Local Government Energy Audit:
Energy Audit Report

Veterans Memorial Middle School

Brick Township Board of Education
105 Hendrickson Avenue
Brick, NJ 08724

April 16, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

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

The goal of an LGEA report is to provide local governments with valuable information on their facilities' energy usage, to identify energy conservation measures (ECMs) and energy management options that may benefit their facilities, and to provide information on financial incentives from New Jersey's Clean Energy Programs (NJCEP) and other sources which may be available to assist with ECM implementation.

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

1.1 Facility Summary

Veterans Memorial Middle School is a 132,389 square foot public school in Brick Township, New Jersey. It is a one-story building originally constructed in 1970, with additional building sections added in 1996, 1999, and 2002. A 379-kW solar PV array was added to the building's rooftop in spring 2017. The building is comprised of classrooms, administrative offices, a cafeteria, a gymnasium, a large multi-purpose room, storage areas, and restrooms.

The interior of the building is mostly lit by 4-foot 32-Watt T8 linear fluorescent fixtures, with 1-4 lamps each. There are also a few older lighting technologies, such as T12 fluorescents and incandescent bulbs. Lighting is controlled throughout the building by manual wall switches. Exterior lighting is mostly comprised of high intensity discharge (HID) wall-mounted lighting fixtures, controlled by timers.

The building's primary source of heat comes from two main gas-fired hot water boilers. They are H.B Smith sectional cast iron boilers installed in 1970. Each has an input capacity of 2,500 MBH and are estimated to be only about 75% efficient. There are also five smaller boilers which provide heat to the new sections of the building. There are two 180 MBH input boilers which supply the 1996 section, two 140 MBH input Weil McLain boilers that supply the classrooms added in 1999, and one 926 MBH input Raypak boiler on the roof which supplies the 2002 addition.

The building has 15 rooftop units (7 Trane packaged units, 1 Carrier unit, and 1 Reznor unit, and 6 Trane split units). They provide between 4 and 15 tons of cooling each. The building also has 14 ductless mini-split AC units and 15 window AC units – which provide 1 to 3 tons of cooling each. Nine of the RTUs are gas/electric, supplying supplemental heating as well. There is also one Trane RTU air source heat pump.

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 11 energy conservation measures. Nine ECMs were determined to be "high priority" measures, which means that they would likely pay for themselves in energy savings alone over the rated useful lifetime of the equipment. These eight measures together represent an opportunity for Veterans Memorial Middle School to reduce its annual energy costs by $35,542 and annual greenhouse gas emissions by 335,917 lbs CO_2e. We estimate that if all measures are implemented as recommended, the project would pay for itself in about 5.6 years. A breakdown of the facility's current utility costs and an estimate of potential annual utility savings are shown in Figure 1 and Figure 2, respectively. Together

these measures represent an opportunity to reduce Veterans Memorial Middle School's annual energy use by 18% overall.

Figure 1 – Previous 12 Month Utility Costs

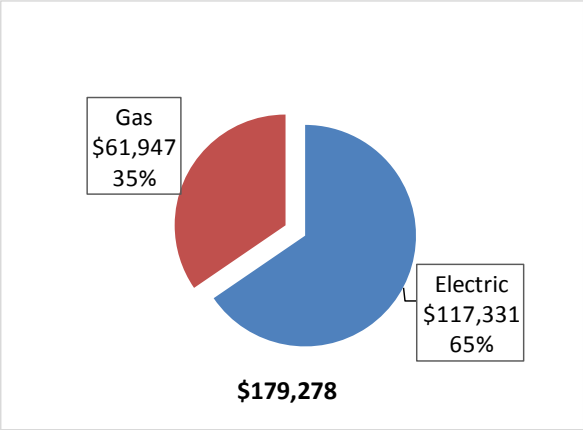
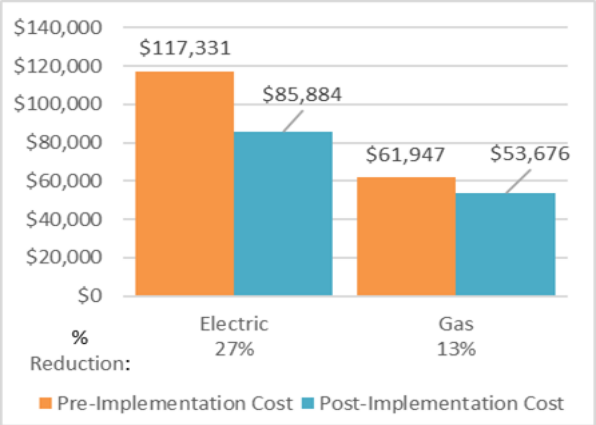


Figure 2 – Potential Post-Implementation Costs



A detailed description of Veterans Memorial 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 below. The measures which were evaluated but not included in the final list are all rooftop unit (RTU) replacement measures. These "lower priority" (i.e. optional measures), were found to have average payback period of about ~30 years based on estimated energy savings.

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			**164,024**	**39.8**	**0.0**	**$18,522.53**	**$109,119.04**	**$18,690.00**	**$90,429.04**	**4.9**	**165,171**
ECM 1	Install LED Fixtures	Yes	26,713	4.0	0.0	$3,016.63	$13,922.76	$2,540.00	$11,382.76	3.8	26,900
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	2,174	0.8	0.0	$245.44	$3,626.00	$0.00	$3,626.00	14.8	2,189
ECM 3	Retrofit Fixtures with LED Lamps	Yes	135,137	35.0	0.0	$15,260.45	$91,570.28	$16,150.00	$75,420.28	4.9	136,082
Lighting Control Measures			**28,969**	**8.0**	**0.0**	**$3,271.39**	**$32,762.00**	**$4,505.00**	**$28,257.00**	**8.6**	**29,172**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	28,969	8.0	0.0	$3,271.39	$32,762.00	$4,505.00	$28,257.00	8.6	29,172
Motor Upgrades			**1,211**	**0.3**	**0.0**	**$136.71**	**$3,693.44**	**$0.00**	**$3,693.44**	**27.0**	**1,219**
ECM 5	Premium Efficiency Motors	Yes	1,211	0.3	0.0	$136.71	$3,693.44	$0.00	$3,693.44	27.0	1,219
Variable Frequency Drive (VFD) Measures			**35,497**	**3.6**	**0.0**	**$4,008.54**	**$10,388.90**	**$0.00**	**$10,388.90**	**2.6**	**35,745**
ECM 6	Install VFDs on Hot Water Pumps	Yes	35,497	3.6	0.0	$4,008.54	$10,388.90	$0.00	$10,388.90	2.6	35,745
Electric Unitary HVAC Measures			**33,926**	**16.2**	**0.0**	**$3,831.09**	**$110,303.76**	**$3,942.50**	**$106,361.26**	**27.8**	**34,163**
	Install High Efficiency Electric AC	No	33,926	16.2	0.0	$3,831.09	$110,303.76	$3,942.50	$106,361.26	27.8	34,163
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**799.0**	**$8,270.53**	**$83,585.53**	**$10,250.00**	**$73,335.53**	**8.9**	**93,559**
ECM 7	Install High Efficiency Hot Water Boilers	Yes	0	0.0	765.7	$7,925.37	$71,622.46	$8,250.00	$63,372.46	8.0	89,654
	Install High Efficiency Furnaces	No	0	0.0	33.3	$345.16	$11,963.07	$2,000.00	$9,963.07	28.9	3,905
HVAC System Improvements			**12,897**	**2.9**	**0.0**	**$1,456.42**	**$4,750.00**	**$2,000.00**	**$2,750.00**	**1.9**	**12,987**
ECM 8	Install Dual Enthalpy Outside Economizer Control	Yes	12,897	2.9	0.0	$1,456.42	$4,750.00	$2,000.00	$2,750.00	1.9	12,987
Plug Load Equipment Control - Vending Machine			**1,954**	**0.0**	**0.0**	**$220.70**	**$460.00**	**$0.00**	**$460.00**	**2.1**	**1,968**
ECM 9	Vending Machine Control	Yes	1,954	0.0	0.0	$220.70	$460.00	$0.00	$460.00	2.1	1,968
TOTAL FOR RECOMMENDED MEASURES			**244,553**	**54.6**	**765.7**	**35,541.65**	**232,795.84**	**33,445.00**	**199,350.84**	**5.6**	**335,917.12**
TOTALS FOR ALL EVALUATED MEASURES			**278,479**	**70.8**	**799.0**	**$39,717.90**	**$355,062.67**	**$39,387.50**	**$315,675.17**	**7.9**	**373,985**

* - 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).

