Local Government Energy Audit:
Energy Audit Report

Belhaven Middle School

51 Belhaven Avenue

Linwood, New Jersey 08221

Linwood City School District

March 29, 2019

Final Report by:

TRC Energy Services

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual 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.

The New Jersey 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. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

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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 Belhaven Middle School.

The goal of a 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

Belhaven Middle School is a 109,278 square foot facility comprised of various space types including classrooms, offices, two gymnasiums, a library, a cafetorium and various school support spaces such as mechanical, IT, and storage spaces. The building was built in stages, the first building (referred to as "1908," which is the street address of the building) was built in the 1920s. The 1908 building is a two-story brick structure over a full basement with a sloped roof. There are classrooms on the above grade floors and maintenance spaces in the basement. The rest of the school is one to two story building, concrete block with brick veneer, slab-on-grade floor and flat roofs covered with a flexible membrane.

The building is cooled with an air-cooled chiller and heated with high efficiency hot water boilers.

Lighting at Belhaven Middle School mostly consists of fluorescent fixtures. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 12 measures and recommends eight measures which together represent an opportunity for Belhaven Middle School to reduce annual energy costs by roughly $19,253 and annual greenhouse gas emissions by 144,904 lbs. CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 6.7 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 Belhaven Middle School's annual energy use by 7%.

Figure 1 – Previous 12 Month Utility Costs

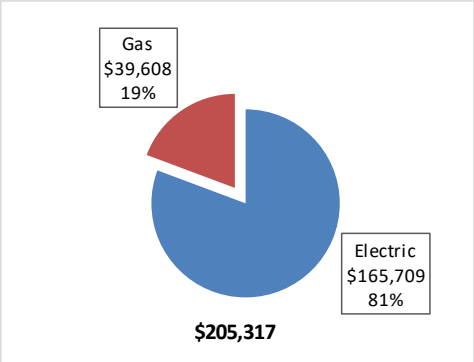
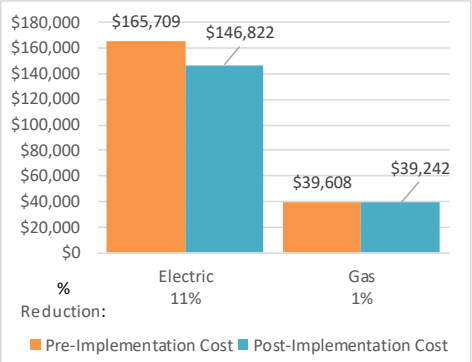


Figure 2 – Potential Post-Implementation Costs



A detailed description of Belhaven 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			**115,737**	**38.1**	**0.0**	**$15,592.09**	**$126,987.28**	**$22,155.00**	**$104,832.28**	**6.7**	**116,546**
ECM 1	Install LED Fixtures	Yes	20,037	4.8	0.0	$2,699.32	$49,210.00	$10,900.00	$38,310.00	14.2	20,177
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	64,964	22.0	0.0	$8,751.92	$54,009.45	$5,525.00	$48,484.45	5.5	65,418
ECM 3	Retrofit Fixtures with LED Lamps	Yes	30,737	11.3	0.0	$4,140.85	$23,767.84	$5,730.00	$18,037.84	4.4	30,952
Lighting Control Measures			**15,230**	**4.9**	**0.0**	**$2,051.81**	**$19,788.00**	**$2,180.00**	**$17,608.00**	**8.6**	**15,337**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	15,230	4.9	0.0	$2,051.81	$19,788.00	$2,180.00	$17,608.00	8.6	15,337
Motor Upgrades			**2,560**	**0.6**	**0.0**	**$344.90**	**$9,081.66**	**$0.00**	**$9,081.66**	**26.3**	**2,578**
	Premium Efficiency Motors	No	2,560	0.6	0.0	$344.90	$9,081.66	$0.00	$9,081.66	26.3	2,578
Electric Unitary HVAC Measures			**22,063**	**12.3**	**0.0**	**$2,972.27**	**$122,579.25**	**$4,999.50**	**$117,579.75**	**39.6**	**22,217**
	Install High Efficiency Electric AC	No	20,597	12.2	0.0	$2,774.76	$115,772.37	$4,723.50	$111,048.87	40.0	20,741
	Install High Efficiency Heat Pumps	No	1,466	0.1	0.0	$197.51	$6,806.88	$276.00	$6,530.88	33.1	1,476
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**7.2**	**$83.16**	**$9,095.79**	**$1,600.00**	**$7,495.79**	**90.1**	**848**
	Install High Efficiency Furnaces	No	0	0.0	7.2	$83.16	$9,095.79	$1,600.00	$7,495.79	90.1	848
HVAC System Improvements			**6,447**	**0.0**	**0.0**	**$868.50**	**$5,437.68**	**$0.00**	**$5,437.68**	**6.3**	**6,492**
ECM 5	Implement Demand Control Ventilation	Yes	6,447	0.0	0.0	$868.50	$5,437.68	$0.00	$5,437.68	6.3	6,492
Domestic Water Heating Upgrade			**0**	**0.0**	**31.9**	**$366.03**	**$243.78**	**$0.00**	**$243.78**	**0.7**	**3,731**
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	31.9	$366.03	$243.78	$0.00	$243.78	0.7	3,731
Food Service Equipment & Refrigeration Measures			**824**	**0.1**	**0.0**	**$111.08**	**$909.90**	**$0.00**	**$909.90**	**8.2**	**830**
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	824	0.1	0.0	$111.08	$909.90	$0.00	$909.90	8.2	830
Plug Load Equipment Control - Vending Machine			**1,954**	**0.0**	**0.0**	**$263.29**	**$460.00**	**$0.00**	**$460.00**	**1.7**	**1,968**
ECM 8	Vending Machine Control	Yes	1,954	0.0	0.0	$263.29	$460.00	$0.00	$460.00	1.7	1,968
TOTALS FOR HIGH PRIORITY MEASURES			**140,193**	**43.1**	**31.9**	**$19,252.80**	**$153,826.64**	**$24,335.00**	**$129,491.64**	**6.7**	**144,904**
TOTALS FOR ALL EVALUATED MEASURES			**164,816**	**56.0**	**39.1**	**$22,653.13**	**$294,583.34**	**$30,934.50**	**$263,648.84**	**11.6**	**170,546**

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

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

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

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

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

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

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

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

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 electric outlets when not in use.

Energy Efficient Practices

TRC also identified 10 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 Belhaven Middle School include:

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Assess Chillers & Request Tune-Ups
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Furnace Maintenance
- Install Plug Load Controls
- Water Conservation

For details on these Energy Efficient Practices, please refer to Section 5.

On-Site Generation Measures

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

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	200	kW DC STC
Electric Generation	238,274	kWh/yr
Displaced Cost	$20,730	/yr
Installed Cost	$520,000	

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
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy Aggregator

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 8.3 for additional information on the ESIP Program.

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

Refer to Section 7 for additional information on this program.

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Teri J. Weeks	School Business Administrator	teriweeks@linwoodschools.org	609-926-6700
Patrick Childs	Supervisor of Facilities and Security	catrickchilds@linwoodschools.org	609-926-6717
TRC Energy Services			
Robert Grindrod	Auditor	rgrindrod@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On July 27, 2018, performed an energy audit at Belhaven Middle School located in Linwood, New Jersey. TRC's team met with Patrick Childs to review the facility operations and help focus our investigation on specific energy-using systems.

Belhaven Middle School is a 109,278 square foot facility comprised of various space types including classrooms, offices, two gymnasiums, a library, a cafetorium and various school support spaces such as mechanical, IT, and storage spaces.

The building was last renovated in 1995. However, the original building, "1908," was built in the 1920s. The 1908 building is a two-story brick structure over a full basement with a sloped roof. There are classrooms on the above grade floors and maintenance spaces in the basement. The rest of the school is a one to two-story building, concrete block with brick veneer, slab-on-grade floor and flat roofs covered with a flexible membrane. The building is cooled with an air cooled chiller and heated with high efficiency hot water boilers.

Lighting at Belhaven Middle School mostly consists of fluorescent fixtures.

2.3 Building Occupancy

The school building is open Monday through Friday as well as on weekends for various programs and functions. During a typical weekday, the facility is occupied by approximately 100 staff and 450 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Belhaven Middle School	Weekday	7:30 AM - 4:30 PM
Belhaven Middle School	Weekend	8:00 AM - 4:00 PM

2.4 Building Envelope

The building was last renovated in 1995. However, the original building, "1908," was built in the 1920s. The 1908 building is a two-story brick structure over a full basement with a sloped roof. There are classrooms on the above grade floors and maintenance spaces in the basement. The rest of the school is a one to two-story building, concrete block with brick veneer, slab-on-grade floor and flat roofs covered with a flexible membrane. The windows through the school are aluminum framed double glazed units in good condition. The main entry is a modern two-story commercial aluminum framed/glass assembly with heavy duty aluminum framed and glass entry doors. The rest of the doors appear to be commercial grade, aluminum clad insulated units, with or without glazing.

Figure 7 - Front entrance with aluminum and glass facade

Figure 8 - 1908 - note replacement windows

2.5 On-Site Generation

Belhaven Middle School does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by T8 and T12 linear fluorescent lamp fixtures. Approximately 75% of the fixtures have relatively inefficient magnetic ballasts and the balance of the fixtures have electronic ballasts. The fixtures are 2-, 3- or 4-lamp, 4-foot long troffers with diffusers.

