facility.

*Figure 16 – Refrigeration Equipment*

## Building Plug Load

There are 262 computer work stations throughout the facility. All of the computers are desktop units with LCD monitors. There is no centralized PC power management software installed.

There are 20 printers or printer/copiers and 36 overhead projectors scattered throughout the facility. In addition, there are also other appliances such as coffee makers, microwaves, and televisions.

The facility also has a non- refrigerated vending machine equipped with occupancy based controls.


*Figure 17 – Plug Load Equipment*

## 2.6 Water-Using Systems

There are 20 restrooms at this facility. Faucets are assumed to be rated for 1.5 gpm or higher. The school also has a girls and boys locker room. The locker rooms each have eight showerheads which are assumed to have flow rates of 2.5 gpm or greater per showerhead.

# 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

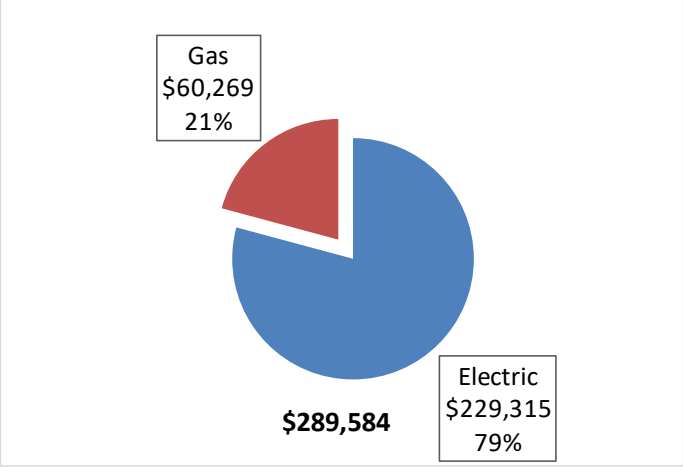
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

*Figure 18 - Utility Summary*

| Utility Summary for Buena Regional Middle School | | |
|---|---|---|
| Fuel | Usage | Cost |
| Electricity | 1,382,989 kWh | $229,315 |
| Natural Gas | 60,191 Therms | $60,269 |
| Total | | $289,584 |

The current annual energy cost for this facility is $289,584 as shown in the chart below.

*Figure 19 - Energy Cost Breakdown*



## 3.2 Electricity Usage

Electricity is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.166/kWh, which is the blended rate that includes energy supply, distribution, and other charges. Peak electric demand is relatively consistent month to month, but consumption is noticeably lower in winter months than summer months. This is due to reduced use of cooling equipment during that period. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

*Figure 20 - Electric Usage & Demand*

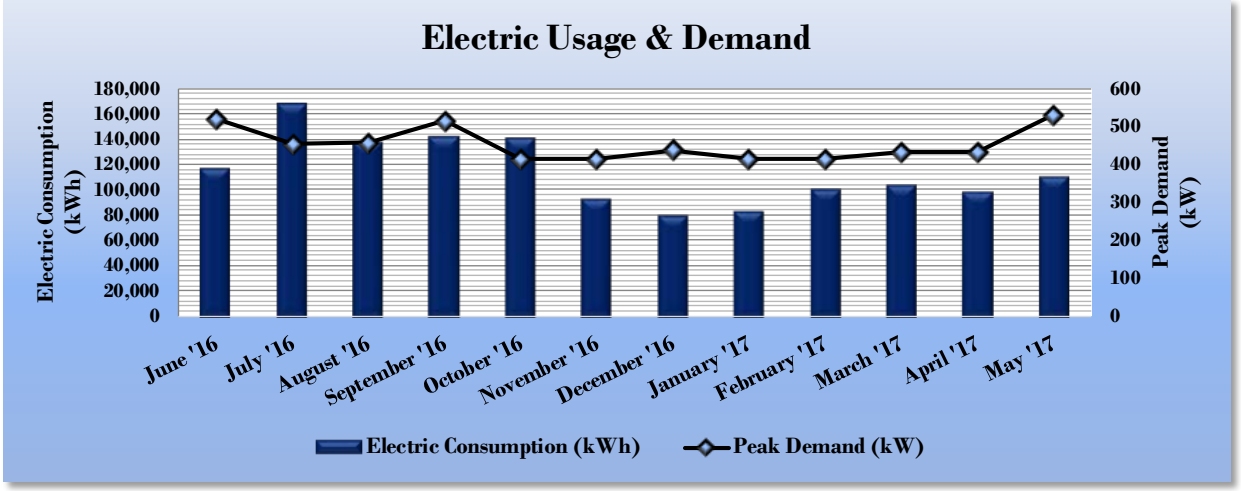



*Figure 21 - Electric Usage & Demand*

| Electric Billing Data for Buena Regional Middle School | | | | | | |
|---|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost | TRC Estimated Usage? |
| 6/23/16 | 30 | 117,200 | 518 | $3,968 | $18,287 | No |
| 7/25/16 | 32 | 168,600 | 453 | $3,700 | $24,208 | No |
| 8/24/16 | 30 | 138,000 | 458 | $3,526 | $20,269 | No |
| 9/23/16 | 30 | 142,600 | 516 | $4,556 | $21,849 | No |
| 10/24/16 | 31 | 141,200 | 414 | $3,781 | $20,620 | No |
| 11/21/16 | 28 | 93,800 | 414 | $3,415 | $14,737 | No |
| 12/21/16 | 30 | 80,000 | 438 | $3,868 | $21,075 | Yes |
| 1/24/17 | 34 | 83,800 | 414 | $4,144 | $22,076 | Yes |
| 2/22/17 | 29 | 100,600 | 414 | $3,533 | $15,626 | No |
| 3/23/17 | 29 | 103,800 | 432 | $3,683 | $16,140 | No |
| 4/24/17 | 32 | 98,800 | 432 | $4,064 | $16,029 | No |
| 5/23/17 | 29 | 110,800 | 530 | $4,519 | $17,771 | No |
| Totals | 364 | 1,379,200 | 530 | $46,757 | $228,687 | 2 |
| Annual | 365 | 1,382,989 | 530 | $46,885 | $229,315 | |

## 3.3 Natural Gas Usage

Natural gas is provided by South Jersey Gas. The average gas cost for the past 12 months is $1.001/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. Consumption noticeably dips in the summer months of August and September as there is less heating occurring during those months; however, because the boilers are used for reheat due to dehumidification, some fuel is still consumed during those months.