A brief description of each measure category can be found below. The assumptions behind our ECM calculations can be found in Section 4.

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

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

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.

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

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.

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

Energy Efficient Best Practices

TRC also identified 14 low cost (or no cost) energy efficient best 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 best practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. It is our understanding Brick Township Board of Education is already implementing many of the best practices described in the audit reports, however they are listed for representative purposes only.

- Reduce Air Leakage
- Close Doors and Windows
- Ensure Lighting Controls Are Operating Properly
- Turn Off Unneeded Motors
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly

- Clean Evaporator/Condenser Coils on AC Systems
- Perform Proper Boiler Maintenance
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

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

On-Site Generation Measures

On October 30, 2015, Brick Township Board of Education entered into a long-term solar power purchase agreement (PPA) with GeoPeak Energy, LLC. According to the terms of the PPA, GeoPeak will install rooftop solar arrays on seven Brick Township schools, including a 379 kW PV solar array at Veterans Memorial Middle School. Brick BOE has agreed to purchase the electric output of the solar arrays at a specified rate (as detailed in the PPA) over the next 20 years.

Installation of the solar array at Veterans Memorial Middle School was on-going during TRC's inspection of the facility, though purchases of the array's electric output had not yet begun. Because an agreement for solar development of the site was already in place, no additional analysis was deemed to be necessary for on-site generation potential at the facility.

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
- Pay for Performance - Existing Building
- Energy Savings Improvement Program
- 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.

Larger facilities with an interest in a more comprehensive whole building approach to energy conservation should consider participating in the Pay for Performance (P4P) program. Projects eligible for this project program must meet minimum savings requirements. Final incentives are calculated based on actual measured performance achieved at the end of the project. The application process is more involved, and it requires working with a qualified P4P contractor, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

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.

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Will Kolibas	Exec Director of Facilities	wkolibas@brickschools.org	(732) 785-3000
James W. Edwards	Business Administrator	jedwards@brickschools.org	(732) 785-3000
TRC Energy Services			
Tom Page	Auditor	tpage@TRCsolutions.com	(732) 855-0033

2.2 General Site Information

On February 22, 2017, TRC performed an energy audit at Veterans Memorial Middle School located in Brick, New Jersey. TRC's team met with Will Kolibas to review the facility operations and help focus our investigation on specific energy-using systems.

Veterans Memorial Middle School is a 132,389 square foot public school in Brick Township, New Jersey. It is a one-story building originally constructed in 1970, with additional building sections added in 1996, 1999, and 2002. A 379-kW solar PV array was added to the building's rooftop in spring 2017. The building is comprised of classrooms, administrative offices, a cafeteria, a gymnasium, a large multi-purpose room, storage areas, and restrooms.

2.3 Building Occupancy

The building is typically occupied from 8:00 AM to 4:00 PM, Monday through Friday, by approximately 170 staff and about 1143 students. It is typically closed on the weekends and during the summer months.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Veteran's Memorial Middle School	Weekday	8 am - 4 pm
Veteran's Memorial Middle School	Weekend	Closed

2.4 Building Envelope

The building is constructed of concrete masonry block with brick façade,. It is a slab on grade construction. With a flat roof covered with a light colored thermoplastic membrane. Windows are mostly operable double-paned glass with aluminum frames. Window seals all appeared tight. Some door seals appeared worn (see image below) and should be replaced to prevent excessive air infiltration.

Image 1: Building front exterior, windows, and doors

2.5 On-Site Generation

Veterans Memorial Middle School is one of the schools that was included in a solar PPA that the Brick Township BOE signed with GeoPeak Energy, LLC in October 2015. According to the terms of the PPA, a 379-kW solar array was to be installed on the building's rooftop in 2017 at VMMS along with solar installations at other Brick Township public school buildings. At the time of our inspection, installation was on-going at Veterans Memorial Middle School and throughout the District.

Image 2: Rooftop solar PV array under construction at VMMS (Feb 22, 2017)

2.6 Energy-Using Systems

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

Lighting System

The interior of the building is mostly lit by 4-foot 32-Watt T8 linear fluorescent fixtures, with 1-4 lamps each. There are also a few older lighting technologies, such as T12 fluorescents and incandescent bulbs. Metal halide fixtures supply illumination in the multipurpose room. Lighting is controlled throughout the building by manual wall switches. Exterior lighting is mostly comprised of high intensity discharge (HID) wall-mounted lighting fixtures. Exterior lighting is controlled by timers.

Image 3: Building interior lighting

Heating, Ventilation, and Air Conditioning (HVAC)

The school's HVAC system consists of hot water boilers, packaged rooftop air conditioning units, and perimeter heating units.

The building's primary source of heat comes from two main gas-fired hot water boilers. They are H.B Smith sectional cast iron boilers, installed in 1970. Each has an input capacity of 2,500 MBH and are estimated to be only about 75% efficient. Heating hot water is circulated from the main boilers by two 15-HP pumps the pumps were installed in 1970, the motors were last replaced 17 years ago. They are in fair condition.

There are also five smaller boilers which provide heat to the newer sections of the building. There are two 180 MBH input boilers which supply the 1996 section, two 140 MBH input Weil McLain boilers that supply the classrooms added in 1999, and one 926 MBH input Raypak boiler on the roof, which supplies the 2002 addition.

Image 4: Building heating is provided by 2 large main boilers, 5 smaller boilers in the newer additions



Nine of the building's rooftop units are gas/electric, supplying some supplemental gas heating to the building as well as air conditioning. There is also one 4-ton Trane air source heat pump on the roof which supplies some supplemental heating.

Only 40% of the building has cooling. Cooling is provided by a variety of rooftop units, ductless mini-split, and window AC units. The building has a total of 15 rooftop units (7 Trane packaged units, 1 Carrier unit, and 1 Reznor unit, and 6 Trane split units). They each provide between 4 and 15 tons of cooling. The building also has 14 ductless mini-split AC units and 15 window AC units which provide 1 to 3 tons of cooling each.

Image 5: Building cooling is provided by multiple RTUs, mini-split, and window AC units








Domestic Hot Water Heating System

Most of the building's domestic hot water is provided by the main boilers. A heat exchanger heats potable water in the main boiler room, which is then held in a large 1763-gallon DHW storage tank. During the heating season this type of system can be a relatively efficient way to produce domestic hot water. However, this system is a very inefficient way to produce hot water during the spring and summer months, because the building's largest boilers must be kept running all year, most often only at partial load.

In such situations we often recommend that a smaller dedicated boiler be installed to run during the summer months for hot water. In this case, however, since we are recommending the main boilers be replaced as well, we recommend that the a series of smaller modular boilers be installed in place of the main boilers, so that just one unit can be kept running for DHW rather than running large boilers at low partial load.

The school also has one 80-gallon electric A.O Smith DHW heater which supplies hot water to restrooms in the newer section of the building. This unit is in good condition.

Image 6: Domestic hot water heater and large DHW storage tank.

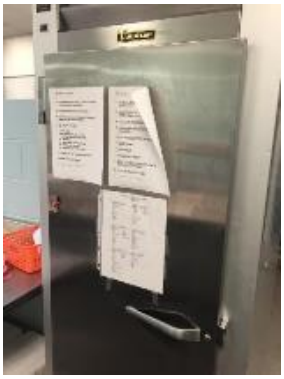
Food Service & Refrigeration Equipment

The kitchen has a large gas stove, one Vulcan and two Blodgett gas ovens, and two CreCor electric warming cabinets for cooking and re-heating school lunches.