Figure 9 - 4-lamp T12 fixtures

Figure 10 - Recessed fixtures and sconces

Figure 11 - Metal halide high bay fixtures in the gym

Figure 12 - Exterior fixture timer

Lighting control in most spaces is provided by wall mounted occupancy sensors and wall switches. The occupancy sensors are either wall or ceiling mounted depending on the space layout. Stairwells, elevator lobbies and main lobby areas do not contain any occupancy sensors and are on 24 hours per day throughout the year.

The building's exterior lighting includes efficient metal halide wall pack fixtures (100-Watt) and pole mounted parking lot fixtures (200-Watt) that are controlled by timers as well as photocell controlled area fixtures (100-Watt).

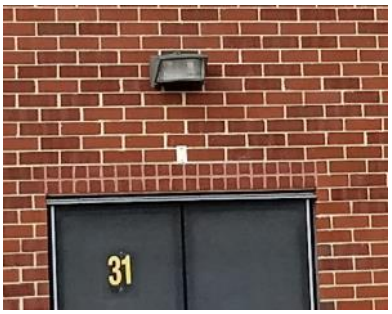


Figure 13 - Wall Pack

Figure 14 - Parking lot fixture

Figure 15 - Photo cell controlled area fixture

Chilled Water System

The facility is served by one seven-year old McQuay 210 ton air-cooled, variable-speed screw chiller located on grade, near the building. Two constant speed 20 hp pumps located in a second story mezzanine circulate chilled water to 39 unit ventilators in the classrooms and offices. The rated efficiency of the chiller is 1 kW/ton at full load. The efficiency increases a part load capacity. The unit ventilators served by the chiller range in size from 750 to 1500 CFM.

Figure 16 - McQuay air-cooled chiller

Figure 17 - McQuay air-cooled chiller

Figure 18 - Constant Speed 20 hp pumps

Hot Water Heating System

The hot water system consists of a pair of AERCO BMK2-Q condensing boilers. The boilers have a nominal combustion efficiency of 96% though under design load conditions the efficiency could be closer to 80% depending on the return water temperature. The boilers are configured in a constant flow primary distribution with two 1 hp hot water pumps. Water temperatures are varied with outdoor air temperature reset controller. The boilers provide hot water to unit ventilators and various cabinet heaters and fan coils and perimeter radiation.

The boilers operate in a lead/lag configuration. Both boilers may be required during cold weather. The lead boiler is rotated weekly.

The boilers are in good condition and well maintained.

Figure 19 - Aerco Benchmark 2.0 high efficiency boiler

Figure 20 - Heating hot water pumps

Figure 21 - Aerco control panel with OA reset function

Chilled Water Air Conditioning System (CHW)

Two constant speed 20 hp pumps located in a second story mezzanine circulate chilled water to the unit ventilators in the classrooms and offices. The unit ventilators have constant speed fans. Integrated thermostats that control the zone value attached to each unit.

Figure 22 - Fan coil unit with condensate pump

Figure 23 - Unit ventilator in an office

Figure 24 - Unit ventilator in a classroom

Direct Expansion Air Conditioning System (DX)

There are 17 DX rooftop units (RTUs) with natural gas fired burners. These range in capacity from 4 to 30-tons, in age from 1 to 25 years with average efficiencies of 10 SEER. These units serve some of the larger spaces such as the library, cafetorium, gymnasiums, band room and some of the core spaces such as the offices. The RTUs serving the library, gymnasiums, main hall, stage, art, office, teacher's lounge and band rooms are constant volume units are constant volume units running at 2000 to 4000 CFM. The 30-ton unit serving the cafetorium is a variable volume unit running up to 12,000 CFM and features an energy recovery ventilator that was not in service at the time of the audit.

There are two ductless mini-split air conditioning (AC) systems serving spaces not well conditioned by the chilled water system or the RTUs. These units cool the IT closets in the 1908 building and the main building.

The 1908 building has a number of ductless multi-split heat pumps with ground mounted condensers and multi indoor evaporator cassettes. The two Mitsubishi City Multi units have a 3-ton capacity, a SEER of 21 and COP of 3.37. There is a 2-ton Daikin unit as well with a SEER of 13 and COP of 3. The Mitsubishi units are controlled with a proprietary control panel. The other mini-splits have individual thermostats. A single 3-ton split system heat pump conditions one of the main offices. This unit has a SEER of 13 and a COP of 2.99.

Figure 25 - 10-ton RTUs - new gym

Figure 26 - 5-ton RTUs - new gym

Figure 27 - 30-ton RTU with ERV - cafetorium

Figure 28 - Daikin split-system heat pump

Figure 29 - Mitsubishi City Multi - multi-split ductless heat pumps

Figure 30 - Mitsubishi Multi City heat pump system control panel

Domestic Hot Water Heating System

A 999 Btu 85% efficient Bradford White boiler is used to heat water in a 1,250-gallon insulated tank and maintain temperature at 120°F. The tank is well insulated with approximately 2" of fiberglass insulation. The system includes a constant speed ¼ hp circulator pump serving a hot water supply loop. The pump runs continuously.

A pair of 90% efficient 199 MBh A.O. Smith tankless hot water heaters located in the equipment mezzanine supply hot water to the kitchen. A single 90% efficient Navien 150Mbh tankless water heater serves the restrooms in the 1908 building. There is no circulation pump for the 1908 building.

Food Service & Laundry Equipment

The school has a kitchen used to serve lunches for students. Food is prepared at a remote site and served from heated serving trays and refrigerators. There is also a conveyer dishwasher.

Refrigeration

The kitchen has a walk-in refrigerator that is used to store food prepared for school lunches. The refrigerator has a single ½-ton air cooled compressor. The evaporator for this unit has a single permanent split capacitor fan. The walk-in space temperature is maintained at 34°F. The kitchen also has a walk-in freezer also with a ½-ton compressor. The evaporator for this unit has a pair of permanent split capacitor fans.

There is also a commercial grade ice maker with a 400 lbs. per day capacity.

Building Plug Load

There are roughly 72 computer work stations throughout the facility. All of the computers are desktop units with LCD monitors. In addition to these there are 556 Chromebook type laptops for the students to use. There is no centralized PC power management software installed.

The classrooms have LCD projectors and smart boards; approximately 30 each.

Other significant plug loads include six small refrigerators, two residential refrigerators, several desktop printers, five large copier/printers and 34 dehumidifiers.

The server closets have cooling provided by dedicated split systems.

The facility has one refrigerated beverage vending machine and a snack vending machine.

2.7 Water-Using Systems

There are 18 student and 10 staff restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.0 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 1 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost 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

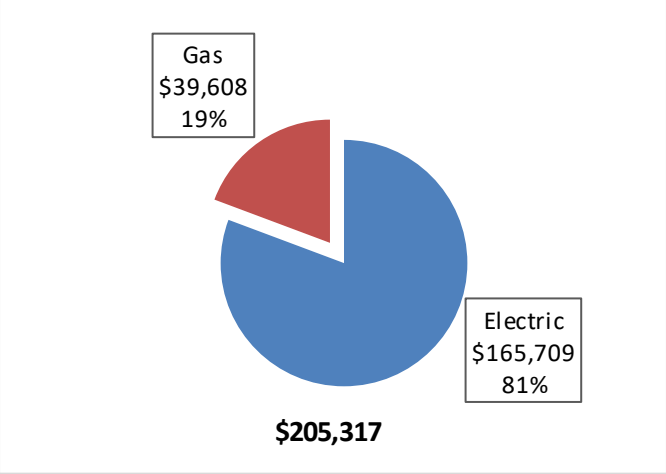
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 31 - Utility Summary

Utility Summary for Belhaven Middle School		
Fuel	**Usage**	**Cost**
Electricity	1,230,029 kWh	$165,709
Natural Gas	34,478 Therms	$39,608
Total		**$205,317**

The current annual energy cost for this facility is $205,317 as shown in the chart below.