*Figure 22 - Natural Gas Usage*

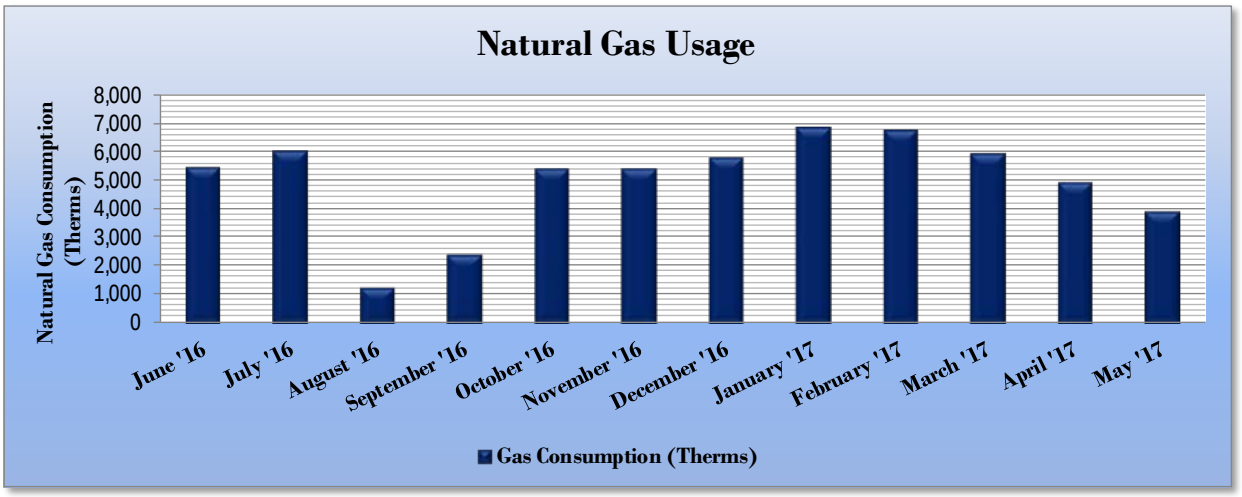



*Figure 23 - Natural Gas Usage*

| Gas Billing Data for Buena Regional Middle School | | | |
|---|---|---|---|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 6/23/16 | 31 | 5,444 | $5,063 |
| 7/25/16 | 32 | 6,050 | $5,643 |
| 8/25/16 | 31 | 1,266 | $1,181 |
| 9/23/16 | 29 | 2,412 | $2,252 |
| 10/24/16 | 31 | 5,387 | $5,421 |
| 11/21/16 | 28 | 5,418 | $5,570 |
| 12/21/16 | 30 | 5,802 | $6,490 |
| 1/24/17 | 34 | 6,863 | $6,677 |
| 2/22/17 | 29 | 6,750 | $6,561 |
| 3/23/17 | 29 | 5,919 | $6,394 |
| 4/24/17 | 32 | 4,950 | $5,068 |
| 5/23/17 | 29 | 3,930 | $3,949 |
| Totals | 365 | 60,191 | $60,269 |
| Annual | 365 | 60,191 | $60,269 |

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

| Energy Use Intensity Comparison - Existing Conditions | | |
|---|---|---|
| | Buena Regional Middle School | National Median<br>Building Type: School (K-12) |
| Source Energy Use Intensity (kBtu/ft$^2$) | 228.9 | 141.4 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 116.3 | 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 25 - Energy Use Intensity Comparison – Following Installation of Recommended Measures*

| Energy Use Intensity Comparison - Following Installation of Recommended Measures | | |
|---|---|---|
| | Buena Regional Middle School | National Median<br>Building Type: School (K-12) |
| Source Energy Use Intensity (kBtu/ft$^2$) | 186.2 | 141.4 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 102.6 | 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% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 11.

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

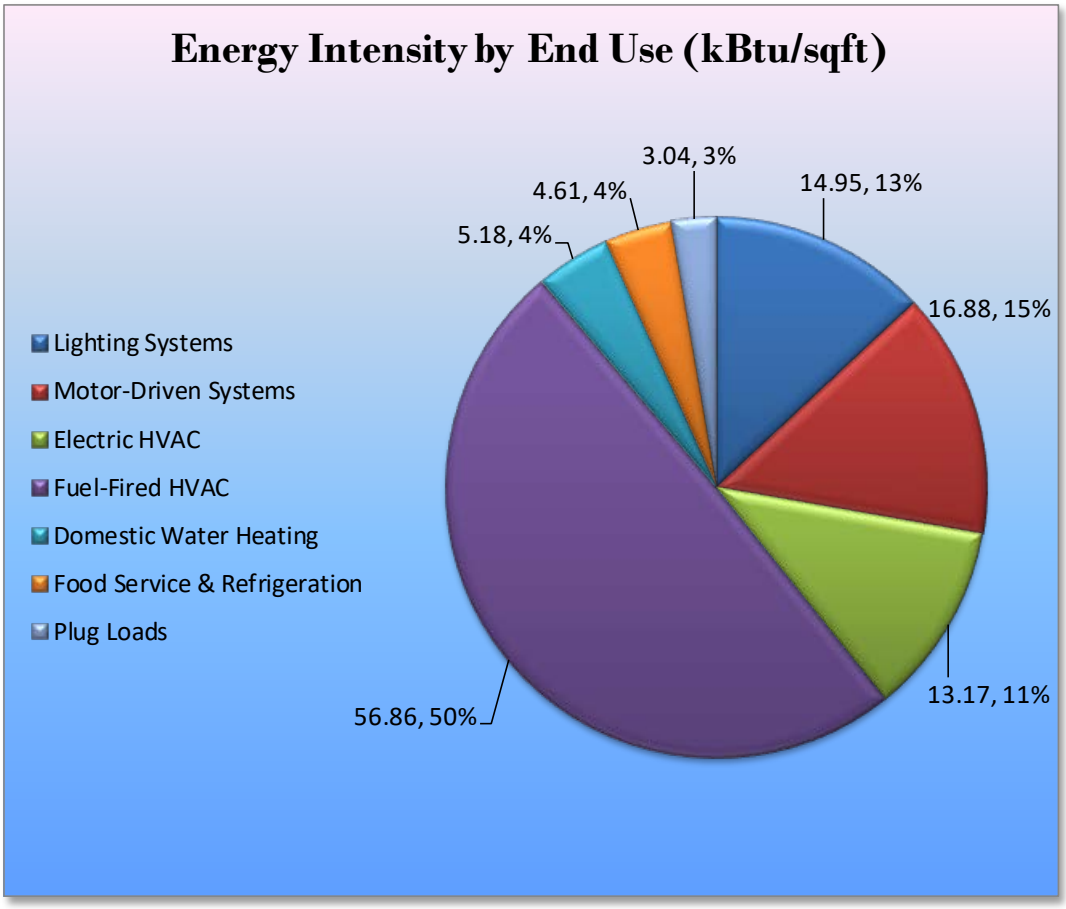
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 26 - 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 Buena Regional Middle 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 27 – 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 | | 246,303 | 44.0 | 0.0 | $40,839.74 | $181,028.52 | $19,605.00 | $161,423.52 | 4.0 | 248,025 |
| ECM 1 | Install LED Fixtures | 118,342 | 19.2 | 0.0 | $19,622.39 | $114,059.53 | $7,450.00 | $106,609.53 | 5.4 | 119,169 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 124,685 | 24.6 | 0.0 | $20,674.11 | $65,785.88 | $12,155.00 | $53,630.88 | 2.6 | 125,557 |
| ECM 3 | Install LED Exit Signs | 3,276 | 0.2 | 0.0 | $543.24 | $1,183.11 | $0.00 | $1,183.11 | 2.2 | 3,299 |
| Lighting Control Measures | | 36,117 | 7.1 | 0.0 | $5,988.66 | $25,254.00 | $3,265.00 | $21,989.00 | 3.7 | 36,370 |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 33,286 | 6.6 | 0.0 | $5,519.19 | $21,054.00 | $3,265.00 | $17,789.00 | 3.2 | 33,519 |
| ECM 5 | Install High/Low Lighitng Controls | 2,831 | 0.6 | 0.0 | $469.47 | $4,200.00 | $0.00 | $4,200.00 | 8.9 | 2,851 |
| Variable Frequency Drive (VFD) Measures | | 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |
| ECM 6 | Install VFDs on Constant Volume (CV) HVAC | 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |
| Domestic Water Heating Upgrade | | 0 | 0.0 | 17.9 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | 0 | 0.0 | 17.9 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |
| Food Service Equipment & Refrigeration Measures | | 5,404 | 0.4 | 0.0 | $896.01 | $4,864.50 | $150.00 | $4,714.50 | 5.3 | 5,442 |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | 2,635 | 0.3 | 0.0 | $436.97 | $1,516.50 | $0.00 | $1,516.50 | 3.5 | 2,654 |
| ECM 9 | Refrigeration Controls | 2,768 | 0.1 | 0.0 | $459.04 | $3,348.00 | $150.00 | $3,198.00 | 7.0 | 2,788 |
| TOTALS | | 366,528 | 77.4 | 17.9 | $60,953.31 | $246,157.85 | $31,020.00 | $215,137.85 | 3.5 | 371,183 |