There is also one Kolpak walk-in cooler, one Kolpak walk-in freezer, plus five cabinet coolers and freezers for food storage.

There are three medium refrigerators and three mini-refrigerators in other parts of the building, which are used by school staff.

***Image 7:** Refrigeration Units*



Building Plug Load

We counted 193 desk computers and monitors throughout the school. There also approximately: 14 printers, seven large copiers, two server racks, and two vending machines, other typical classroom and office equipment.

There are 68 older less-efficient CRT TVs in each classroom which are used to display school announcements. TRC did not include TV replacement as an ECM, but the school may want to consider replacing the TVs in each classroom with ENERGY STAR® rated flat screen LCD TVs which use less energy than the older models. Many of the CRT TVs appeared to be on all day long and replacing them with ENERGY STAR® models may yield additional energy savings.



2.7 Water-Using Systems

There are 21 restrooms in the facility. We checked the fixtures for a representative sample of them. The restroom fixtures were found to meet current federal guidelines for water conserving low-flow devices (restroom faucets were found to be 2.2 gallon per minute (gpm) or less, toilets were found to be 2.5 gallons per flush (gpf) or less, and urinals were found to be 2.0 gpf or less).

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

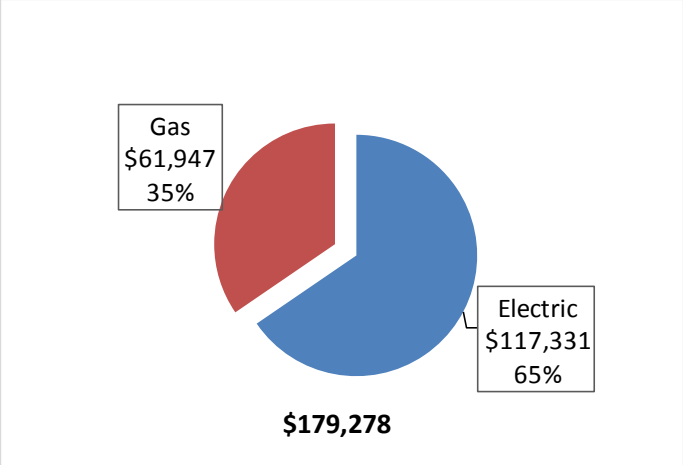
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Veteran's Memorial Middle School		
Fuel	**Usage**	**Cost**
Electricity	1,039,014 kWh	$117,331
Natural Gas	59,849 Therms	$61,947
Total		**$179,278**

The current annual energy cost for this facility is $179,278 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over a recent 12-month period was found to be $0.113/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. In the school district's LGEA application, this school was listed as fully occupied for just 10 months out of the year. Summer use is higher than expected for 10-month scheduled operations. The facility should review equipment and lighting operations during unoccupied periods, (i.e. during the summer and holiday periods) for opportunities to shut off unneeded lighting and other equipment. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

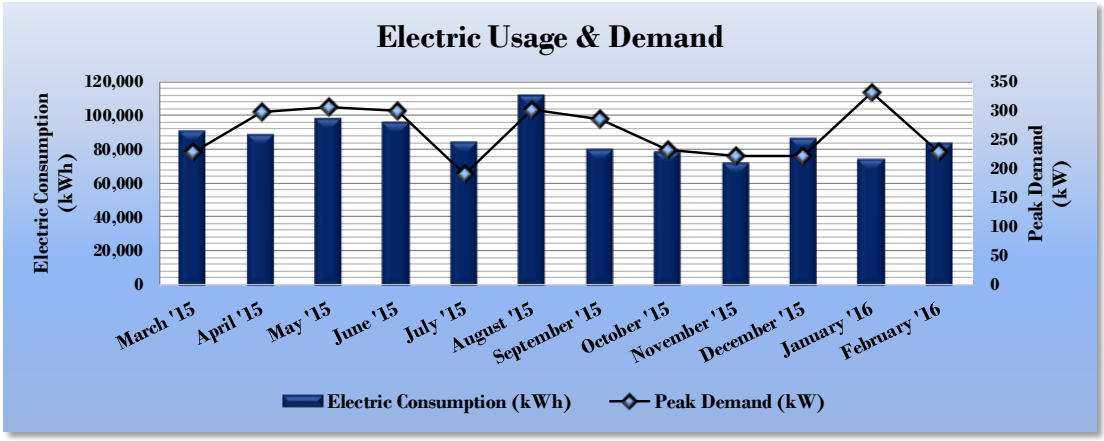


Figure 9 - Electric Usage & Demand

Electric Billing Data for Veteran's Memorial Middle School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
4/15/15	33	91,200	227	$10,241	No
5/14/15	29	89,400	298	$10,435	No
6/15/15	32	98,200	306	$11,441	No
7/16/15	31	96,600	299	$9,900	No
8/14/15	29	85,000	190	$9,455	No
9/16/15	33	112,000	302	$12,765	No
10/15/15	29	80,600	284	$9,486	No
11/16/15	32	78,800	232	$9,022	No
12/15/15	29	72,800	221	$8,377	No
1/18/16	34	87,200	222	$9,789	No
2/16/16	29	74,800	332	$8,217	No
3/16/16	29	83,800	227	$9,489	No
Totals	**369**	**1,050,400**	**332**	**$118,617**	0
Annual	**365**	**1,039,014**	**332**	**$117,331**	

3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas cost over a recent 12-month period was found to be $1.035/therm, which is the blended rate used throughout the analyses in this report. Natural gas use follows a typical heating profile. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

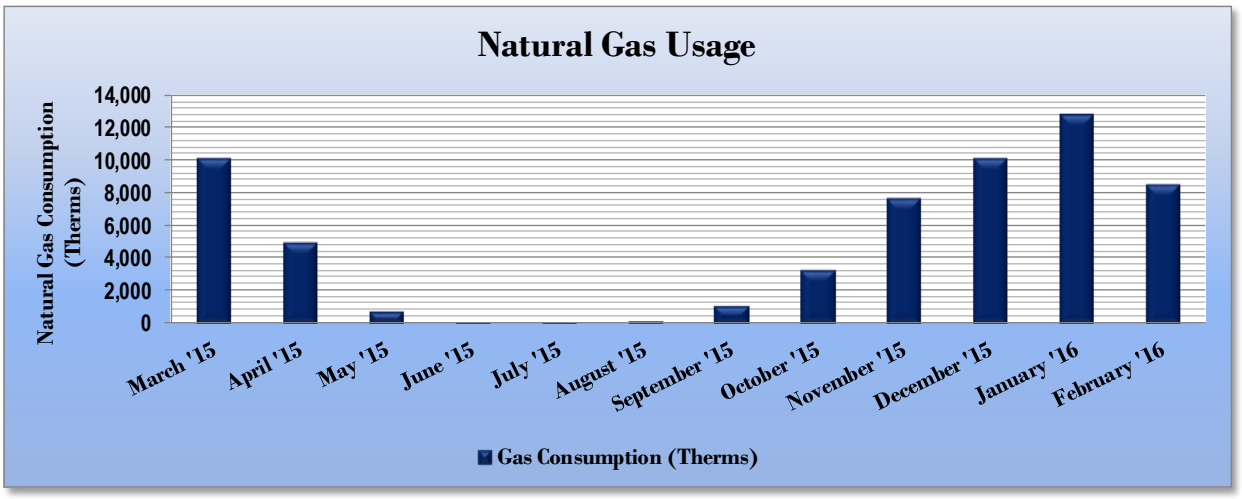


Figure 11 - Natural Gas Usage

Gas Billing Data for Veteran's Memorial Middle School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/17/15	29	10,139	$9,455
5/18/15	31	5,014	$5,212
6/18/15	31	751	$1,668
7/21/15	33	38	$1,091
8/17/15	27	65	$1,113
9/16/15	30	177	$2,214
10/19/15	33	1,142	$1,964
11/13/15	25	3,304	$3,457
12/18/15	35	7,652	$7,383
1/19/16	32	10,131	$9,150
2/17/16	29	12,870	$11,338
3/18/16	30	8,568	$7,903
Totals	**365**	**59,849**	**$61,947**
Annual	**365**	**59,849**	**$61,947**

3.4 Benchmarking

This facility was benchmarked using Portfolio Manager, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager analyzes your building's consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of "site energy" and "source energy." Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Veteran's Memorial Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	131.6	141.4
Site Energy Use Intensity (kBtu/ft^2)	72.0	58.2

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

Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Veteran's Memorial Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	105.7	141.4
Site Energy Use Intensity (kBtu/ft^2)	59.9	58.2

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

This facility has a current score of 24, which means that is uses significantly more energy per square foot than an average school of similar size, age, and occupancy. Installation of the ECMs described in this report –(upgrading aging boilers, replacing light fixtures and adding controls to turn lights off in unoccupied spaces) will likely improve the school's score significantly.