Figure 32 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.135/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 33 - Electric Usage & Demand

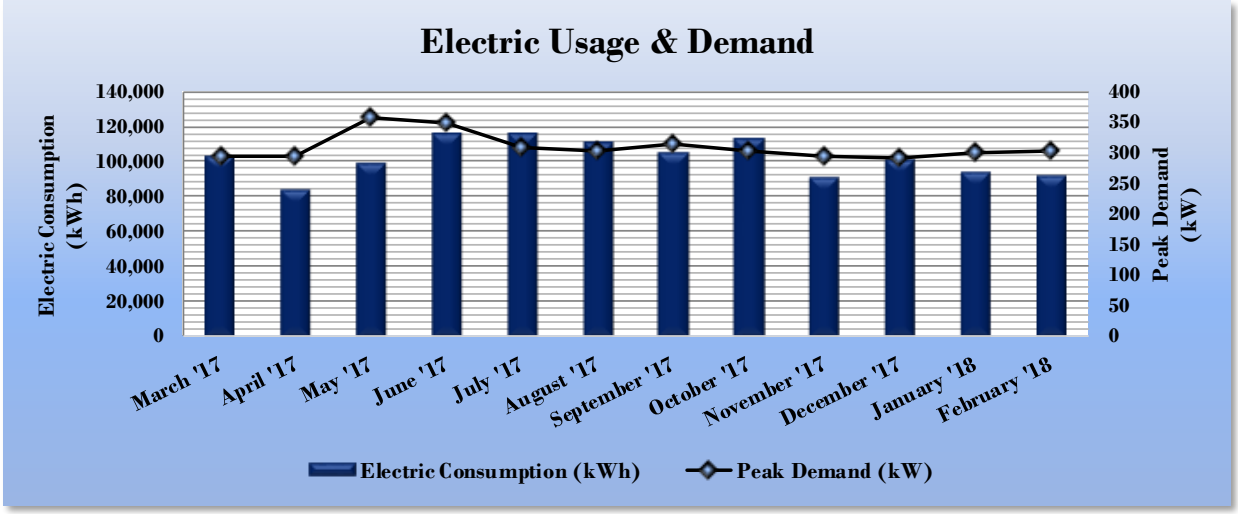


Figure 34 - Electric Usage & Demand

Electric Billing Data for Belhaven Middle School						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
4/3/17	32	103,100	295	2,971	15,775	No
5/1/17	28	83,429	295	2,971	12,785	Yes
5/31/17	30	98,560	358	3,239	14,022	No
6/30/17	30	115,740	348	3,179	14,785	No
7/31/17	31	115,660	308	2,786	14,405	No
8/31/17	31	110,740	304	2,880	14,168	No
9/29/17	29	104,620	316	2,617	13,503	No
10/31/17	32	113,140	302	3,230	14,699	No
12/1/17	31	90,760	294	2,985	12,189	No
1/2/18	32	100,940	293	3,094	13,281	No
1/31/18	29	94,320	299	2,888	12,753	No
2/28/18	28	92,280	303	2,799	12,437	No
Totals	**363**	**1,223,289**	**357.6**	**$35,639**	**$164,801**	
Annual	**365**	**1,230,029**	**357.6**	**$35,836**	**$165,709**	

3.3 Natural Gas Usage

Natural gas is provided by South Jersey Gas. The average gas cost for the past 12 months is $1.149/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 35 - Natural Gas Usage

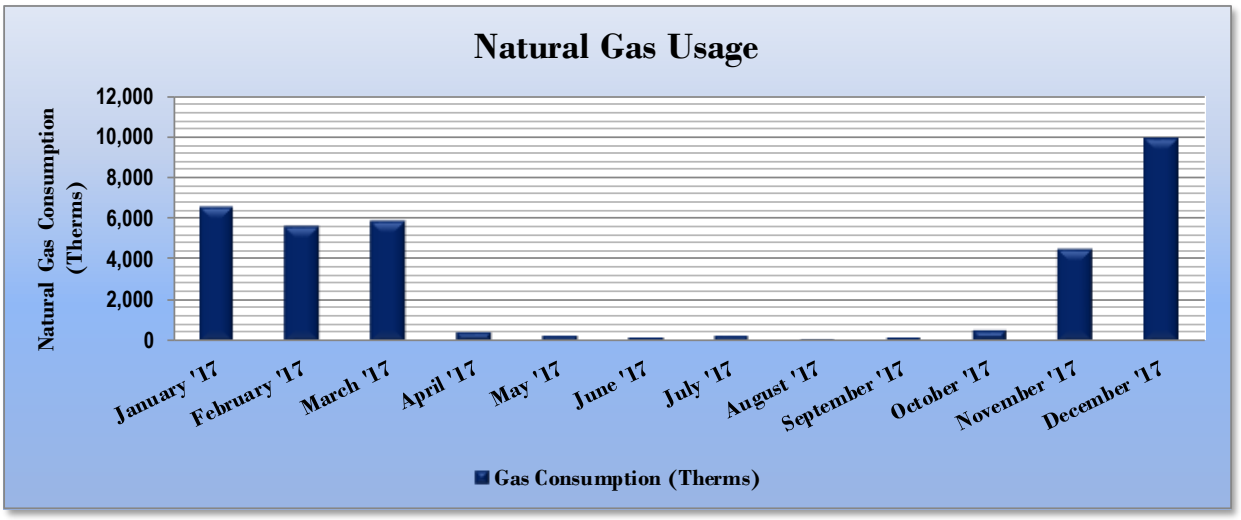


Figure 36 - Natural Gas Usage

Gas Billing Data for Belhaven Middle School				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
1/30/17	35	6,551	$6,376	No
2/28/17	27	5,677	$5,522	No
3/31/17	29	5,914	$8,062	No
4/30/17	31	416	$696	Yes
5/31/17	30	268	$268	No
6/30/17	30	161	$176	No
7/31/17	30	267	$311	No
8/31/17	31	121	$156	No
9/29/17	31	157	$192	No
10/31/17	29	564	$623	No
12/1/17	32	4,498	$5,294	No
1/2/18	31	9,978	$12,040	No
Totals	**366**	**34,572**	**$39,716**	
Annual	**365**	**34,478**	**$39,608**	

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 37 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Belhaven Middle School	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	153.7	262.6
Site Energy Use Intensity (kBtu/ft^2)	70.0	130.7

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

Figure 38 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Belhaven Middle School	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	139.7	262.6
Site Energy Use Intensity (kBtu/ft^2)	65.3	130.7

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 39.

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

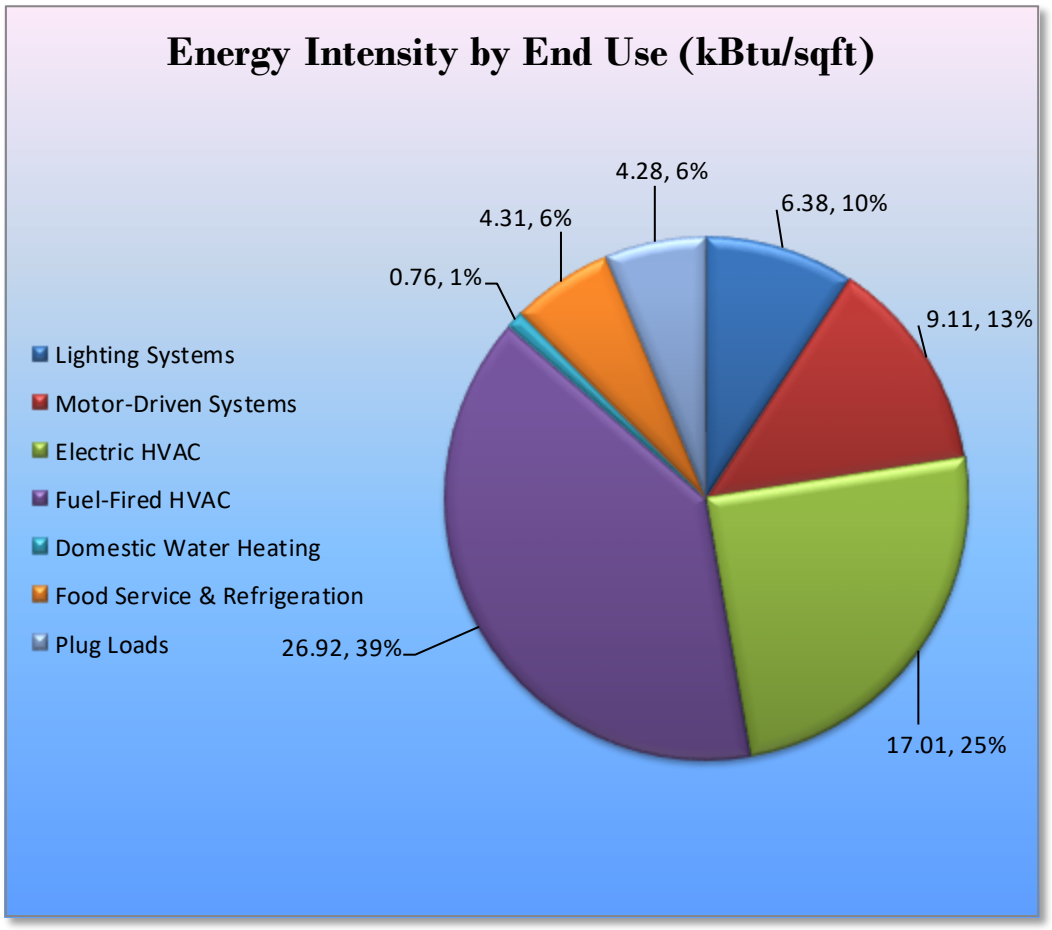
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 39 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Belhaven 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 40 – 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		**115,737**	**38.1**	**0.0**	**$15,592.09**	**$126,987.28**	**$22,155.00**	**$104,832.28**	**6.7**	**116,546**
ECM 1	Install LED Fixtures	20,037	4.8	0.0	$2,699.32	$49,210.00	$10,900.00	$38,310.00	14.2	20,177
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	64,964	22.0	0.0	$8,751.92	$54,009.45	$5,525.00	$48,484.45	5.5	65,418
ECM 3	Retrofit Fixtures with LED Lamps	30,737	11.3	0.0	$4,140.85	$23,767.84	$5,730.00	$18,037.84	4.4	30,952
Lighting Control Measures		**15,230**	**4.9**	**0.0**	**$2,051.81**	**$19,788.00**	**$2,180.00**	**$17,608.00**	**8.6**	**15,337**
ECM 4	Install Occupancy Sensor Lighting Controls	15,230	4.9	0.0	$2,051.81	$19,788.00	$2,180.00	$17,608.00	8.6	15,337
HVAC System Improvements		**6,447**	**0.0**	**0.0**	**$868.50**	**$5,437.68**	**$0.00**	**$5,437.68**	**6.3**	**6,492**
ECM 5	Implement Demand Control Ventilation	6,447	0.0	0.0	$868.50	$5,437.68	$0.00	$5,437.68	6.3	6,492
Domestic Water Heating Upgrade		**0**	**0.0**	**31.9**	**$366.03**	**$243.78**	**$0.00**	**$243.78**	**0.7**	**3,731**
ECM 6	Install Low-Flow Domestic Hot Water Devices	0	0.0	31.9	$366.03	$243.78	$0.00	$243.78	0.7	3,731
Food Service Equipment & Refrigeration Measures		**824**	**0.1**	**0.0**	**$111.08**	**$909.90**	**$0.00**	**$909.90**	**8.2**	**830**
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	824	0.1	0.0	$111.08	$909.90	$0.00	$909.90	8.2	830
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$263.29**	**$460.00**	**$0.00**	**$460.00**	**1.7**	**1,968**
ECM 8	Vending Machine Control	1,954	0.0	0.0	$263.29	$460.00	$0.00	$460.00	1.7	1,968
TOTALS		**140,193**	**43.1**	**31.9**	**$19,252.80**	**$153,826.64**	**$24,335.00**	**$129,491.64**	**6.7**	**144,904**

* - 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 41 below.