* - 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 28 below.

*Figure 28 – 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 | | 246,303 | 44.0 | 0.0 | $40,839.74 | $181,028.52 | $19,605.00 | $161,423.52 | 4.0 | 248,025 |
| ECM 1 | Install LED Fixtures | 118,342 | 19.2 | 0.0 | $19,622.39 | $114,059.53 | $7,450.00 | $106,609.53 | 5.4 | 119,169 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 124,685 | 24.6 | 0.0 | $20,674.11 | $65,785.88 | $12,155.00 | $53,630.88 | 2.6 | 125,557 |
| ECM 3 | Install LED Exit Signs | 3,276 | 0.2 | 0.0 | $543.24 | $1,183.11 | $0.00 | $1,183.11 | 2.2 | 3,299 |

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 | 56,759 | 11.2 | 0.0 | $9,411.28 | $73,388.72 | $3,900.00 | $69,488.72 | 7.4 | 57,156 |
| Exterior | 61,583 | 8.0 | 0.0 | $10,211.11 | $40,670.81 | $3,550.00 | $37,120.81 | 3.6 | 62,013 |

*Measure Description*

We recommend replacing exterior pole mounted and wall mounted fixtures containing metal halide lamps with new high performance LED light fixtures. Interior areas recommended for fixture replacement include the gym, wrestling, and auditorium seating areas, where metal halide fixtures are also present. 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 metal halide sources.

## ECM 2: Retrofit Fixtures with LED Lamps

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 122,937 | 24.3 | 0.0 | $20,384.34 | $64,959.06 | $12,155.00 | $52,804.06 | 2.6 | 123,797 |
| Exterior | 1,748 | 0.2 | 0.0 | $289.77 | $826.83 | $0.00 | $826.83 | 2.9 | 1,760 |

*Measure Description*

We recommend retrofitting existing incandescent, and fluorescent 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 a fluorescent tubes and more than ten times longer than many incandescent lamps.

## ECM 3: 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 | 3,276 | 0.2 | 0.0 | $543.24 | $1,183.11 | $0.00 | $1,183.11 | 2.2 | 3,299 |
| Exterior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.0 | 0 |

*Measure Description*

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

## 4.1.2 Lighting Control Measures

Our recommendations for upgrades to existing lighting controls are summarized in Figure 29 below.

***Figure 29 – 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 | | 36,117 | 7.1 | 0.0 | $5,988.66 | $25,254.00 | $3,265.00 | $21,989.00 | 3.7 | 36,370 |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 33,286 | 6.6 | 0.0 | $5,519.19 | $21,054.00 | $3,265.00 | $17,789.00 | 3.2 | 33,519 |
| ECM 5 | Install High/Low Lighitng Controls | 2,831 | 0.6 | 0.0 | $469.47 | $4,200.00 | $0.00 | $4,200.00 | 8.9 | 2,851 |

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 4: 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) |
|---|---|---|---|---|---|---|---|---|
| 33,286 | 6.6 | 0.0 | $5,519.19 | $21,054.00 | $3,265.00 | $17,789.00 | 3.2 | 33,519 |

*Measure Description*

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms, offices, library, gym, and auditorium. 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 5: 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) |
|---|---|---|---|---|---|---|---|---|
| 2,831 | 0.6 | 0.0 | $469.47 | $4,200.00 | $0.00 | $4,200.00 | 8.9 | 2,851 |

*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, such as hallways. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

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

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

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

## 4.1.3 Variable Frequency Drive Measures

Our recommendation for variable frequency drive (VFD) measures is summarized in Figure 30 below.

***Figure 30 – Summary of Variable Frequency Drive 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable Frequency Drive (VFD) Measures | | 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |
| ECM 6 | Install VFDs on Constant Volume (CV) HVAC | 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |

### ECM 6: Install VFDs on Constant Volume (CV) HVAC

*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) |
|---|---|---|---|---|---|---|---|---|
| 78,704 | 25.7 | 0.0 | $13,049.99 | $33,481.65 | $8,000.00 | $25,481.65 | 2.0 | 79,254 |

*Measure Description*

We recommend installing variable frequency drives (VFDs) to control supply fan motor speeds in order to convert constant-volume, single-zone air handling systems into a variable-air-volume (VAV) systems.

Our recommendation pertains to supply and return fans associated with AHU 1, 4, and 6.

A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one. Zone thermostats will cause the VFD to modulate fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings results from reducing fan speed (and power) when there is a reduced load required for the zone. The magnitude of energy savings is based on the estimated amount of time that fan motors operate at partial load.

VAV systems should not be controlled such that the supply air temperature is raised at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low, e.g., 55°F, until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

## 4.1.4 Domestic Hot Water Heating System Upgrades

Our recommendation for domestic hot water heating system improvements is summarized in Figure 31 below.

*Figure 31 - 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 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | 0 | 0.0 | 17.9 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |

### 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 | $178.91 | $1,529.18 | $0.00 | $1,529.18 | 8.5 | 2,092 |

*Measure Description*

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

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

## 4.1.5 Food Service Equipment & Refrigeration Measures

Our recommendations for upgrades to food service and refrigeration measures are summarized in Figure 32 below.

***Figure 32 - 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 | | 5,404 | 0.4 | 0.0 | $896.01 | $4,864.50 | $150.00 | $4,714.50 | 5.3 | 5,442 |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | 2,635 | 0.3 | 0.0 | $436.97 | $1,516.50 | $0.00 | $1,516.50 | 3.5 | 2,654 |
| ECM 9 | Refrigeration Controls | 2,768 | 0.1 | 0.0 | $459.04 | $3,348.00 | $150.00 | $3,198.00 | 7.0 | 2,788 |

### ECM 8: Refrigerator/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) |
|---|---|---|---|---|---|---|---|---|
| 2,635 | 0.3 | 0.0 | $436.97 | $1,516.50 | $0.00 | $1,516.50 | 3.5 | 2,654 |

*Measure Description*

We recommend replacing shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in the existing walk-in cooler and freezer. 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 Cooler and 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) |
|---|---|---|---|---|---|---|---|---|
| 2,768 | 0.1 | 0.0 | $459.04 | $3,348.00 | $150.00 | $3,198.00 | 7.0 | 2,788 |

*Measure Description*

We recommend the installation of additional controls to optimize the operation of the walk-in cooler and freezer located in the kitchen.