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

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

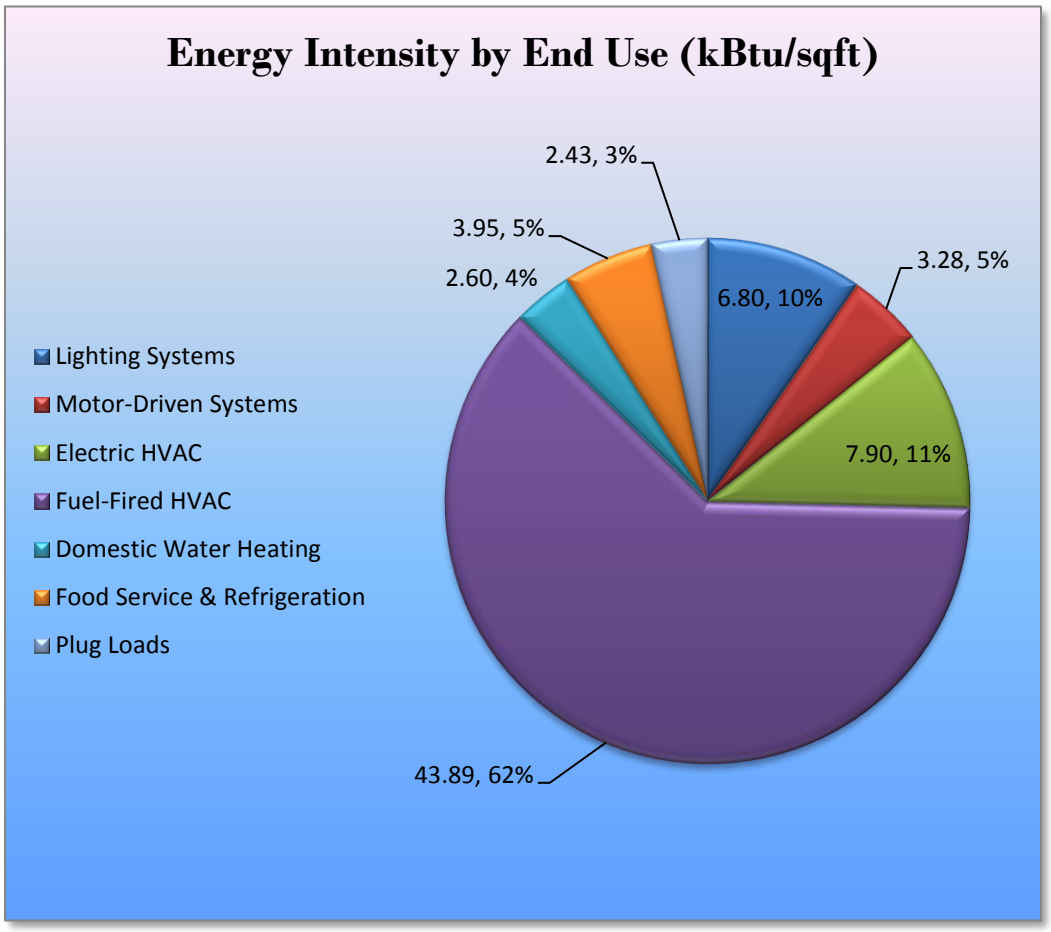
A Portfolio Manager account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio

Manager regularly, so that you can keep track of your building's performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager to track your building's performance at: https://www.energystar.gov/buildings/training.

3.5 Energy End-Use Breakdown

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

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



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Veterans Memorial 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 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**164,024**	**39.8**	**0.0**	**$18,522.53**	**$109,119.04**	**$18,690.00**	**$90,429.04**	**4.9**	**165,171**
ECM 1	Install LED Fixtures	26,713	4.0	0.0	$3,016.63	$13,922.76	$2,540.00	$11,382.76	3.8	26,900
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	2,174	0.8	0.0	$245.44	$3,626.00	$0.00	$3,626.00	14.8	2,189
ECM 3	Retrofit Fixtures with LED Lamps	135,137	35.0	0.0	$15,260.45	$91,570.28	$16,150.00	$75,420.28	4.9	136,082
Lighting Control Measures		**28,969**	**8.0**	**0.0**	**$3,271.39**	**$32,762.00**	**$4,505.00**	**$28,257.00**	**8.6**	**29,172**
ECM 4	Install Occupancy Sensor Lighting Controls	28,969	8.0	0.0	$3,271.39	$32,762.00	$4,505.00	$28,257.00	8.6	29,172
Motor Upgrades		**1,211**	**0.3**	**0.0**	**$136.71**	**$3,693.44**	**$0.00**	**$3,693.44**	**27.0**	**1,219**
ECM 5	Premium Efficiency Motors	1,211	0.3	0.0	$136.71	$3,693.44	$0.00	$3,693.44	27.0	1,219
Variable Frequency Drive (VFD) Measures		**35,497**	**3.6**	**0.0**	**$4,008.54**	**$10,388.90**	**$0.00**	**$10,388.90**	**2.6**	**35,745**
ECM 6	Install VFDs on Hot Water Pumps	35,497	3.6	0.0	$4,008.54	$10,388.90	$0.00	$10,388.90	2.6	35,745
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**765.7**	**$7,925.37**	**$71,622.46**	**$8,250.00**	**$63,372.46**	**8.0**	**89,654**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	765.7	$7,925.37	$71,622.46	$8,250.00	$63,372.46	8.0	89,654
HVAC System Improvements		**12,897**	**2.9**	**0.0**	**$1,456.42**	**$4,750.00**	**$2,000.00**	**$2,750.00**	**1.9**	**12,987**
ECM 8	Install Dual Enthalpy Outside Economizer Control	12,897	2.9	0.0	$1,456.42	$4,750.00	$2,000.00	$2,750.00	1.9	12,987
Plug Load Equipment Control - Vending Machine		**1,954**	**0.0**	**0.0**	**$220.70**	**$460.00**	**$0.00**	**$460.00**	**2.1**	**1,968**
ECM 9	Vending Machine Control	1,954	0.0	0.0	$220.70	$460.00	$0.00	$460.00	2.1	1,968
TOTALS		**244,553**	**54.6**	**765.7**	**$35,541.65**	**$232,795.84**	**$33,445.00**	**$199,350.84**	**5.6**	**335,917**

* - 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

Recommended upgrades to existing lighting fixtures are summarized in Figure 16 below.

Figure 16 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**164,024**	**39.8**	**0.0**	**$18,522.53**	**$109,119.04**	**$18,690.00**	**$90,429.04**	**4.9**	**165,171**
ECM 1	Install LED Fixtures	26,713	4.0	0.0	$3,016.63	$13,922.76	$2,540.00	$11,382.76	3.8	26,900
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	2,174	0.8	0.0	$245.44	$3,626.00	$0.00	$3,626.00	14.8	2,189
ECM 3	Retrofit Fixtures with LED Lamps	135,137	35.0	0.0	$15,260.45	$91,570.28	$16,150.00	$75,420.28	4.9	136,082

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	11,482	2.0	0.0	$1,296.57	$4,377.28	$2,400.00	$1,977.28	1.5	11,562
Exterior	15,232	2.0	0.0	$1,720.07	$9,545.48	$140.00	$9,405.48	5.5	15,338

Measure Description

We recommend replacing existing fixtures containing high intensity discharge (HID) lamps with new high performance LED light fixtures. HID fixtures can often be retrofitted with LED bulbs instead, if the customer chooses to keep the original fixture.