Figure 41 – 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		**115,737**	**38.1**	**0.0**	**$15,592.09**	**$126,987.28**	**$22,155.00**	**$104,832.28**	**6.7**	**116,546**
ECM 1	Install LED Fixtures	20,037	4.8	0.0	$2,699.32	$49,210.00	$10,900.00	$38,310.00	14.2	20,177
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	64,964	22.0	0.0	$8,751.92	$54,009.45	$5,525.00	$48,484.45	5.5	65,418
ECM 3	Retrofit Fixtures with LED Lamps	30,737	11.3	0.0	$4,140.85	$23,767.84	$5,730.00	$18,037.84	4.4	30,952

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	10,022	3.2	0.0	$1,350.22	$34,560.00	$7,200.00	$27,360.00	20.3	10,092
Exterior	10,014	1.6	0.0	$1,349.10	$14,650.00	$3,700.00	$10,950.00	8.1	10,084

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes longer than other technologies.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	64,964	22.0	0.0	$8,751.92	$54,009.45	$5,525.00	$48,484.45	5.5	65,418
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T12 fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. This includes all fixtures with magnetic ballasts. The affected fixtures are throughout the building including corridors, offices, the band rooms, library and other spaces.

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	30,737	11.3	0.0	$4,140.85	$23,767.84	$5,730.00	$18,037.84	4.4	30,952
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T8 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. This measure includes those fixtures with T8 lamps and electronic ballasts mostly in the classrooms.

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

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 42 below.

Figure 42 – 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		**15,230**	**4.9**	**0.0**	**$2,051.81**	**$19,788.00**	**$2,180.00**	**$17,608.00**	**8.6**	**15,337**
ECM 4	Install Occupancy Sensor Lighting Controls	15,230	4.9	0.0	$2,051.81	$19,788.00	$2,180.00	$17,608.00	8.6	15,337

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)
15,230	4.9	0.0	$2,051.81	$19,788.00	$2,180.00	$17,608.00	8.6	15,337

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, classrooms, and offices areas as well as the two gyms. 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.

4.1.3 HVAC System Upgrades

Our recommendations for HVAC system improvements are summarized in Figure 43 below.

Figure 43 - Summary of HVAC System Improvement ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**6,447**	**0.0**	**0.0**	**$868.50**	**$5,437.68**	**$0.00**	**$5,437.68**	**6.3**	**6,492**
ECM 5	Implement Demand Control Ventilation	6,447	0.0	0.0	$868.50	$5,437.68	$0.00	$5,437.68	6.3	6,492

ECM 5: Implement Demand Control Ventilation (DCV)

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)
6,447	0.0	0.0	$868.50	$5,437.68	$0.00	$5,437.68	6.3	6,492

Measure Description

Demand control ventilation (DCV) monitors indoor air CO_2 content to measure room occupancy. This data is used to regulate the amount of outdoor provided to the space for ventilation. In order to ensure adequate air quality, standard ventilation systems often provide outside air based on a space's estimated maximum occupancy. However, during low occupancy periods, the space may be over ventilated. This wastes energy through excessive fan more usage and additional cost to heat and cool the excessive air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels, saving significant amounts of energy. DCV is most suited for facilities where occupancy levels vary significantly hour to hour and day to day. The units affected those roof top units serving library, cafeteria, and old and new gymnasiums.

Energy savings associated with DCV are based on hours of operation, space occupancy, system air flow, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

4.1.4 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 44 below.

Figure 44 - 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**	**31.9**	**$366.03**	**$243.78**	**$0.00**	**$243.78**	**0.7**	**3,731**
ECM 6	Install Low-Flow Domestic Hot Water Devices	0	0.0	31.9	$366.03	$243.78	$0.00	$243.78	0.7	3,731

ECM 6: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	31.9	$366.03	$243.78	$0.00	$243.78	0.7	3,731

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.

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

4.1.5 Food Service Equipment & Refrigeration Measures

Our recommendations for food service and refrigeration measures are summarized in Figure 45 below.

Figure 45 - 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		**824**	**0.1**	**0.0**	**$111.08**	**$909.90**	**$0.00**	**$909.90**	**8.2**	**830**
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	824	0.1	0.0	$111.08	$909.90	$0.00	$909.90	8.2	830

ECM 7: 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)
824	0.1	0.0	$111.08	$909.90	$0.00	$909.90	8.2	830

Measure Description

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

4.1.6 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment control measures are summarized in Figure 46 below.

Figure 46 - Summary of Plug Load Equipment 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)
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$263.29**	**$460.00**	**$0.00**	**$460.00**	**1.7**	**1,968**
ECM 8	Vending Machine Control	1,954	0.0	0.0	$263.29	$460.00	$0.00	$460.00	1.7	1,968

ECM 8: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,954	0.0	0.0	$263.29	$460.00	$0.00	$460.00	1.7	1,968

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

4.2 ECMs Evaluated but Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in each measure description section.

Figure 47 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades	**2,560**	**0.6**	**0.0**	**$344.90**	**$9,081.66**	**$0.00**	**$9,081.66**	**26.3**	**2,578**
Premium Efficiency Motors	2,560	0.6	0.0	$344.90	$9,081.66	$0.00	$9,081.66	26.3	2,578
Electric Unitary HVAC Measures	**22,063**	**12.3**	**0.0**	**$2,972.27**	**$122,579.25**	**$4,999.50**	**$117,579.75**	**39.6**	**22,217**
Install High Efficiency Electric AC	20,597	12.2	0.0	$2,774.76	$115,772.37	$4,723.50	$111,048.87	40.0	20,741
Install High Efficiency Heat Pumps	1,466	0.1	0.0	$197.51	$6,806.88	$276.00	$6,530.88	33.1	1,476
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**7.2**	**$83.16**	**$9,095.79**	**$1,600.00**	**$7,495.79**	**90.1**	**848**
Install High Efficiency Furnaces	0	0.0	7.2	$83.16	$9,095.79	$1,600.00	$7,495.79	90.1	848
TOTALS	**24,623**	**12.9**	**7.2**	**$3,400.34**	**$140,756.70**	**$6,599.50**	**$134,157.20**	**39.5**	**25,643**

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

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

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,560	0.6	0.0	$344.90	$9,081.66	$0.00	$9,081.66	26.3	2,578

Measure Description

We evaluated replacing standard efficiency motors with NEMA Premium® efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. Affecting units were the supply fans in the roof top units, the chilled water pumps and the heating hot water pumps.

Reasons for not Recommending

Due to a longer simple payback for this measure the replacement would not be cost effective based on energy savings alone. The facility may choose to upgrade for other reasons such as a compressive facility-wide retrofit or additional O&M savings.

Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
20,597	12.2	0.0	$2,774.76	$115,772.37	$4,723.50	$111,048.87	40.0	20,741

Measure Description

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours. The affect units were the older packaged roof top units serving the stage, old gym, main hall and band room.

Reasons for not Recommending

Due to a longer simple payback for this measure the replacement would not be cost effective based on energy savings alone. The facility may choose to upgrade for other reasons such as a compressive facility-wide retrofit or additional O&M savings.

Install High Efficiency Heat Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,466	0.1	0.0	$197.51	$6,806.88	$276.00	$6,530.88	33.1	1,476

Measure Description

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

Reasons for not Recommending

Due to a longer simple payback for this measure the replacement would not be cost effective based on energy savings alone. The facility may choose to upgrade for other reasons such as a compressive facility-wide retrofit or additional O&M savings.

Install High Efficiency Furnaces

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	7.2	$83.16	$9,095.79	$1,600.00	$7,495.79	90.1	848

Measure Description

We evaluated replacing existing standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases which can significantly improve furnace efficiency. Savings result from improved system efficiency.

Reasons for not Recommending

Due to a longer simple payback for this measure the replacement would not be cost effective based on energy savings alone. The facility may choose to upgrade for other reasons such as a compressive facility-wide retrofit or additional O&M savings.

5 ENERGY EFFICIENT PRACTICES

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. Based on the information collected during the audit, many or all of these practices are routinely being done and listed for reference purposes.