Many walk-in coolers and 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.

# 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.

## Develop a Lighting Maintenance Schedule

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

## Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

## Ensure Economizers are Functioning Properly

Economizers, when properly configured, can be used to significantly reduce mechanical cooling. However, if the outdoor thermostat or enthalpy control is malfunctioning or the damper is stuck or improperly adjusted, benefits from the economizer may not be fully realized. As such, periodic inspection and maintenance is required to ensure proper operation. This maintenance should be scheduled with maintenance of the facility's air conditioning system and should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position. A malfunctioning economizer can significantly increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air.

## Clean and/or Replace HVAC Filters

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

## Perform Proper Boiler Maintenance

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

## Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

## Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 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 4.1.4 for any low-flow ECM recommendations.

# 6 On-Site Generation Measures

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

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

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

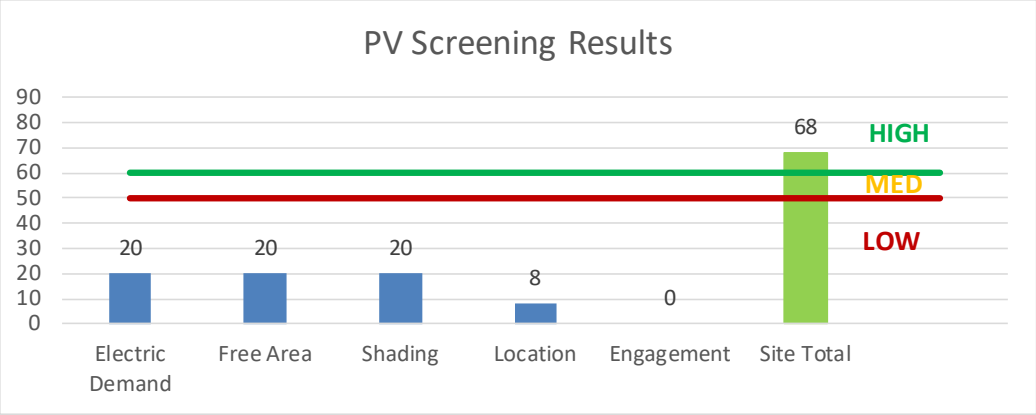
## 6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential for PV at the site. A PV array located on the roof of the main building and over the main parking lot may be feasible. If Buena Regional Middle School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

*Figure 33 - Photovoltaic Screening*



Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

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.

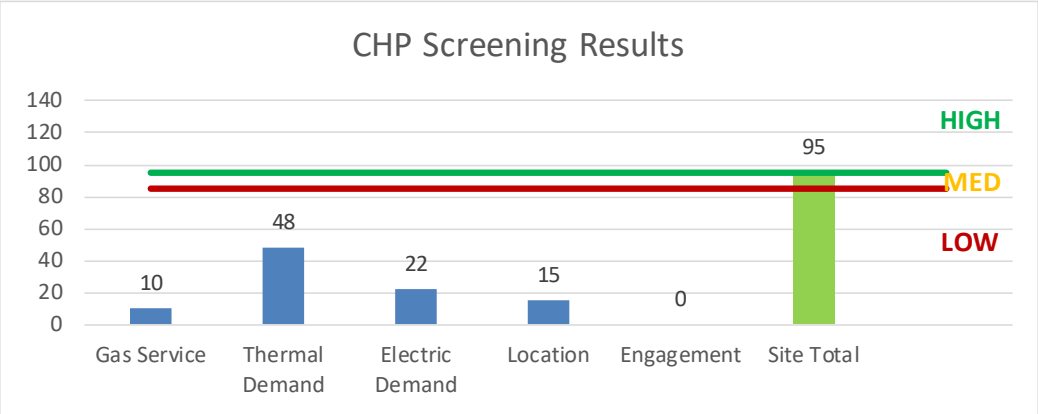
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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 High potential for installing a cost-effective CHP system.

The magnitude, type, and duration of the thermal demand, the coincident electric load, and the ease of interconnection contribute to the potential for CHP at the site. Based on the amount of hot water used throughout the year and the concurrent electric demand a microturbine may be feasible. If Buena Regional Middle School is interested in pursuing the installation of CHP, we recommended a more detailed feasibility study be conducted.

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 34 - Combined Heat and Power Screening*




Please see Section 8.2 for additional information in the Combined Heat & Power Program.

# 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 a viable option for 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 35 for a list of the eligible programs identified for each recommended ECM.

*Figure 35 - 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 | | | | | |
| ECM 2 | Retrofit Fixtures with LED Lamps | x | | | | | |
| ECM 3 | Install LED Exit Signs | | | | | | |
| ECM 4 | Install Occupancy Sensor Lighting Controls | x | | | | | |
| ECM 5 | Install High/Low Lighitng Controls | | | | | | |
| ECM 6 | Install VFDs on Constant Volume (CV) HVAC | x | | | | | |
| ECM 7 | Install Low-Flow Domestic Hot Water Devices | | | | | | |
| ECM 8 | Refrigerator/Freezer Case Electrically Commutated Motors | | | | | | |
| ECM 9 | Refrigeration Controls | x | | | | | |

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

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

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

## 8.1 SmartStart

**Overview**

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

**Equipment with Prescriptive Incentives Currently Available:**

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

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

**Incentives**

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

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

**How to Participate**

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

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

## 8.2 Combined Heat and Power and Fuel Cell

**Overview**

One of the goals of the State of New Jersey is to enhance energy efficiency through on-site power generation with recovery and productive use of waste heat, and to reduce existing and new demands to the electric power grid. The Combined Heat & Power (CHP) program provides incentives for eligible CHP or Waste Heat to Power (WHP) projects. Eligible CHP or Waste Heat to Power (WHP) projects must achieve an annual system efficiency of at least 65% (Lower Heating Value - LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

**Incentives**

| Eligible Technologies | Size (Installed Rated Capacity) | Incentive ($/kW) | % of Total Cost Cap per Project[3] | $ Cap per Project[3] |
|---|---|---|---|---|
| Powered by non-renewable or renewable fuel source[4] | ≤500 kW | $2,000 | 30-40%[2] | $2 million |
| Gas Internal Combustion Engine | >500 kW - 1 MW | $1,000 | | |
| Gas Combustion Turbine | > 1 MW - 3 MW | $550 | 30% | $3 million |
| Microturbine<br>Fuel Cells with Heat Recovery | >3 MW | $350 | | |
| Waste Heat to Power* | <1 MW | $1,000 | 30% | $2 million |
| | > 1MW | $500 | | $3 million |

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, incentive levels, and requirements.

**How to Participate**

You work with a qualified developer or consulting firm to complete the CHP Application. Once the application is approved the project can be installed. Information about the CHP program can be found at: www.njcleanenergy.com/CHP.

## 8.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SRP prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number which enables it to generate New Jersey SRECs. SRECs are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SRECs to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

## 8.4 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 description and application can be found at: www.njcleanenergy.com/ESIP.