This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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

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	2,174	0.8	0.0	$245.44	$3,626.00	$0.00	$3,626.00	14.8	2,189
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, which are designed to be used retrofitted T12 fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

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	132,956	34.7	0.0	$15,014.16	$90,868.56	$16,125.00	$74,743.56	5.0	133,886
Exterior	2,181	0.3	0.0	$246.29	$701.72	$25.00	$676.72	2.7	2,196

Measure Description

We recommend retrofitting existing incandescent, halogen, and T8 fluorescent fixtures with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

Figure 17 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**28,969**	**8.0**	**0.0**	**$3,271.39**	**$32,762.00**	**$4,505.00**	**$28,257.00**	**8.6**	**29,172**
ECM 4	Install Occupancy Sensor Lighting Controls	28,969	8.0	0.0	$3,271.39	$32,762.00	$4,505.00	$28,257.00	8.6	29,172

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)
28,969	8.0	0.0	$3,271.39	$32,762.00	$4,505.00	$28,257.00	8.6	29,172

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, classrooms, offices areas, gyms, cafeterias, and other spaces where occupancy varies throughout the day. 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 Motor Upgrades

Our recommendations for motor upgrade measures are summarized in Figure 18 below.

Figure 18 – Summary of Motor 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)
Motor Upgrades		**1,211**	**0.3**	**0.0**	**$136.71**	**$3,693.44**	**$0.00**	**$3,693.44**	**27.0**	**1,219**
ECM 5	Premium Efficiency Motors	1,211	0.3	0.0	$136.71	$3,693.44	$0.00	$3,693.44	27.0	1,219

ECM 5: 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)
1,211	0.3	0.0	$136.71	$3,693.44	$0.00	$3,693.44	27.0	1,219

Measure Description

We recommend replacing 2 standard efficiency 15-HP motors on the heating hot water pumps with IHP 2014 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.

It is generally recommended to replace older motors with new high efficiency models wherever possible when new variable frequency drive controls are proposed to be added (see ECM 6 below).

4.1.4 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 19 below.

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**35,497**	**3.6**	**0.0**	**$4,008.54**	**$10,388.90**	**$0.00**	**$10,388.90**	**2.6**	**35,745**
ECM 6	Install VFDs on Hot Water Pumps	35,497	3.6	0.0	$4,008.54	$10,388.90	$0.00	$10,388.90	2.6	35,745

ECM 6: Install VFDs on Hot Water 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)
35,497	3.6	0.0	$4,008.54	$10,388.90	$0.00	$10,388.90	2.6	35,745

Measure Description

We recommend installing variable frequency drives (VFD) to control hot water pumps. This measure requires that a majority of the hot water coils be served by 2-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load. Note that the main boiler replacement project, if implemented, may alter the configuration of the main heating loop. The VFD measure should be considered in light of the overall design.

4.1.5 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 20 below.

Figure 20 - Summary of Gas-Fired Heating Replacement 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)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**765.7**	**$7,925.37**	**$71,622.46**	**$8,250.00**	**$63,372.46**	**8.0**	**89,654**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	765.7	$7,925.37	$71,622.46	$8,250.00	$63,372.46	8.0	89,654

ECM 7: Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	765.7	$7,925.37	$71,622.46	$8,250.00	$63,372.46	8.0	89,654

Measure Description

We recommend replacing older inefficient hot water boilers with high efficiency hot water boilers. Boilers 1 and 2 are each over 47 years old. They are clearly past their rated useful lifetime and are inefficient relative to available technologies. They should be replaced.

We recommend replacing older inefficient hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are most effective when the return water temperature is less than 130°F during most of the operating hours.

We recommended installing multiple staged hydronic boilers rather than a single large boiler. For example the existing two 2,500 MBH (input) gas-fired could be replaced with five 1000 MBH high efficiency modular boilers. This will increase the efficiency of the system during low load conditions.

The school currently runs its main boilers year round. During summer months the large main boilers are run at low load in order to generate domestic hot water. Modular systems are more efficient and in this case only one small boiler would need to run to provide domestic hot water. Modular systems only start up additional boiler sections as capacity is needed, which ensures that boilers are more often running near their design peak load efficiencies.

Care should be taken to size new boilers appropriately, as operational conditions may have changed since the original boilers were installed. This project will require follow on design to ensure optimal configuration of the heating and domestic hot water systems.

4.1.6 HVAC System Improvements

Our recommendations for HVAC system improvements are summarized in Figure 21 below.

Figure 21 - 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		**12,897**	**2.9**	**0.0**	**$1,456.42**	**$4,750.00**	**$2,000.00**	**$2,750.00**	**1.9**	**12,987**
ECM 8	Install Dual Enthalpy Outside Economizer Control	12,897	2.9	0.0	$1,456.42	$4,750.00	$2,000.00	$2,750.00	1.9	12,987

ECM 8: Install Dual Enthalpy Economizer Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
12,897	2.9	0.0	$1,456.42	$4,750.00	$2,000.00	$2,750.00	1.9	12,987

Measure Description

Dual enthalpy economizers are used to control a ventilation system's outside air intake in order to reduce a facility's total cooling load. A dual-enthalpy economizer monitors the air temperature and humidity of both the outside and return air. The control supplies the lowest energy (temperature and humidity) air to the air handling system. When outside air conditions allow, outside air can be used for cooling instead of running the air handling system's compressor. This reduces the demand on the cooling system, lowering its usage hours and saving energy.

Savings result from using outside air instead of mechanical cooling when outside air conditions permit.

4.1.7 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure 22 below.

Figure 22 - Summary of Plug Load Equipment 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**	**$220.70**	**$460.00**	**$0.00**	**$460.00**	**2.1**	**1,968**
ECM 8	Vending Machine Control	1,954	0.0	0.0	$220.70	$460.00	$0.00	$460.00	2.1	1,968

ECM 9: 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	$220.70	$460.00	$0.00	$460.00	2.1	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 23 - 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)
Electric Unitary HVAC Measures	**33,926**	**16.2**	**0.0**	**$3,831.09**	**$110,303.76**	**$3,942.50**	**$106,361.26**	**27.8**	**34,163**
Install High Efficiency Electric AC	33,926	16.2	0.0	$3,831.09	$110,303.76	$3,942.50	$106,361.26	27.8	34,163
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**33.3**	**$345.16**	**$11,963.07**	**$2,000.00**	**$9,963.07**	**28.9**	**3,905**
Install High Efficiency Furnaces	0	0.0	33.3	$345.16	$11,963.07	$2,000.00	$9,963.07	28.9	3,905
TOTALS	**33,926**	**16.2**	**33.3**	**$4,176.25**	**$122,266.83**	**$5,942.50**	**$116,324.33**	**27.9**	**38,068**

* - 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).

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)
33,926	16.2	0.0	$3,831.09	$110,303.76	$3,942.50	$106,361.26	27.8	34,163

Measure Description

We evaluated the replacement of up to nine rooftop air conditioning units and five ductless mini-split units with high efficiency packaged and mini-split 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.

We included in our evaluation all rooftop and mini-split air conditioning units that were 15 years old or older.

Reasons for not Recommending

While all of the air conditioning units that we evaluated could be replaced with higher efficiency models which would lead to additional energy savings, none of the RTUs and mini-split units were found to be cost-effective enough to include in the final list of high priority measures. Average payback period for replacement was over 25 years. None of the AC units that we evaluated were in dire need of immediate replacement. When these units need to be replaced, we recommend replacing them with the highest efficiency similarly sized models available.