Lighting Maintenance

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

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.

Lighting Controls

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

Chillers

Chillers are responsible for a substantial portion of a commercial building's overall energy usage. When components of a chiller are not optimized, this can quickly result in a noticeable increase in energy bills. Chiller diagnostics can produce a 5% to 10% cost avoidance potential from discovery and implementation of low/no cost optimization strategies.

Evaporator/Condenser Coils on AC Systems

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

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.

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.

Furnace Maintenance

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

Plug Load Controls

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

Water Conservation

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

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

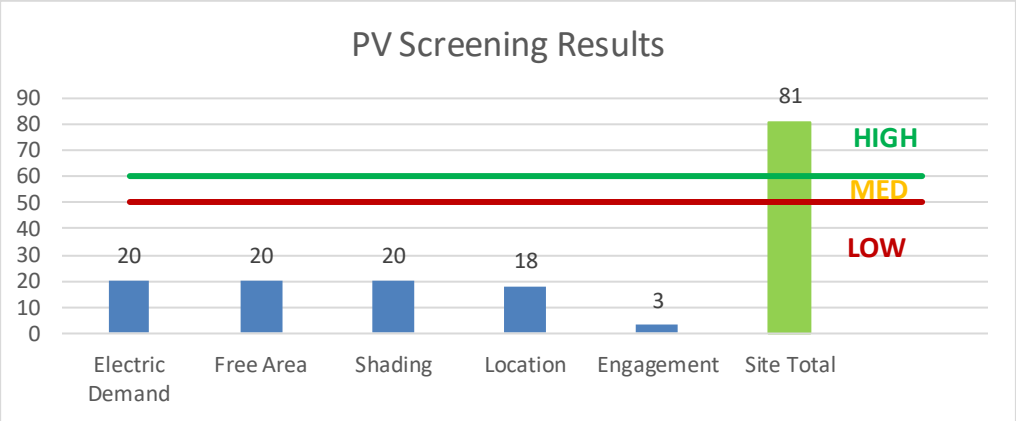
6.1 Photovoltaic

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 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/ground next to the building/over the main parking lot may be feasible. If Belhaven Middle School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 48 - Photovoltaic Screening



Potential	High	
System Potential	200	kW DC STC
Electric Generation	238,274	kWh/yr
Displaced Cost	$20,730	/yr
Installed Cost	$520,000	

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.

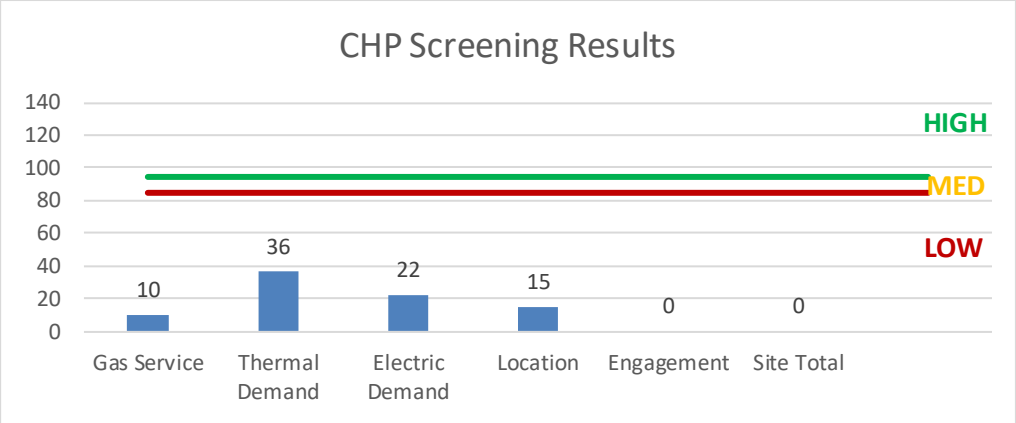
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

Figure 49 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

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

Figure 50 - 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 Fluorescent Fixtures with LED Lamps and Drivers	X					
ECM 3	Retrofit Fixtures with LED Lamps	X					
ECM 4	Install Occupancy Sensor Lighting Controls	X					
ECM 5	Implement Demand Control Ventilation	X					
ECM 6	Install Low-Flow Domestic Hot Water Devices						
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	X					
ECM 8	Vending Machine Control	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 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. SREC's 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 SREC's 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.

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

8.4 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (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 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 the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

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 of 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 of 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
Kitchen Mezzanine	10	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.34	1,062	0.0	$143.07	$687.73	$100.00	4.11
Pump Mezzanine	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.46	1,466	0.0	$197.44	$825.27	$120.00	3.57
Server Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,800	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.19	608	0.0	$81.88	$408.12	$100.00	3.76
Maintenance Storage	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.19	201	0.0	$27.13	$371.61	$70.00	11.12
Maintenance Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.05	173	0.0	$23.26	$189.03	$40.00	6.41
Boiler Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.28	888	0.0	$119.64	$474.70	$130.00	2.88
Front Vestibule	10	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.39	1,221	0.0	$164.53	$687.73	$100.00	3.57
Foyer	7	Compact Fluorescent: Twin-tube Pin-based 2L	Wall Switch	28	1,800	Relamp	Yes	7	LED Screw-In Lamps: LED PL Retrofit Bulbs	Occupancy Sensor	20	1,260	0.07	207	0.0	$27.88	$515.00	$0.00	18.47
Foyer	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.13	405	0.0	$54.55	$688.87	$0.00	12.63
Atrium	14	Compact Fluorescent: Twin-tube Pin-based 2L	Wall Switch	28	1,800	Relamp	Yes	14	LED Screw-In Lamps: LED PL Retrofit Bulbs	Occupancy Sensor	20	1,260	0.13	414	0.0	$55.75	$760.00	$0.00	13.63
Atrium	4	Compact Fluorescent: Twin-tube Pin-based 2L	Wall Switch	28	1,800	Relamp	Yes	4	LED Screw-In Lamps: LED PL Retrofit Bulbs	Occupancy Sensor	15	1,260	0.05	145	0.0	$19.52	$410.00	$0.00	21.00
Reception	8	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	No	8	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.20	646	0.0	$87.01	$837.74	$0.00	9.63
Reception	12	Compact Fluorescent: Twin-tube Pin-based 2L	Wall Switch	28	1,800	Relamp	No	12	LED Screw-In Lamps: LED PL Retrofit Bulbs	Wall Switch	20	1,800	0.07	209	0.0	$28.11	$420.00	$0.00	14.94
Teacher's lounge	11	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.70	2,198	0.0	$296.17	$1,342.70	$200.00	3.86
Auditorium	90	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	No	90	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	2.30	7,266	0.0	$978.83	$9,424.58	$0.00	9.63
107	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	28	1,800	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.06	191	0.0	$25.77	$941.27	$140.00	31.10
Library	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.10	323	0.0	$43.50	$418.87	$0.00	9.63
Library	32	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	1.42	4,484	0.0	$604.14	$3,280.72	$460.00	4.67
Library	19	compact Fluorescent: Twin-tube Pin-based 2L	Wall Switch	28	1,800	Relamp	Yes	19	LED Screw-In Lamps: LED PL Retrofit Bulbs	Occupancy Sensor	20	1,260	0.18	562	0.0	$75.66	$1,475.00	$105.00	18.11
Library	32	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	1.42	4,484	0.0	$604.14	$3,280.72	$460.00	4.67
Library	40	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	1.78	5,606	0.0	$755.18	$3,830.90	$540.00	4.36
It Office	6	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.38	1,199	0.0	$161.55	$855.11	$125.00	4.52
Library Office	8	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.51	1,599	0.0	$215.40	$896.14	$140.00	3.51
Library rest room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.03	101	0.0	$13.64	$220.72	$0.00	16.19
Cafetorium	6	LED - Fixtures: Wall Sconces	Wall Switch	8	1,800	None	No	6	LED - Fixtures: Wall Sconces	Wall Switch	8	1,800	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
Courtyard Class	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.03	101	0.0	$13.64	$220.72	$20.00	14.72
Back Office Psych	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.05	173	0.0	$23.26	$189.03	$40.00	6.41
Back Hall	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.06	180	0.0	$24.26	$217.38	$0.00	8.96
Conference room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.16	518	0.0	$69.77	$335.09	$80.00	3.66
Back Office Staff Rest Room	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,800	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,800	0.01	28	0.0	$3.76	$16.26	$5.00	2.99
Social Worker	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.05	173	0.0	$23.26	$189.03	$40.00	6.41
Work Room STS	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.13	400	0.0	$53.85	$311.04	$50.00	4.85
STS	4	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,800	Relamp	No	4	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,800	0.04	112	0.0	$15.06	$65.03	$20.00	2.99
Testing	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.13	400	0.0	$53.85	$311.04	$50.00	4.85
Office	3	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.19	600	0.0	$80.77	$408.55	$65.00	4.25
Business Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.10	322	0.0	$43.39	$405.84	$20.00	8.89
Inner Office	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,800	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.53	1,682	0.0	$226.55	$826.18	$140.00	3.03
Superintendent	8	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.51	1,599	0.0	$215.40	$896.14	$140.00	3.51
Conference room	8	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,800	Relamp & Reballast	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.71	2,242	0.0	$302.07	$1,062.90	$180.00	2.92
Superintendents Office	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,800	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.53	1,682	0.0	$226.55	$826.18	$140.00	3.03
Staff Rest Room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.03	101	0.0	$13.64	$220.72	$0.00	16.19
101102	8	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.51	1,599	0.0	$215.40	$896.14	$140.00	3.51
100 Hall Vestibule	1	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.05	173	0.0	$23.29	$97.52	$15.00	3.54
100 Hall	24	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	1.52	4,797	0.0	$646.20	$3,140.43	$360.00	4.30
Snack Bar	1	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.05	173	0.0	$23.29	$97.52	$15.00	3.54
Club A	16	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	1.01	3,198	0.0	$430.80	$2,640.29	$380.00	5.25
Old Gym Hall	6	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.38	1,199	0.0	$161.55	$1,185.11	$90.00	6.78
Front Office Hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.22	691	0.0	$93.03	$492.12	$80.00	4.43
103	15	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.95	2,998	0.0	$403.87	$1,578.77	$245.00	3.30
300 Nurses Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.11	345	0.0	$46.52	$262.06	$60.00	4.34