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize 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 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 9 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.17 | 855 | 0.0 | $141.83 | $526.50 | $90.00 | 3.08 |
| Boiler Room | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Stock Room | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 8 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.22 | 1,105 | 0.0 | $183.20 | $584.00 | $100.00 | 2.64 |
| Room 415 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.05 | 276 | 0.0 | $45.80 | $233.00 | $40.00 | 4.21 |
| Electrical Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.06 | 328 | 0.0 | $54.37 | $175.50 | $30.00 | 2.68 |
| Electrical Room | 1 | Exit Signs: Incandescent | None | 40 | 8,760 | Fixture Replacement | No | 1 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.02 | 343 | 0.0 | $56.79 | $107.56 | $0.00 | 1.89 |
| cafeteria Hallway | 25 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 25 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,016 | 0.68 | 3,453 | 0.0 | $572.51 | $2,462.50 | $250.00 | 3.86 |
| cafeteria Hallway | 4 | Exit Signs: Incandescent | None | 40 | 8,760 | Fixture Replacement | No | 4 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.09 | 1,370 | 0.0 | $227.17 | $430.22 | $0.00 | 1.89 |
| cafeteria | 30 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 30 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 1.44 | 7,293 | 0.0 | $1,209.26 | $3,934.00 | $740.00 | 2.64 |
| cafeteria | 3 | Exit Signs: Incandescent | None | 40 | 8,760 | Fixture Replacement | No | 3 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.07 | 1,028 | 0.0 | $170.38 | $322.67 | $0.00 | 1.89 |
| Kitchen | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.21 | 1,036 | 0.0 | $171.75 | $492.00 | $95.00 | 2.31 |
| Kitchen | 2 | Exit Signs: Incandescent | None | 40 | 8,760 | Fixture Replacement | No | 2 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.04 | 685 | 0.0 | $113.59 | $215.11 | $0.00 | 1.89 |
| Kitchen | 10 | Incandescent: Heating Lamps | Wall Switch | 60 | 2,880 | None | No | 10 | Incandescent: Heating Lamps | Wall Switch | 60 | 2,880 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 10 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.41 | 2,072 | 0.0 | $343.50 | $868.00 | $170.00 | 2.03 |
| Kitchen | 2 | Linear Fluorescent - T8: 2' T8 (17W) - 2L | Wall Switch | 33 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 2' Lamps | Occupancy Sensor | 17 | 2,016 | 0.03 | 140 | 0.0 | $23.17 | $212.40 | $40.00 | 7.44 |
| Kitchen | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 1 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.05 | 243 | 0.0 | $40.31 | $95.13 | $55.00 | 1.00 |
| Kitchen | 1 | Exit Signs: Incandescent | None | 40 | 8,760 | Fixture Replacement | No | 1 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.02 | 343 | 0.0 | $56.79 | $107.56 | $0.00 | 1.89 |
| Dish Wash | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,880 | 0.06 | 328 | 0.0 | $54.37 | $150.40 | $30.00 | 2.21 |
| Janitor | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Room 420D | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,880 | 0.03 | 164 | 0.0 | $27.18 | $75.20 | $15.00 | 2.21 |
| Dry Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 2,880 | 0.07 | 371 | 0.0 | $61.51 | $190.27 | $40.00 | 2.44 |
| Kevin's Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.05 | 276 | 0.0 | $45.80 | $233.00 | $40.00 | 4.21 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Teacher's Lounge | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.25 | 1,243 | 0.0 | $206.10 | $567.20 | $110.00 | 2.22 |
| Teacher's Lounge RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |

| | 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 302 | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.74 | 3,729 | 0.0 | $618.31 | $1,585.60 | $310.00 | 2.06 |
| Room 302 | 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 |
| Class Room 301 | 19 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 19 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.78 | 3,936 | 0.0 | $652.66 | $1,660.80 | $325.00 | 2.05 |
| Class Room 301 | 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 |
| Class Room 304 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.33 | 1,657 | 0.0 | $274.80 | $717.60 | $140.00 | 2.10 |
| Hallway | 21 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 21 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,016 | 0.57 | 2,900 | 0.0 | $480.90 | $2,028.50 | $210.00 | 3.78 |
| Class Room 306 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.33 | 1,657 | 0.0 | $274.80 | $717.60 | $140.00 | 2.10 |
| Class Room 308 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.37 | 1,864 | 0.0 | $309.15 | $792.80 | $155.00 | 2.06 |
| Class Room 303 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.25 | 1,243 | 0.0 | $206.10 | $567.20 | $110.00 | 2.22 |
| Class Room 305 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.25 | 1,243 | 0.0 | $206.10 | $567.20 | $110.00 | 2.22 |
| Class Room 307 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.25 | 1,243 | 0.0 | $206.10 | $567.20 | $110.00 | 2.22 |
| Courtyard Wallpack | 4 | Metal Halide: (1) 150W Lamp | Wall Switch | 190 | 4,380 | Fixture Replacement | No | 4 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Wall Switch | 50 | 4,380 | 0.37 | 2,821 | 0.0 | $467.71 | $1,344.00 | $400.00 | 2.02 |
| Courtyard | 2 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 4,380 | Relamp | No | 2 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Wall Switch | 38 | 4,380 | 0.02 | 141 | 0.0 | $23.39 | $53.50 | $0.00 | 2.29 |
| RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Class Room 315 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.05 | 276 | 0.0 | $45.80 | $233.00 | $40.00 | 4.21 |
| Class Room 317 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 11 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.45 | 2,279 | 0.0 | $377.85 | $1,097.20 | $200.00 | 2.37 |
| Class Room 310 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 312 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 320 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 322 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 324 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 329 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 327 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,172.40 | $215.00 | 2.32 |
| Class Room 327 | 1 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 1 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.02 | 84 | 0.0 | $13.95 | $26.75 | $35.00 | -0.59 |

| | 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 |
| RR | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.11 | 552 | 0.0 | $91.60 | $504.00 | $75.00 | 4.68 |
| RR | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.11 | 552 | 0.0 | $91.60 | $504.00 | $75.00 | 4.68 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Class Room 317 | 1 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 1 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.02 | 84 | 0.0 | $13.95 | $26.75 | $35.00 | -0.59 |
| Guidance 214 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.29 | 1,459 | 0.0 | $241.85 | $840.80 | $155.00 | 2.84 |
| Guidance 214 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 1 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.03 | 138 | 0.0 | $22.90 | $58.50 | $45.00 | 0.59 |
| Hallway | 21 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 21 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,016 | 0.57 | 2,900 | 0.0 | $480.90 | $2,028.50 | $210.00 | 3.78 |
| Hallway | 7 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 7 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Class Room 212 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 207 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 210 | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 16 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.66 | 3,315 | 0.0 | $549.61 | $1,319.20 | $260.00 | 1.93 |
| Class Room 210 | 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 |
| Class Room 210 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| Class Room 206 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| Class Room 203 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 201 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 204 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 202 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.29 | 1,459 | 0.0 | $241.85 | $918.80 | $180.00 | 3.05 |
| Class Room 202 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 1 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.04 | 207 | 0.0 | $34.35 | $191.20 | $35.00 | 4.55 |
| RR | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.14 | 691 | 0.0 | $114.50 | $408.50 | $70.00 | 2.96 |
| RR | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.14 | 691 | 0.0 | $114.50 | $408.50 | $70.00 | 2.96 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Server 124 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Class Room 128 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 125 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |

| | 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 |
| Class Room 123 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 121 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Hallway | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 18 | LED - Linear Tubes: (3) 4' Lamps | High/Low Control | 44 | 2,016 | 0.74 | 3,729 | 0.0 | $618.31 | $2,153.60 | $270.00 | 3.05 |
| Hallway | 5 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 5 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Class Room 116 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 11 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.45 | 2,279 | 0.0 | $377.85 | $1,097.20 | $200.00 | 2.37 |
| Class Room 116 | 2 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 2 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.03 | 168 | 0.0 | $27.90 | $53.50 | $35.00 | 0.66 |
| Class Room 119 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 117 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| Class Room 114 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.05 | 276 | 0.0 | $45.80 | $233.00 | $40.00 | 4.21 |
| Class Room 115 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.49 | 2,486 | 0.0 | $412.20 | $1,018.40 | $200.00 | 1.99 |
| RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Class Room 108 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.25 | 1,243 | 0.0 | $206.10 | $567.20 | $110.00 | 2.22 |
| Class Room 106 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.37 | 1,864 | 0.0 | $309.15 | $792.80 | $155.00 | 2.06 |
| Class Room 111 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.33 | 1,657 | 0.0 | $274.80 | $717.60 | $140.00 | 2.10 |
| Class Room 109 | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.33 | 1,657 | 0.0 | $274.80 | $717.60 | $140.00 | 2.10 |
| Class Room 107 | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 16 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.66 | 3,315 | 0.0 | $549.61 | $1,473.20 | $275.00 | 2.18 |
| Class Room 107 | 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 |
| Class Room 107 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 1 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.03 | 138 | 0.0 | $22.90 | $58.50 | $45.00 | 0.59 |
| Class Room 107B | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.04 | 219 | 0.0 | $36.24 | $117.00 | $20.00 | 2.68 |
| Class Room 104 Lab | 19 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 19 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.78 | 3,936 | 0.0 | $652.66 | $1,660.80 | $325.00 | 2.05 |
| Class Room 104 Lab | 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 |
| Class Room 104 A | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 1 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.03 | 138 | 0.0 | $22.90 | $174.50 | $30.00 | 6.31 |
| Hallway | 19 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 19 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,016 | 0.52 | 2,624 | 0.0 | $435.10 | $1,911.50 | $190.00 | 3.96 |
| Hallway | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

| | 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 |
| Class Room 102 Music | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 18 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.74 | 3,729 | 0.0 | $618.31 | $1,469.60 | $290.00 | 1.91 |
| Class Room 102 Music | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $291.50 | $50.00 | 3.52 |
| Class Room 102 Music | 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 |
| RR | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $291.50 | $50.00 | 3.52 |
| RR | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $291.50 | $50.00 | 3.52 |
| Locker Room | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.27 | 1,381 | 0.0 | $229.00 | $855.00 | $135.00 | 3.14 |
| Locker Room | 3 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 3 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.05 | 252 | 0.0 | $41.85 | $80.25 | $35.00 | 1.08 |
| Room 402B | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Locker Room | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Gym | 26 | Metal Halide: (1) 400W Lamp | Wall Switch | 458 | 2,880 | Fixture Replacement | Yes | 26 | LED - Fixtures: High-Bay | Occupancy Sensor | 146 | 2,016 | 6.06 | 30,639 | 0.0 | $5,080.23 | $75,535.20 | $4,810.00 | 13.92 |
| Gym | 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 |
| Wrestling (Aux) | 8 | Metal Halide: (1) 250W Lamp | Wall Switch | 295 | 2,880 | Fixture Replacement | Yes | 8 | LED - Fixtures: Lo-Bay | Occupancy Sensor | 86 | 2,016 | 1.23 | 6,221 | 0.0 | $1,031.55 | $2,555.44 | $70.00 | 2.41 |
| Wrestling (Aux) | 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 |
| Storage | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.16 | 829 | 0.0 | $137.40 | $467.00 | $80.00 | 2.82 |
| Boys Locker | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.27 | 1,381 | 0.0 | $229.00 | $701.00 | $120.00 | 2.54 |
| Boys Locker | 4 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 4 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.07 | 336 | 0.0 | $55.80 | $223.00 | $20.00 | 3.64 |
| Boys Locker | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| RR | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,880 | 0.03 | 164 | 0.0 | $27.18 | $75.20 | $15.00 | 2.21 |
| RR | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $291.50 | $50.00 | 3.52 |
| RR | 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 |
| Room 404 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.16 | 829 | 0.0 | $137.40 | $570.80 | $95.00 | 3.46 |
| Room 404 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.19 | 972 | 0.0 | $161.24 | $380.53 | $115.00 | 1.65 |
| Closet 406 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.04 | 219 | 0.0 | $36.24 | $117.00 | $20.00 | 2.68 |

| | 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 408 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.04 | 219 | 0.0 | $36.24 | $117.00 | $20.00 | 2.68 |
| Class Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.14 | 729 | 0.0 | $120.93 | $401.40 | $80.00 | 2.66 |
| Class room | 8 | Incandescent: 1 lamp Incandecent fixture | Wall Switch | 100 | 2,880 | Relamp | Yes | 8 | LED Screw-In Lamps: LED screw-in lamp equivalent | Occupancy Sensor | 15 | 2,016 | 0.47 | 2,371 | 0.0 | $393.20 | $214.02 | $75.00 | 0.35 |
| Stage | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 10 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.27 | 1,381 | 0.0 | $229.00 | $855.00 | $135.00 | 3.14 |
| Stage | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.04 | 219 | 0.0 | $36.24 | $117.00 | $20.00 | 2.68 |
| Seating area | 13 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 13 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.22 | 1,094 | 0.0 | $181.33 | $617.75 | $35.00 | 3.21 |
| Seating area | 20 | Halogen Incandescent: Auditorium Flood Lights | Wall Switch | 100 | 2,880 | Relamp | Yes | 20 | LED Screw-In Lamps: Flood Lamp LED equivalent | Occupancy Sensor | 45 | 2,016 | 0.90 | 4,537 | 0.0 | $752.36 | $1,273.02 | $135.00 | 1.51 |
| Seating area | 6 | Metal Halide: (4) 400W Lamp | Wall Switch | 1,800 | 2,880 | Fixture Replacement | Yes | 6 | LED - Fixtures: Auditorium Flood LED equivalent | Occupancy Sensor | 146 | 2,016 | 6.68 | 33,739 | 0.0 | $5,594.25 | $1,828.08 | $35.00 | 0.32 |
| Control Booth | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,880 | 0.06 | 328 | 0.0 | $54.37 | $150.40 | $30.00 | 2.21 |
| Auditorium | 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 |
| Library | 20 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 20 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.55 | 2,762 | 0.0 | $458.00 | $1,710.00 | $270.00 | 3.14 |
| Library | 24 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 24 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.98 | 4,972 | 0.0 | $824.41 | $2,344.80 | $430.00 | 2.32 |
| Library Lab | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.37 | 1,864 | 0.0 | $309.15 | $792.80 | $155.00 | 2.06 |
| Library | 4 | Compact Fluorescent: 1 lamp pin fixture | Wall Switch | 26 | 2,880 | Relamp | Yes | 4 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 19 | 2,016 | 0.03 | 168 | 0.0 | $27.90 | $107.00 | $35.00 | 2.58 |
| Library | 2 | Compact Fluorescent: 4 lamp pin fixture | Wall Switch | 104 | 2,880 | Relamp | Yes | 2 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 76 | 2,016 | 0.07 | 336 | 0.0 | $55.80 | $53.50 | $35.00 | 0.33 |
| Library | 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 |
| Library | 8 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 8 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.13 | 673 | 0.0 | $111.59 | $214.00 | $35.00 | 1.60 |
| Library | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.16 | 829 | 0.0 | $137.40 | $300.80 | $95.00 | 1.50 |
| Library Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.10 | 486 | 0.0 | $80.62 | $306.27 | $60.00 | 3.05 |
| Library Seminar | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.14 | 729 | 0.0 | $120.93 | $285.40 | $95.00 | 1.57 |
| Library Seminar | 8 | Incandescent: 1 lamp incandecent fixture | Wall Switch | 100 | 2,880 | Relamp | Yes | 8 | LED Screw-In Lamps: LED screw-in lamp equivalent | Occupancy Sensor | 15 | 2,016 | 0.47 | 2,371 | 0.0 | $393.20 | $484.02 | $75.00 | 1.04 |
| Office 407 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| Office 409 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| Main Lobby | 5 | Halogen Incandescent: Spot lights | Wall Switch | 100 | 2,880 | Relamp | No | 5 | LED Screw-In Lamps: spotlight LED equivalent | Wall Switch | 15 | 2,880 | 0.28 | 1,408 | 0.0 | $233.40 | $318.26 | $0.00 | 1.36 |