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	33.3	$345.16	$11,963.07	$2,000.00	$9,963.07	28.9	3,905

Measure Description

Five of the Trane RTUs that we evaluated contain gas furnaces as well as DX air conditioning. The table above shows our estimate of the additional gas savings that would result from replacement of older gas/electric RTUs. 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

We evaluated the costs and savings for replacement of all RTUs that were 15 yrs old or older. Nine of the RTUs provide gas heating as well as electric cooling. The table above shows the estimated gas savings that would likely result from replacing them with higher efficiency gas/electric RTUs. While all of the rooftop furnace units evaluated would yield some additional gas savings if replaced with higher efficiency models, none of the RTUs was found to be cost-effective enough to include in the final list of high priority measures. The costs and savings shown above are provided to show the customer the full costs and savings that would likely result from replacement of older RTUs.

5 ENERGY EFFICIENT BEST PRACTICES

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. The recommendations below are for informational purposes only and do not reflect actual efforts actively being performed by Brick Township Board of Education.

Reduce Air Leakage

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

Close Doors and Windows

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

Ensure Lighting Controls Are Operating Properly

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.

Turn Off Unneeded Motors

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Reducing run hours for these motors can result in significant energy savings. Whenever possible, use automatic devices such as twist timers or occupancy sensors to ensure that motors are turned off when not needed.

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Ensure Economizers are Functioning Properly

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

Clean 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.

Perform Proper Boiler Maintenance

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

Perform Proper 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.

Perform Proper Water Heater Maintenance

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

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.

Replace Computer Monitors

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

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).

6 On-Site Generation Measures

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

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

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

6.1 Photovoltaic

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

On October 30, 2015, Brick Township Board of Education entered into a long-term solar power purchase agreement (PPA) with GeoPeak Energy, LLC. According to the terms of the PPA, GeoPeak will install rooftop solar arrays on seven Brick Township schools, including a 379-kW PV solar array at Veterans Memorial Middle School. Brick BOE has agreed to purchase the electric output of the solar arrays at a specified rate (as detailed in the PPA) over the next 20 years.

Installation of the solar array at Veterans Memorial Middle School was on-going during TRC's inspection of the facility, though purchases of the array's electric output had not yet begun.

Image 8: School's rooftop before and after solar PV installation

The first image above shows an aerial view of the school (from Google Maps) prior to installation of the solar array. The second image (from the PPA with GeoPeak, LLC) shows the proposed layout of the installed solar array.

The image shows that most of the unshaded flat roof space has already been developed for solar electric generation, though not every rooftop area. So, some expansion of the solar array might be possible in the future to include additional rooftop areas. However, because an agreement for solar development of the building's rooftop is already in place, no additional analysis was deemed to be necessary for on-site generation potential at the facility.

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

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 24 - ECM Incentive Program Eligibility

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

Figure 24 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
ECM 1	Install LED Fixtures	X			X
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers				X
ECM 3	Retrofit Fixtures with LED Lamps	X			X
ECM 4	Install Occupancy Sensor Lighting Controls	X			X
ECM 5	Premium Efficiency Motors				X
ECM 6	Install VFDs on Hot Water Pumps	X			X
ECM 7	Install High Efficiency Hot Water Boilers	X			X
ECM 8	Vending Machine Control	X			X

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (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 SS 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 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program the minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings. P4P is a generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also utilize the P4P program.

Incentives

Incentives are calculated based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

To participate in the P4B EB program you will need to contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

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 years.

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Main Boiler Rm	8	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,200	Relamp & Reballast	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,200	0.17	348	0.0	$39.27	$784.00	$0.00	19.96
Main Boiler Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,200	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,200	0.02	48	0.0	$5.45	$71.80	$10.00	11.33
Mech Rm 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.04	76	0.0	$8.57	$117.00	$20.00	11.32
Mech Rm 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.06	114	0.0	$12.86	$150.40	$30.00	9.36
Mech Rm 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.04	91	0.0	$10.29	$117.00	$20.00	9.43
Kitchen Dry Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.05	101	0.0	$11.44	$211.13	$20.00	16.71
Kitchen Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.05	101	0.0	$11.44	$211.13	$20.00	16.71
Kitchen Area	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,000	0.51	1,803	0.0	$203.63	$1,331.87	$280.00	5.17
Kitchen Hood	8	Incandescent: 60W Incadescent Bulbs	None	60	1,200	Relamp	No	8	LED Screw-In Lamps: 9W LED Bulbs	None	9	1,200	0.27	563	0.0	$63.58	$430.02	$40.00	6.13
Walk-in Cooler	1	Incandescent: 60W Incadescent Bulbs	Wall Switch	60	2,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	2,000	0.03	117	0.0	$13.25	$53.75	$5.00	3.68
Walk-in Freezer	1	Incandescent: 60W Incadescent Bulbs	Wall Switch	60	2,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	2,000	0.03	117	0.0	$13.25	$53.75	$5.00	3.68
Kitchen Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.05	135	0.0	$15.25	$211.13	$20.00	12.53
Janitor Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	600	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	600	0.04	39	0.0	$4.36	$95.13	$20.00	17.22
Kitchen Restroom / Lockers	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.05	101	0.0	$11.44	$211.13	$20.00	16.71
Multipurpose Room / Cafeteria	16	Metal Halide: (1) 250W Lamp	Wall Switch	295	3,360	Fixture Replacement	Yes	16	LED - Fixtures: High-Bay	Occupancy Sensor	100	2,352	2.36	13,910	0.0	$1,570.84	$4,917.28	$2,470.00	1.56
Multipurpose Room / Cafeteria	4	LED - Fixtures: High-Bay	Wall Switch	100	3,360	None	Yes	4	LED - Fixtures: High-Bay	Occupancy Sensor	100	2,352	0.08	464	0.0	$52.36	$270.00	$35.00	4.49
Table Storage Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.11	192	0.0	$21.66	$350.00	$60.00	13.39
Custodial Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	$43.32	$350.00	$60.00	6.69
Men's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.12	432	0.0	$48.74	$495.60	$80.00	8.53
Boy's Locker Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,600	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,120	0.12	345	0.0	$38.99	$495.60	$80.00	10.66
Girl's Locker Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,600	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,120	0.08	230	0.0	$25.99	$266.40	$50.00	8.33
Girl's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,600	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,120	0.08	230	0.0	$25.99	$266.40	$50.00	8.33
Corridor (near MP Rm)	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.23	1,339	0.0	$151.19	$526.40	$105.00	2.79
East Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,600	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,120	0.08	230	0.0	$25.99	$266.40	$50.00	8.33
East Office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,600	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,120	0.16	460	0.0	$51.99	$416.80	$80.00	6.48

	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
Gym	30	Linear Fluorescent - T5: 4' T5 (28W) - 6L	Wall Switch	180	3,360	Relamp	Yes	30	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	2,352	2.34	13,806	0.0	$1,559.06	$4,836.70	$1,005.00	2.46
Gym Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.05	153	0.0	$17.33	$233.00	$20.00	12.29
Boy's Locker Rm	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.25	863	0.0	$97.48	$796.50	$125.00	6.89
Office Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.03	58	0.0	$6.50	$174.50	$10.00	25.31
Gym Storage	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.25	432	0.0	$48.74	$642.50	$110.00	10.93
Gym Storage	4	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,000	Relamp & Reballast	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	700	0.09	165	0.0	$18.62	$508.00	$20.00	26.20
Girl's Locker Rm	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.25	863	0.0	$97.48	$796.50	$125.00	6.89
Gym Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.05	153	0.0	$17.33	$233.00	$40.00	11.14
Gym Office Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.03	161	0.0	$18.20	$174.50	$10.00	9.04
Corridor (Rm 125 to 119)	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.26	1,530	0.0	$172.79	$601.60	$120.00	2.79
Boy's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.05	153	0.0	$17.33	$233.00	$40.00	11.14
Girl's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.05	153	0.0	$17.33	$233.00	$40.00	11.14
Rm 119	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Lab Rm 120	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.74	2,590	0.0	$292.43	$1,623.60	$305.00	4.51
Rm 121	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 122	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 123	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 124	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 125	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Corridor (Door 14 to Gym)	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.32	1,913	0.0	$215.99	$877.50	$150.00	3.37
Sm. Study Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.14	405	0.0	$45.75	$555.40	$95.00	10.06
Corridor (in front of Gym)	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,360	0.11	649	0.0	$73.31	$285.40	$60.00	3.07
Corridor (Gym to Corridor F)	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.22	1,275	0.0	$143.99	$585.00	$100.00	3.37
Boy's Rm	3	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,600	Relamp & Reballast	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.07	198	0.0	$22.35	$410.00	$0.00	18.35
Janitor Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.02	38	0.0	$4.29	$58.50	$10.00	11.32