	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
Nurse Exam Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.03	86	0.0	$11.63	$152.52	$30.00	10.54
Nurse's Ward	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.08	259	0.0	$34.89	$225.55	$50.00	5.03
Nurse's Rest Room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.03	101	0.0	$13.64	$220.72	$0.00	16.19
Copy Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.04	129	0.0	$17.44	$170.77	$35.00	7.78
Storage 300	12	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.76	2,398	0.0	$323.10	$1,286.22	$180.00	3.42
Vestibule East 300	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.05	161	0.0	$21.75	$209.44	$0.00	9.63
Hall East 300	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	96	0.0	$12.88	$73.03	$20.00	4.12
Band	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.82	2,590	0.0	$348.87	$1,365.45	$335.00	2.95
Band Office	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.13	405	0.0	$54.55	$534.87	$20.00	9.44
Band Practice	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.16	518	0.0	$69.77	$335.09	$80.00	3.66
Girl's Rest Room 300	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	96	0.0	$12.88	$73.03	$20.00	4.12
Boy's Rest Room 300	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	96	0.0	$12.88	$73.03	$20.00	4.12
Music Room	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.49	1,554	0.0	$209.32	$1,197.27	$250.00	4.53
Music Room	2	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.06	202	0.0	$27.27	$325.44	$20.00	11.20
Music Room Office	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.13	405	0.0	$54.55	$534.87	$20.00	9.44
300 Hall	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.29	646	0.0	$86.97	$492.95	$135.00	4.12
300 Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.10	307	0.0	$41.41	$164.32	$45.00	2.88
301	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,800	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.38	1,216	0.0	$163.75	$700.24	$180.00	3.18
302	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,800	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.38	1,216	0.0	$163.75	$700.24	$180.00	3.18
303	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,800	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.38	1,216	0.0	$163.75	$700.24	$180.00	3.18
304	16	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	1,260	None	No	16	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	1,260	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
300 Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.10	307	0.0	$41.41	$164.32	$45.00	2.88
Office	12	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.38	1,215	0.0	$163.64	$1,372.61	$20.00	8.27
Guidance	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.13	420	0.0	$56.64	$322.32	$50.00	4.81
Staff Rest Room	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,260	0.03	101	0.0	$13.64	$220.72	$0.00	16.19

	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
Work Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.13	400	0.0	$53.85	$311.04	$50.00	4.85
Principal	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,800	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.27	841	0.0	$113.28	$471.09	$80.00	3.45
Conference room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.08	259	0.0	$34.89	$225.55	$50.00	5.03
Back Hall	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.06	180	0.0	$24.26	$217.38	$0.00	8.96
Back Hall Rest Room	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,800	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,800	0.02	56	0.0	$7.53	$32.52	$10.00	2.99
Dir of Curriculum	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.11	345	0.0	$46.52	$262.06	$60.00	4.34
Mezzanine of Teacher's Lounge	4	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.10	323	0.0	$43.50	$418.87	$0.00	9.63
Mezzanine of Teacher's Lounge	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.08	244	0.0	$32.91	$137.55	$20.00	3.57
401	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.29	646	0.0	$86.97	$492.95	$135.00	4.12
401 Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.04	41	0.0	$5.48	$68.77	$10.00	10.72
402	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.19	430	0.0	$57.98	$328.64	$90.00	4.12
403	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.29	646	0.0	$86.97	$492.95	$135.00	4.12
403 Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.04	41	0.0	$5.48	$68.77	$10.00	10.72
404	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.26	574	0.0	$77.30	$438.18	$120.00	4.12
404 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	600	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	600	0.03	34	0.0	$4.60	$54.77	$15.00	8.64
404 Rest Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	140	0.0	$18.88	$184.77	$10.00	9.26
405	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.29	646	0.0	$86.97	$492.95	$135.00	4.12
406	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.19	430	0.0	$57.98	$328.64	$90.00	4.12
400 Hall	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.19	430	0.0	$57.98	$328.64	$90.00	4.12
400 Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.06	205	0.0	$27.61	$109.55	$30.00	2.88
Girl's Rest Room 400	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	96	0.0	$12.88	$73.03	$20.00	4.12
Boy's Rest Room 400	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	96	0.0	$12.88	$73.03	$20.00	4.12
Stair 400	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.12	366	0.0	$49.36	$206.32	$30.00	3.57
Custodial	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	140	0.0	$18.88	$184.77	$10.00	9.26
Hall Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	140	0.0	$18.88	$184.77	$10.00	9.26

	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
Elevator Hall 400	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.10	215	0.0	$28.99	$164.32	$45.00	4.12
500 Stair	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.02	48	0.0	$6.44	$36.52	$10.00	4.12
500 Stair	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.10	215	0.0	$28.99	$164.32	$45.00	4.12
501	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.26	574	0.0	$77.30	$438.18	$120.00	4.12
501 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	600	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	600	0.03	34	0.0	$4.60	$54.77	$15.00	8.64
502	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.32	717	0.0	$96.63	$547.73	$150.00	4.12
503	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.26	574	0.0	$77.30	$438.18	$120.00	4.12
503 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	600	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	600	0.03	34	0.0	$4.60	$54.77	$15.00	8.64
504	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.26	574	0.0	$77.30	$438.18	$120.00	4.12
504 Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	600	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	420	0.08	86	0.0	$11.63	$225.55	$30.00	16.82
505 inner	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.06	143	0.0	$19.33	$109.55	$30.00	4.12
505 outer	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.19	615	0.0	$82.82	$328.64	$90.00	2.88
Elevator Hall 500	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,260	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	96	0.0	$12.88	$73.03	$20.00	4.12
Hall 500	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,260	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.19	430	0.0	$57.98	$328.64	$90.00	4.12
Custodial 500	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.04	129	0.0	$17.44	$170.77	$15.00	8.93
1908 Basement	10	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	200	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	200	0.56	198	0.0	$26.65	$1,286.93	$0.00	48.29
1908 Bsmt Shop	5	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	200	Relamp & Reballast	No	5	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	200	0.28	99	0.0	$13.32	$643.46	$0.00	48.29
Old Band Room	4	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	200	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	200	0.23	79	0.0	$10.66	$514.77	$0.00	48.29
1908 Bsmt Hall	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	200	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	200	0.11	40	0.0	$5.33	$257.39	$0.00	48.29
1098 Boiler Rm	5	LED Screw-In Lamps: A19 utility fixture	Wall Switch	16	200	None	No	5	LED Screw-In Lamps: A19 utility fixture	Wall Switch	16	200	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1098 Boiler Rm	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	200	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	200	0.06	20	0.0	$2.66	$128.69	$0.00	48.29
IT Hall	4	Incandescent: Recessed Fixture	Wall Switch	60	200	Relamp	No	4	LED Screw-In Lamps: LED Screw in lamps	Wall Switch	18	200	0.11	39	0.0	$5.21	$68.90	$20.00	9.39
IT Rest Rooms	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,800	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,800	0.02	66	0.0	$8.92	$65.03	$20.00	5.05
IT Office	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,800	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,260	0.18	561	0.0	$75.52	$352.73	$60.00	3.88
IT Shower Room	3	compact Fluorescent: A19 utility fixture	Wall Switch	23	1,800	Relamp	Yes	3	LED Screw-In Lamps: LED Screw in lamps	Occupancy Sensor	16	1,260	0.02	73	0.0	$9.81	$167.68	$20.00	15.05