| | 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 |
| Main Lobby | 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 |
| Main Lobby | 10 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 10 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.17 | 841 | 0.0 | $139.49 | $267.50 | $35.00 | 1.67 |
| Main Lobby | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.21 | 1,036 | 0.0 | $171.75 | $646.00 | $110.00 | 3.12 |
| Main Office | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.58 | 2,917 | 0.0 | $483.71 | $1,257.60 | $260.00 | 2.06 |
| Main Office Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,880 | 0.02 | 109 | 0.0 | $18.12 | $58.50 | $10.00 | 2.68 |
| Principal Office | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.16 | 829 | 0.0 | $137.40 | $416.80 | $80.00 | 2.45 |
| Class Room 1C | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.12 | 621 | 0.0 | $103.05 | $341.60 | $65.00 | 2.68 |
| Class Room 1C | 6 | Incandescent: 1 lamp incandecent fixture | Wall Switch | 100 | 2,880 | Relamp | Yes | 8 | LED Screw-In Lamps: LED screw-in lamp equivalent | Occupancy Sensor | 15 | 2,016 | 0.34 | 1,709 | 0.0 | $283.37 | $214.02 | $75.00 | 0.49 |
| Workroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,016 | 0.19 | 972 | 0.0 | $161.24 | $650.53 | $115.00 | 3.32 |
| Workroom | 2 | Compact Fluorescent: 2 lamp pin fixture | Wall Switch | 52 | 2,880 | Relamp | Yes | 2 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | Occupancy Sensor | 38 | 2,016 | 0.03 | 168 | 0.0 | $27.90 | $53.50 | $35.00 | 0.66 |
| Workroom | 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 |
| Security Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 2,880 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,016 | 0.08 | 414 | 0.0 | $68.70 | $266.40 | $50.00 | 3.15 |
| RR | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.11 | 552 | 0.0 | $91.60 | $350.00 | $60.00 | 3.17 |
| RR | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,880 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,016 | 0.11 | 552 | 0.0 | $91.60 | $350.00 | $60.00 | 3.17 |
| Exterior | 24 | Compact Fluorescent: 2 lamp pin fixture | None | 26 | 4,380 | Relamp | No | 24 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | None | 19 | 4,380 | 0.11 | 846 | 0.0 | $140.31 | $372.05 | $0.00 | 2.65 |
| Exterior | 8 | Compact Fluorescent: 2 lamp pin fixture | None | 52 | 4,380 | Relamp | No | 8 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | None | 38 | 4,380 | 0.07 | 564 | 0.0 | $93.54 | $214.02 | $0.00 | 2.29 |
| Exterior | 5 | Metal Halide: (1) 150W Lamp | None | 190 | 4,380 | Fixture Replacement | No | 5 | LED - Fixtures: Architectural Flood/Spot Luminaire | None | 50 | 4,380 | 0.46 | 3,526 | 0.0 | $584.63 | $6,124.76 | $250.00 | 10.05 |
| Pole Fixture | 11 | Metal Halide: (4) 250W Lamp | None | 1,200 | 4,380 | Fixture Replacement | No | 11 | LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture | None | 344 | 4,380 | 6.17 | 47,428 | 0.0 | $7,864.15 | $21,482.92 | $1,100.00 | 2.59 |
| Pole Fixture | 3 | Metal Halide: (2) 250W Lamp | None | 600 | 4,380 | Fixture Replacement | No | 3 | LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture | None | 172 | 4,380 | 0.84 | 6,468 | 0.0 | $1,072.38 | $5,858.98 | $300.00 | 5.18 |
| Wallpacks | 15 | Metal Halide: (1) 150W Lamp | None | 190 | 4,380 | Fixture Replacement | No | 15 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | None | 50 | 4,380 | 1.38 | 10,578 | 0.0 | $1,753.90 | $5,860.16 | $1,500.00 | 2.49 |
| Exterior | 6 | Compact Fluorescent: 2 lamp pin fixture | None | 52 | 4,380 | Relamp | No | 6 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | None | 38 | 4,380 | 0.06 | 423 | 0.0 | $70.16 | $160.51 | $0.00 | 2.29 |
| Exterior | 1 | Compact Fluorescent: 1 lamp pin fixture | None | 26 | 4,380 | Relamp | No | 1 | LED Screw-In Lamps: 4 pin plug-in LED equivalent | None | 19 | 4,380 | 0.00 | 35 | 0.0 | $5.85 | $26.75 | $0.00 | 4.58 |