	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
Girl's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.04	121	0.0	$13.62	$223.70	$15.00	15.32
Nurse's Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.09	241	0.0	$27.24	$331.40	$50.00	10.33
Nurse's Back Office	4	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,600	Relamp & Reballast	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.09	264	0.0	$29.80	$508.00	$20.00	16.38
Nurses's Restroom 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,000	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.01	18	0.0	$2.08	$48.20	$10.00	18.38
Nurses's Restroom 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.27	$35.90	$5.00	13.60
Office Supply Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	$2.27	$35.90	$5.00	13.60
Office Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,000	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.01	18	0.0	$2.08	$48.20	$10.00	18.38
Main Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	No	12	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,000	0.14	483	0.0	$54.54	$430.80	$60.00	6.80
Main Office - Office 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.06	161	0.0	$18.16	$259.60	$40.00	12.09
Main Office - Office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.06	161	0.0	$18.16	$259.60	$40.00	12.09
Main Office - Office 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.06	161	0.0	$18.16	$259.60	$40.00	12.09
Main Office - Office 4	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.06	161	0.0	$18.16	$259.60	$40.00	12.09
Corridor (in front of Main Office)	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,360	0.29	1,731	0.0	$195.48	$761.07	$160.00	3.07
Auditorium	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.52	1,822	0.0	$205.71	$1,404.00	$240.00	5.66
Back Stage	10	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,200	Relamp	No	10	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,200	0.11	242	0.0	$27.27	$359.00	$50.00	11.33
Corridor (Rm 114 to 126)	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.36	2,104	0.0	$237.59	$827.20	$165.00	2.79
Rm 114	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Lab Rm 115	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.74	2,590	0.0	$292.43	$1,893.60	$340.00	5.31
Rm 116	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 117	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 118	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$194.95	$1,172.40	$215.00	4.91
Rm 126	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.37	1,295	0.0	$146.21	$946.80	$170.00	5.31
Corridor (Rm 113 to 109)	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.29	1,721	0.0	$194.39	$676.80	$135.00	2.79
Rm 113	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 112	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97

	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
Rm 111	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 110	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 109	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Corridor (Rm 108 to 104)	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.36	2,104	0.0	$237.59	$827.20	$165.00	2.79
Rm 108	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 107	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 106	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 105	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 104	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Corridor (Rm 110 to 100)	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.26	1,530	0.0	$172.79	$601.60	$120.00	2.79
Rm 100	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 101	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 102	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm 103	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Janitor's Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.02	128	0.0	$14.40	$58.50	$10.00	3.37
Boy's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	$32.49	$445.50	$65.00	11.71
Girl's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	$32.49	$445.50	$65.00	11.71
Corridor (near Door 18)	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.10	574	0.0	$64.80	$225.60	$45.00	2.79
Rm E-1	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm E-2	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm E-3	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm E-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm E-5	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm E-6	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Boy's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.04	151	0.0	$17.03	$223.70	$35.00	11.08

	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
Janitor's Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.02	122	0.0	$13.74	$98.00	$0.00	7.13
Rm D-6	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm D-5	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm D-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm D-3	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm D-2	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Storage Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,000	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.02	36	0.0	$4.09	$98.00	$0.00	23.96
Men's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,200	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	840	0.01	30	0.0	$3.41	$151.90	$5.00	43.14
Women's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,200	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	840	0.01	30	0.0	$3.41	$151.90	$5.00	43.14
Corridor F	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	19	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.41	2,423	0.0	$273.59	$1,111.50	$190.00	3.37
Men's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.10	203	0.0	$22.88	$306.27	$60.00	10.76
Women's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.10	203	0.0	$22.88	$306.27	$60.00	10.76
Rm F-1	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	$102.15	$1,186.20	$160.00	10.05
Rm F-2	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	$102.15	$1,186.20	$160.00	10.05
Rm F-3	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.25	863	0.0	$97.48	$796.50	$125.00	6.89
Rm F-4	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.25	863	0.0	$97.48	$796.50	$125.00	6.89
Rm F-5	32	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	32	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.46	1,608	0.0	$181.60	$1,958.80	$265.00	9.33
Rm F-6	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.34	1,206	0.0	$136.20	$1,401.60	$190.00	8.90
Copy Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.01	40	0.0	$4.54	$151.90	$5.00	32.36
Faculty Rm	10	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.14	402	0.0	$45.40	$629.00	$85.00	11.98
Men's Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,200	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	840	0.01	29	0.0	$3.29	$164.20	$10.00	46.90
Women's Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,200	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	840	0.01	29	0.0	$3.29	$164.20	$10.00	46.90
Conference Rm	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.09	241	0.0	$27.24	$331.40	$50.00	10.33
Guidance Dept.	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.09	302	0.0	$34.05	$485.40	$65.00	12.35
Guidance Dept.	3	Incandescent: 60W Incadescent Bulbs	Wall Switch	60	2,000	Relamp	No	3	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	2,000	0.10	352	0.0	$39.74	$161.26	$15.00	3.68

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
7th Grade Guidance Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.03	80	0.0	$9.08	$187.80	$30.00	17.38
8th Grade Guidance Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.06	161	0.0	$18.16	$259.60	$40.00	12.09
6th Grade Guidance Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,600	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.03	80	0.0	$9.08	$187.80	$30.00	17.38
Corridor (Front Entrance to Gym)	13	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	No	13	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,360	0.48	2,813	0.0	$317.66	$1,236.73	$260.00	3.07
Book Storage	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.27	575	0.0	$64.98	$701.00	$120.00	8.94
Corridor G	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.15	893	0.0	$100.80	$409.50	$70.00	3.37
Corridor G	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,360	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.01	68	0.0	$7.64	$35.90	$5.00	4.05
CST	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.19	675	0.0	$76.26	$650.53	$115.00	7.02
CST - Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
CST - Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
CST - Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
CST - Office 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
Rm G-8	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.19	675	0.0	$76.26	$496.53	$100.00	5.20
Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
Office 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.05	135	0.0	$15.25	$211.13	$20.00	12.53
Office 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
Office 5	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.05	135	0.0	$15.25	$211.13	$20.00	12.53
Rm G-1	26	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	26	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.37	1,307	0.0	$147.55	$1,473.40	$200.00	8.63
Rm G-2	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	$102.15	$1,186.20	$160.00	10.05
Woodshop Rm G-3	15	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	No	15	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,000	0.31	1,087	0.0	$122.72	$1,470.00	$0.00	11.98
Woodshop Rm G-3	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,200	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	840	0.13	271	0.0	$30.65	$593.10	$80.00	16.74
Rm G-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Rm G-5	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.53	1,857	0.0	$209.70	$1,316.47	$255.00	5.06
Computer Rm G-6	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97