	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
IT Shower Room	5	LED: A19 utility fixture	Wall Switch	16	1,800	None	No	5	LED: A19 utility fixture	Wall Switch	16	1,800	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
IT Room	5	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.22	701	0.0	$94.40	$459.86	$70.00	4.13
Old Gym Girl's Locker	10	Incandescent: Recessed Fixture	Wall Switch	60	1,800	Relamp	Yes	10	LED Screw-In Lamps: LED Screw in lamps	Occupancy Sensor	18	1,260	0.31	981	0.0	$132.18	$712.25	$120.00	4.48
Locker	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.18	561	0.0	$75.52	$545.09	$75.00	6.22
Rest Room	1	Linear Fluorescent - T12: 2' T12 (20W) - 2L	Wall Switch	50	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,260	0.02	79	0.0	$10.62	$180.77	$10.00	16.07
Rest Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.04	140	0.0	$18.88	$184.77	$10.00	9.26
Industrial Arts Shop	44	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	44	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	1.70	5,374	0.0	$723.95	$3,025.99	$440.00	3.57
IA Office	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.13	420	0.0	$56.64	$322.32	$50.00	4.81
IA Storage	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.09	280	0.0	$37.76	$253.55	$20.00	6.19
Old Gym	24	Metal Halide: (1) 200W Lamp	Wall Switch	232	1,800	Fixture Replacement	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	116	1,260	2.37	7,492	0.0	$1,009.29	$17,820.00	$3,670.00	14.02
Old Gym Closet	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.09	93	0.0	$12.59	$253.55	$20.00	18.56
Old Gym Closet	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.09	93	0.0	$12.59	$253.55	$20.00	18.56
Old Gym Hall	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.12	366	0.0	$49.36	$206.32	$30.00	3.57
New Gym	24	Metal Halide: (1) 200W Lamp	Wall Switch	232	1,800	Fixture Replacement	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	116	1,260	2.37	7,492	0.0	$1,009.29	$17,820.00	$3,670.00	14.02
Weight Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.11	345	0.0	$46.52	$262.06	$60.00	4.34
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.11	115	0.0	$15.51	$262.06	$40.00	14.32
Boy's Locker	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.22	230	0.0	$31.01	$408.12	$100.00	9.94
Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.02	68	0.0	$9.20	$36.52	$10.00	2.88
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.04	137	0.0	$18.41	$73.03	$20.00	2.88
Girl's Locker	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.27	280	0.0	$37.76	$528.64	$80.00	11.88
Lower Mezzanine	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.08	81	0.0	$10.97	$137.55	$20.00	10.72
Art Classroom	15	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.95	2,998	0.0	$403.87	$1,578.77	$245.00	3.30
Kiln Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	600	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	600	0.05	58	0.0	$7.76	$97.52	$15.00	10.63
Kitchen	19	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	1,800	Relamp & Reballast	No	19	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,800	1.47	4,641	0.0	$625.23	$2,248.90	$380.00	2.99
Kitchen	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	1,800	Relamp & Reballast	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.08	242	0.0	$32.63	$314.15	$0.00	9.63

	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
Kitchen Hall	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,800	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.04	122	0.0	$16.45	$68.77	$10.00	3.57
Kitchen Rest Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.04	41	0.0	$5.48	$68.77	$10.00	10.72
Storage	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.08	81	0.0	$10.97	$137.55	$20.00	10.72
Hall - Gym to Kitchen	5	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.27	864	0.0	$116.43	$487.59	$75.00	3.54
Hall - Kitchen to Main	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	No	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.23	717	0.0	$96.63	$383.41	$105.00	2.88
Electric room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	600	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.04	41	0.0	$5.48	$68.77	$10.00	10.72
Hall Ktcn to Maintenance	3	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	127	1,800	Relamp & Reballast	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.19	600	0.0	$80.77	$562.55	$80.00	5.97
Stair 200	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,800	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,800	0.07	232	0.0	$31.23	$146.06	$40.00	3.40
Stair 200	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,800	0.04	120	0.0	$16.17	$144.92	$0.00	8.96
8th Grade Science	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.66	2,072	0.0	$279.09	$992.36	$260.00	2.62
Closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.06	68	0.0	$9.20	$109.55	$30.00	8.64
Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	420	0.16	173	0.0	$23.26	$335.09	$60.00	11.83
7th Grade Science	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.62	1,942	0.0	$261.65	$937.59	$245.00	2.65
203	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
204	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
205	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
206	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
207	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
208	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
209	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.33	1,036	0.0	$139.55	$554.18	$140.00	2.97
End Hall 200	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,800	0.03	102	0.0	$13.80	$54.77	$15.00	2.88
Printer Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,800	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,260	0.04	129	0.0	$17.44	$170.77	$35.00	7.78
Girl's Rest Room 200	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.11	345	0.0	$46.52	$262.06	$40.00	4.77
Boy's Rest Room 200	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,260	0.11	345	0.0	$46.52	$262.06	$40.00	4.77
Electric room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,800	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.04	137	0.0	$18.41	$73.03	$20.00	2.88

	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
Exit	46	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	46	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Wall packs	19	Metal Halide: (1) 100W Lamp	Daylight Dimming	128	3,468	Fixture Replacement	No	19	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	64	3,468	0.80	4,849	0.0	$653.25	$6,650.00	$1,900.00	7.27
Wall mounted area fixtures	8	Metal Halide: (1) 100W Lamp	Daylight Dimming	128	3,468	Fixture Replacement	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	64	3,468	0.34	2,042	0.0	$275.05	$2,000.00	$800.00	4.36
Pole Mounted Parking Lot fixtures	10	Metal Halide: (1) 200W Lamp	Daylight Dimming	232	3,468	Fixture Replacement	No	10	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	116	3,468	0.76	4,626	0.0	$623.17	$6,000.00	$1,000.00	8.02

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
Roof	Teachers lounge and adjacent	1	Supply Fan	1.0	82.0%	No	2,745	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Hall	1	Supply Fan	1.0	82.0%	No	2,745	Yes	85.5%	No		0.02	77	0.0	$10.33	$474.06	$0.00	45.90
Roof	Library	1	Supply Fan	7.5	89.5%	No	3,391	Yes	91.0%	No		0.06	262	0.0	$35.31	$1,131.44	$0.00	32.05
Roof	Cafeteria	1	Supply Fan	10.0	91.0%	No	3,391	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Stage	1	Supply Fan	1.0	82.0%	No	2,745	Yes	85.5%	No		0.02	77	0.0	$10.33	$474.06	$0.00	45.90
Roof	Stage	1	Supply Fan	0.5	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Art	1	Supply Fan	0.5	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Office	1	Supply Fan	1.0	82.0%	No	2,745	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	unknown (tag RTU1)	1	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Old Gym	4	Supply Fan	0.4	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	New Gym	2	Supply Fan	0.8	65.0%	No	2,745	No	65.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	South East Roof	1	Supply Fan	5.0	87.5%	No	2,745	Yes	89.5%	No		0.05	196	0.0	$26.42	$800.37	$0.00	30.29
Roof	South East Roof	1	Supply Fan	1.5	84.0%	No	2,745	Yes	86.5%	No		0.02	79	0.0	$10.68	$758.15	$0.00	71.00
Mechanical Room	Whole Building	1	Chilled Water Pump	20.0	91.0%	No	3,391	Yes	93.0%	No		0.20	897	0.0	$120.81	$2,247.73	$0.00	18.61
Mechanical Room	Whole Building	1	Chilled Water Pump	20.0	91.0%	No	3,391	Yes	93.0%	No		0.20	897	0.0	$120.81	$2,247.73	$0.00	18.61
Classrooms	Classrooms	39	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Halls and various	Halls and various	17	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Various cabinet Heaters	5	Supply Fan	0.1	55.0%	No	2,745	No	55.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Various Hydronic Unit Heaters	17	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Hot water primary loop	1	Heating Hot Water Pump	1.0	82.5%	No	2,745	Yes	85.5%	No		0.02	65	0.0	$8.80	$474.06	$0.00	53.87

		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
Mechanical Room	Hot water primary loop	1	Heating Hot Water Pump	1.0	85.0%	No	2,745	Yes	85.5%	No		0.00	11	0.0	$1.42	$474.06	$0.00	333.02
Storage	DHW circulator	1	Process Fan	0.3	55.0%	No	2,745	No	55.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ventilation Fans	Various	42	Ventilation Fan	0.8	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ceiling over 505	Second Floor 1908	1	Supply Fan	2.0	82.0%	No	2,745	No	82.0%	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
Roof	Teachers lounge and adjacent	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Hall	1	Packaged AC	6.00		Yes	1	Packaged AC	6.00		11.50		No	0.63	1,062	0.0	$143.09	$10,692.63	$438.00	71.66
Roof	Library	1	Packaged AC	30.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Cafeteria	1	Packaged AC	30.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Stage	1	Packaged AC	8.50		Yes	1	Packaged AC	8.50		11.50		No	0.89	1,505	0.0	$202.72	$15,147.90	$620.50	71.66
Roof	Stage	1	Packaged AC	7.50		Yes	1	Packaged AC	7.50		11.50		No	0.79	1,328	0.0	$178.87	$13,365.79	$547.50	71.66
Roof	Art	1	Packaged AC	7.50		Yes	1	Packaged AC	7.50		11.50		No	0.79	1,328	0.0	$178.87	$13,365.79	$547.50	71.66
Roof	Main Office	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	unknown (tag RTU1)	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Old Gym	3	Packaged AC	5.00		Yes	3	Packaged AC	5.00		14.00		No	3.45	5,817	0.0	$783.61	$34,034.40	$1,380.00	41.67
Roof	New Gym	2	Packaged AC	10.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	South East Roof	1	Packaged AC	10.00		Yes	1	Packaged AC	10.00		11.50		No	1.30	2,190	0.0	$295.04	$17,821.06	$730.00	57.93
Roof	South East Roof	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		No	0.34	582	0.0	$78.36	$11,344.80	$460.00	138.91
Roof	Roof	1	Ductless Mini-Split AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	1908	1	Ductless Mini-Split AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	2nd floor 1908	1	Ductless Mini-Split HP	1.83	8.60	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	1908 Tag HPA	1	Ductless Mini-Split HP	3.00	42.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	1908 Tag HPB	1	Ductless Mini-Split HP	3.00	42.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	Office	1	Split-System Air-Source HP	3.00	33.60	Yes	1	Packaged Air-Source HP	3.00	33.60	14.00	3.80	No	0.13	1,466	0.0	$197.51	$6,806.88	$276.00	33.07
Ground	Server Room	1	Ductless Mini-Split HP	2.00	25.20	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
Ground	Whole Building	1	Air-Cooled Screw Chiller	210.00	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
Roof	Teachers lounge and adjacent	1	Furnace	65.60	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Hall	1	Furnace	97.50	Yes	1	Furnace	97.50	95.00%	AFUE	0.00	0	5.7	$65.82	$2,209.09	$400.00	27.49
Roof	Library	1	Furnace	288.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Cafeteria	1	Furnace	400.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Stage	1	Furnace	109.35	Yes	1	Furnace	109.35	82.00%	AFUE	0.00	0	0.5	$6.24	$2,477.58	$400.00	332.99
Roof	Stage	1	Furnace	97.30	Yes	1	Furnace	97.30	82.00%	AFUE	0.00	0	0.5	$5.55	$2,204.56	$400.00	325.05
Roof	Art	1	Furnace	97.30	Yes	1	Furnace	97.30	82.00%	AFUE	0.00	0	0.5	$5.55	$2,204.56	$400.00	325.05
Roof	Tag RTU1	1	Furnace	108.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Unknown	1	Furnace	65.60	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Old GYM	4	Furnace	109.35	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	New Gym	2	Furnace	200.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	South East Roof	1	Furnace	144.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	South East Roof	1	Furnace	100.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Whole Building	2	Condensing Hot Water Boiler	2,000.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU1	1	Furnace	108.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Demand Control Ventilation Recommendations