## Motor Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Annual Operating Hours | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Rooftop | Air Handling Units | 2 | Supply Fan | 60.0 | 93.6% | Yes | 1,850 | No | 93.6% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Rooftop | Air Handling Units | 3 | Return Fan | 30.0 | 92.4% | Yes | 1,850 | No | 92.4% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Mechanical Room | Heating Hot Water System (Primary Circuit) | 3 | Heating Hot Water Pump | 2.0 | 80.0% | No | 1,830 | No | 80.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Mechanical Room | Heating Hot Water System (Secondary Circuit) | 2 | Heating Hot Water Pump | 20.0 | 93.0% | Yes | 875 | No | 93.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Mechanical Room | Chilled Water System (Primary Circuit) | 1 | Chilled Water Pump | 10.0 | 91.7% | No | 3,000 | No | 91.7% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Mechanical Room | Chilled Water System (Secondary Circuit) | 1 | Chilled Water Pump | 20.0 | 93.0% | Yes | 1,200 | No | 93.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Rooftop | Air Handling Units | 1 | Return Fan | 15.0 | 91.0% | No | 3,000 | No | 91.0% | Yes | 1 | 3.86 | 12,266 | 0.0 | $2,033.83 | $5,194.45 | $1,200.00 | 1.96 |
| Rooftop | Air Handling Units | 2 | Supply Fan | 20.0 | 91.0% | No | 3,000 | No | 91.0% | Yes | 2 | 10.28 | 32,709 | 0.0 | $5,423.55 | $12,668.60 | $3,200.00 | 1.75 |
| Rooftop | Air Handling Units | 1 | Supply Fan | 25.0 | 91.7% | No | 3,000 | No | 91.7% | Yes | 1 | 6.38 | 20,287 | 0.0 | $3,363.84 | $8,002.70 | $2,000.00 | 1.78 |
| Rooftop | Air Handling Units | 1 | Return Fan | 10.0 | 89.5% | No | 3,000 | No | 89.5% | Yes | 1 | 2.61 | 8,314 | 0.0 | $1,378.61 | $3,807.95 | $800.00 | 2.18 |
| Rooftop | Air Handling Units | 1 | Return Fan | 10.0 | 89.5% | No | 1,850 | No | 89.5% | Yes | 1 | 2.61 | 5,127 | 0.0 | $850.14 | $3,807.95 | $800.00 | 3.54 |
| Rooftop | Air Handling Units | 1 | Supply Fan | 50.0 | 93.0% | Yes | 1,850 | No | 93.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Rooftop | Kitchen Hood | 1 | Kitchen Hood Exhaust Fan | 2.0 | 84.0% | No | 1,680 | No | 84.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Multiple | Exhasut Fans | 6 | Exhaust Fan | 0.3 | 82.5% | No | 2,000 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Multiple | Exhasut Fans | 2 | Exhaust Fan | 0.3 | 82.5% | Yes | 1,800 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Gym Restrooms | Exhasut Fans | 1 | Exhaust Fan | 0.5 | 82.5% | No | 2,000 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Janitors Closet | Exhasut Fans | 1 | Exhaust Fan | 0.2 | 82.5% | No | 2,745 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Multiple | Exhasut Fans | 3 | Exhaust Fan | 0.2 | 82.5% | Yes | 1,800 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Multiple | Exhasut Fans | 2 | Exhaust Fan | 0.2 | 82.5% | Yes | 1,800 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Mechanical Storage | Exhasut Fans | 1 | Exhaust Fan | 0.0 | 82.5% | Yes | 1,800 | No | 82.5% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Electric HVAC Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Cooling Mode Efficiency (SEER/EER) | Heating Mode Efficiency (COP) | Install Dual Enthalpy Economizer? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Ceiling | All | 3 | Electric Resistance Heat | | 11.00 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Wall | All | 1 | Electric Resistance Heat | | 5.12 | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Electric Chiller Inventory & Recommendations

| | | Existing Conditions | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Chiller Quantity | System Type | Cooling Capacity per Unit (Tons) | Install High Efficiency Chillers? | Chiller Quantity | System Type | Constant/ Variable Speed | Cooling Capacity (Tons) | Full Load Efficiency (kW/Ton) | IPLV Efficiency (kW/Ton) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Mechanical Yard | All | 1 | Air-Cooled Screw Chiller | 350.00 | 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 |
| Mechanical Room | All | 3 | Non-Condensing Hot Water Boiler | 1,700.00 | 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 |
| Mechanical Room | All | 1 | Storage Tank Water Heater (> 50 Gal) | No | | | | | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Low-Flow Device Recommendations

| | Recommedation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Multiple | 6 | Faucet Aerator (Lavatory) | 1.50 | 1.00 | 0.00 | 0 | 3.4 | $33.78 | $43.02 | $0.00 | 1.27 |
| Multiple | 16 | Showerhead | 2.50 | 2.00 | 0.00 | 0 | 10.0 | $100.09 | $1,428.80 | $0.00 | 14.28 |
| Multiple | 8 | Faucet Aerator (Lavatory) | 1.50 | 1.00 | 0.00 | 0 | 4.5 | $45.04 | $57.36 | $0.00 | 1.27 |

## Reach-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 Energy Efficient Doors? | Install Door Heater Control? | Install Aluminum Night Covers? | 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 |
| Cafeteria | 2 | Cooler (35F to 55F) | No | No | No | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## 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 | Cooler (35F to 55F) | Yes | No | Yes | 0.18 | 2,249 | 0.0 | $372.93 | $2,280.60 | $75.00 | 5.91 |
| Kitchen | 1 | Medium Temp Freezer (0F to 30F) | Yes | No | Yes | 0.26 | 3,155 | 0.0 | $523.09 | $2,583.90 | $75.00 | 4.80 |

## 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 | 2 | Stand-Up Refrigerator, Solid Door (>50 cu. ft.) | No | 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 |
| Multiple | 2 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | Yes | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Multiple | 2 | Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.) | Yes | 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 | 2 | Gas Convection Oven (Full Size) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 1 | Insulated Food Holding Cabinet (Full Size) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Dishwasher Inventory & Recommendations

| | Existing Conditions | | | | | Proposed Conditions | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Dishwasher Type | Water Heater Fuel Type | Booster Heater Fuel Type | ENERGY STAR Qualified? | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Payback w/ Incentives in Years |
| Kitchen | 1 | Single Tank Conveyor (Low Temp) | Electric | N/A | No | 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? |
| Multiple | 36 | Overhead Projectors | 376.0 | No |
| Multiple | 3 | 46" TV | 60.0 | Yes |
| Multiple | 262 | Desktop Workstations | 250.0 | Yes |
| Multiple | 5 | Printer (S) | 910.0 | Yes |
| Multiple | 10 | Copier/Printer (M) | 425.0 | Yes |
| Multiple | 6 | Copier/Printer (L) | 425.0 | Yes |
| Multiple | 6 | Microwave | 700.0 | No |
| Multiple | 4 | Coffee Maker | 780.0 | Yes |

## 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 |
| Cafeteria | 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

LEARN MORE AT energystar.gov

**11**

ENERGY STAR® Score[1]

### Buena Regional Middle School

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 92,335
**Built:** 2009

**For Year Ending:** April 30, 2017
**Date Generated:** May 28, 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 |
|---|---|---|
| Buena Regional Middle School<br>175 Weymouth Road<br>Buena, New Jersey 08650 | Buena Regional School District<br>914 Main Avenue<br>Richland, NJ 08350<br>(856) 697-0800 | Joe Biluck, Jr.<br>914 Main Avenue<br>Richland, NJ 08350<br>(856) 697-0800<br>jbiluck@buena.k12.nj.us |

**Property ID:** 6358233

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

**Site EUI**
117.5 kBtu/ft²

**Source EUI**
231.9 kBtu/ft²

| Annual Energy by Fuel | |
|---|---|
| Electric - Grid (kBtu) | 4,795,478 (44%) |
| Natural Gas (kBtu) | 6,051,941 (56%) |

| National Median Comparison | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 78.6 |
| National Median Source EUI (kBtu/ft²) | 155.2 |
| % Diff from National Median Source EUI | 49% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 853 |

### 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)**