	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
Rm G-7	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$228.77	$1,411.60	$275.00	4.97
Book Storage	1	Incandescent: 60W Incadescent Bulbs	Wall Switch	60	1,200	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,200	0.03	70	0.0	$7.95	$53.75	$5.00	6.13
Storage Closet	1	Incandescent: 60W Incadescent Bulbs	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,000	0.03	59	0.0	$6.62	$53.75	$5.00	7.36
G-Wing Lower Level Corridor	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,360	0.40	2,380	0.0	$268.79	$1,046.47	$220.00	3.07
Round Corridor	32	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,360	Relamp	No	32	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.37	2,164	0.0	$244.35	$1,148.80	$160.00	4.05
Round Corridor	28	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	No	28	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,360	1.03	6,059	0.0	$684.19	$2,663.73	$560.00	3.07
Library	44	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	44	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	2.12	7,428	0.0	$838.82	$5,265.87	$1,020.00	5.06
Library Storage Rm 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.05	101	0.0	$11.44	$211.13	$20.00	16.71
Library Storage Rm 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,200	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	840	0.19	405	0.0	$45.75	$496.53	$100.00	8.67
Library Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.10	270	0.0	$30.50	$306.27	$60.00	8.07
Listening Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.19	540	0.0	$61.01	$496.53	$100.00	6.50
Work Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.08	230	0.0	$25.99	$291.50	$50.00	9.29
Storage Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.02	38	0.0	$4.29	$58.50	$10.00	11.32
Rm C-1	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm C-2	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm C-3	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm C-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm C-5	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm C-6	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Janitor's Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,000	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.02	36	0.0	$4.09	$98.00	$0.00	23.96
Boy's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.05	153	0.0	$17.33	$233.00	$40.00	11.14
Exterior Courtyard	2	Incandescent: 60W Incadescent Bulbs	Wall Switch	60	4,380	Relamp	No	2	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	4,380	0.07	514	0.0	$58.02	$107.51	$10.00	1.68
Electrical Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	600	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	600	0.02	24	0.0	$2.73	$71.80	$10.00	22.66
Rm B-6	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm B-5	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90

	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
Rm B-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm B-3	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm B-2	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm B-1	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm A-1	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm A-2	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm A-3	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm A-4	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Rm A-5	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.17	603	0.0	$68.10	$700.80	$95.00	8.90
Whole School - All Exits	58	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	58	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior Perimeter	28	Metal Halide: (1) 100W Lamp	None	128	4,380	Fixture Replacement	No	28	LED - Fixtures: Outdoor Porch Wall Mount	None	20	4,380	1.98	15,232	0.0	$1,720.07	$9,545.48	$140.00	5.47
Exterior Perimeter	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	4,380	Relamp	No	6	LED - Linear Tubes: (2) U-Lamp	None	33	4,380	0.11	876	0.0	$98.97	$379.20	$0.00	3.83
Exterior Perimeter	3	Incandescent: 60W Incadescent Bulbs	None	60	4,380	Relamp	No	3	LED Screw-In Lamps: 9W LED Bulbs	None	9	4,380	0.10	771	0.0	$87.03	$161.26	$15.00	1.68
Exterior Perimeter	1	Compact Fluorescent: 13W CFL Bulbs	None	13	4,380	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	None	9	4,380	0.00	20	0.0	$2.28	$53.75	$0.00	23.63

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	Whole School	8	Exhaust Fan	1.0	75.5%	No	2,745	No	75.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Whole School	15	Exhaust Fan	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Whole School	13	Exhaust Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Rm 2	Sewer Pumps	2	Process Pump	1.5	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Rm 4	Utica Heating Boilers	1	Heating Hot Water Pump	6.0	87.5%	No	3,391	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Rm 4	Utica Heating Boilers	1	Process Pump	0.2	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Boiler Rm	Main Boilers	2	Heating Hot Water Pump	15.0	91.0%	No	3,391	Yes	93.0%	Yes	2	3.89	36,708	0.0	$4,145.25	$14,082.34	$0.00	3.40
Mech Rm 3	Weil McLain Boilers	4	Process Pump	0.5	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen Hood	1	Kitchen Hood Exhaust Fan	1.0	75.5%	No	500	No	75.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Woodshop	Woodshop EF	1	Exhaust Fan	1.0	75.5%	No	1,000	No	75.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Boiler Rm	Pneumatic Controls	1	Air Compressor	2.0	84.0%	No	2,479	No	84.0%	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
Clasrooms & Offices	Clasrooms & Offices	3	Window AC	2.21		Yes	3	Ductless Mini-Split AC	2.00		21.00		No	3.97	8,294	0.0	$936.62	$16,436.96	$0.00	17.55
Clasrooms & Offices	Clasrooms & Offices	2	Window AC	2.33		Yes	2	Ductless Mini-Split AC	2.00		21.00		No	2.42	5,053	0.0	$570.57	$10,957.97	$0.00	19.21
Clasrooms & Offices	Clasrooms & Offices	10	Window AC	2.33		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Clasrooms & Offices	Clasrooms & Offices	1	Through-The-Wall AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Clasrooms & Offices	Clasrooms & Offices	1	Ductless Mini-Split HP	2.00	25.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Clasrooms & Offices	Clasrooms & Offices	3	Ductless Mini-Split HP	3.00	36.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Clasrooms & Offices	Clasrooms & Offices	5	Ductless Mini-Split AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Clasrooms & Offices	Clasrooms & Offices	5	Ductless Mini-Split AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	-	2	Packaged AC	5.00		Yes	2	Packaged AC	5.00		15.20		No	1.41	2,947	0.0	$332.83	$22,689.60	$920.00	65.41
Roof	Multi-Purpose Rm/ Cafeteria	2	Packaged AC	15.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	-	2	Split-System AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	1999 Addition	3	Split-System AC	7.50		Yes	3	Split-System AC	7.50		13.90		No	4.55	9,505	0.0	$1,073.33	$26,184.83	$1,642.50	22.87
Roof	-	1	Split-System AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	-	1	Packaged Air-Source HP	4.00	59.40	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	-	3	Packaged AC	5.00		Yes	3	Packaged AC	5.00		15.20		No	3.89	8,127	0.0	$917.74	$34,034.40	$1,380.00	35.58
Roof	1996 Addition	1	Packaged AC	10.00		Yes	1	Packaged AC	10.00		11.50		No	0.81	1,702	0.0	$192.20	$17,821.06	$730.00	88.92

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
Main Boiler Rm	Original Building	2	Non-Condensing Hot Water Boiler	1,875.00	Yes	2	Condensing Hot Water Boiler	1,875.00	91.00%	Et	0.00	0	597.8	$6,187.53	$71,622.46	$8,250.00	10.24
Mech Rm 4	1996 Addition	2	Non-Condensing Hot Water Boiler	139.40	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Rm 3	1999 Addition	2	Non-Condensing Hot Water Boiler	122.08	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	2002 Addition	1	Non-Condensing Hot Water Boiler	759.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	-	2	Furnace	120.00	Yes	2	Furnace	120.00	95.00%	AFUE	0.00	0	15.2	$156.89	$5,437.76	$800.00	29.56
Roof	-	3	Furnace	96.00	Yes	3	Furnace	96.00	95.00%	AFUE	0.00	0	18.2	$188.27	$6,525.31	$1,200.00	28.29
Roof	-	2	Furnace	284.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	1996 Addition	2	Furnace	240.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mech Rm 2	VMMS	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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
VMMS	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
VMMS	3	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Refrigerator, Solid Door (31 - 50 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
Kitchen	1	Freezer Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Gas Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Whole School	193	Desktop Computers + Monitors	150.0	Yes
Whole School	7	Lg. Copy Machines	380.0	Yes
Whole School	14	Sm. Printers	26.0	Yes
Whole School	2	Server	450.0	No
Whole School	68	CRT TVs	150.0	No
Whole School	21	Microwaves & Toaster Ovens	1,000.0	No

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
Hall near MP Rm	1	Refrigerated	Yes	0.00	1,612	0.0	$182.02	$230.00	$0.00	1.26
Hall near MP Rm	1	Non-Refrigerated	Yes	0.00	343	0.0	$38.68	$230.00	$0.00	5.95

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

24

ENERGY STAR® Score[1]

Veteran's Memorial Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 132,389
Built: 1970

For Year Ending: February 29, 2016
Date Generated: August 30, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Veteran's Memorial Middle School 105 Hendrickson Avenue Brick, New Jersey 08724	Brick Township Board of Education 101 Hendrickson Avenue Brick, NJ 08724 (732) 785-3000	James Edwards 101 Hendrickson Avenue Brick, NJ 08724 (732) 785-3000 jedwards@brickschools.org

Property ID: 6015764

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
75.8 kBtu/ft²

Source EUI
135.7 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	3,549,776 (35%)
Natural Gas (kBtu)	6,491,350 (65%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	60.6
National Median Source EUI (kBtu/ft²)	108.5
% Diff from National Median Source EUI	25%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	739

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)