		Recommendation Inputs				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Library	1	30.00			0.00	2,036	0.0	$274.26	$1,359.42	$0.00	4.96
Roof	Cafeteria	1	30.00			0.00	2,036	0.0	$274.26	$1,359.42	$0.00	4.96
Roof	Old Gym	1	15.00			0.00	1,018	0.0	$137.13	$1,359.42	$0.00	9.91
Roof	New Gym	1	20.00			0.00	1,357	0.0	$182.84	$1,359.42	$0.00	7.43

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
Mezzanine	Kitchen	2	Tankless Water Heater	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	Whole Building	1	Indirect System	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1908 Basement	1908	1	Tankless Water Heater	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
Rest Rooms	34	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	31.9	$366.03	$243.78	$0.00	0.67

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	No	0.03	412	0.0	$55.54	$303.30	$0.00	5.46
Kitchen	1	Low Temp Freezer (-35F to -5F)	Yes	No	No	0.03	412	0.0	$55.54	$606.60	$0.00	10.92

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Refrigerator Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Ice Making Head (≥450 lbs/day), Batch	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 Fryer	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Gas Rack Oven (Single)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Steamer	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Insulated Food Holding Cabinet (1/2 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 (High Temp)	Natural Gas	N/A	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

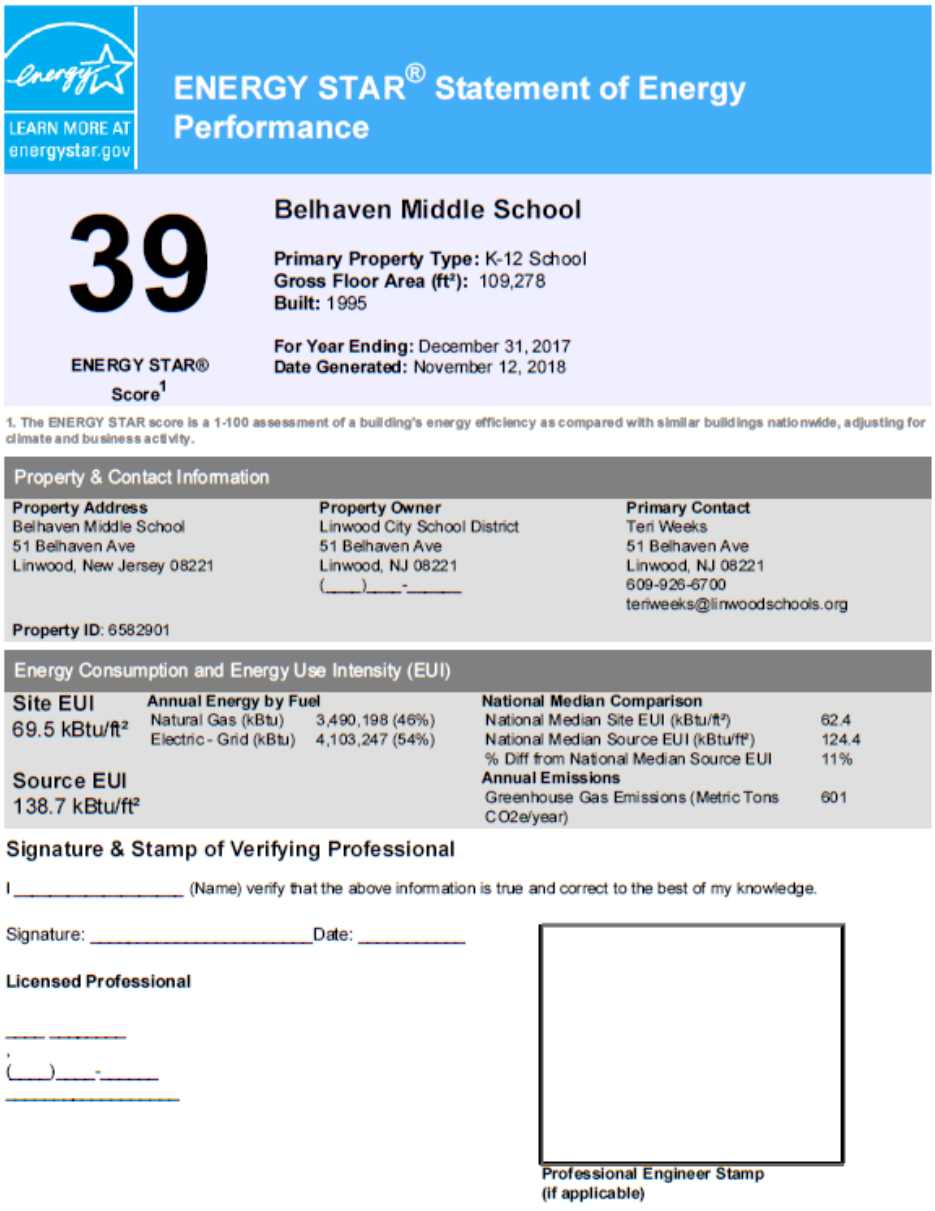
	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms	72	DeskTop PCs	150.0	
Classrooms	72	LCD Monitors	85.0	
Classrooms	30	LCD Projectors	300.0	
Various	30	Smart Board	69.4	
Various	9	Small Printers	60.0	
Offices	5	Large Printers/copiers	175.1	
Offices	2	Stand alone copiers	54.1	
Classrooms	34	Dehumidifiers	173.5	
Reception	1	Large Flat screen TV	250.0	
IT Racks	1	Misc Equipment	3,550.0	
Various	6	Small Refrigerators	314.0	
1908 IT rack	1	Misc Equipment	800.0	
1908 Classroom	1	Clothes Washer	500.0	
1908 Classroom	1	Clothes Dryer	4,500.0	
1908 Classroom	1	Refrigerator	419.0	
1908 Classroom	1	Dishwasher	1,400.0	
1908	1	Refrigerator	419.0	
Various	4	Microwaves	1,200.0	
Kitchen	1	Microwave Commercial	1,200.0	
Carts	556	Laptops	80.0	

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Teachers Lounge	1	Non-Refrigerated	Yes	0.00	343	0.0	$46.14	$230.00	$0.00	4.98
Teachers Lounge	1	Refrigerated	Yes	0.00	1,612	0.0	$217.15	$230.00	$0.00	1.06

Appendix B: ENERGY STAR® Statement of Energy Performance

EUI is presented in terms of *site energy* and *source energy*. Site energy is the amount of fuel (natural gas) 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. The ENERGY STAR® score is based on a comparison of similar buildings across the county, while neutralizing variations due to location, occupancy and operating hours. The fact that the building has had two additions affects the building's efficiency more than if the building were built all at one time and designed with a cohesive, integrated set of HVAC equipment.



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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Belhaven Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 109,278
Built: 1995

For Year Ending: December 31, 2017
Date Generated: November 12, 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
Belhaven Middle School 51 Belhaven Ave Linwood, New Jersey 08221	Linwood City School District 51 Belhaven Ave Linwood, NJ 08221 (___)___-____	Teri Weeks 51 Belhaven Ave Linwood, NJ 08221 609-926-6700 teriweeks@linwoodschools.org

Property ID: 6582901

Energy Consumption and Energy Use Intensity (EUI)

Site EUI 69.5 kBtu/ft²	**Annual Energy by Fuel**		**National Median Comparison**	
	Natural Gas (kBtu)	3,490,198 (46%)	National Median Site EUI (kBtu/ft²)	62.4
	Electric - Grid (kBtu)	4,103,247 (54%)	National Median Source EUI (kBtu/ft²)	124.4
			% Diff from National Median Source EUI	11%
Source EUI 138.7 kBtu/ft²			**Annual Emissions**	
			Greenhouse Gas Emissions (Metric Tons CO2e/year)	601

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)