Local Government Energy Audit:
Energy Audit Report

Macopin Middle School

70 Highlander Drive

West Milford, New Jersey 07480

West Milford Township School District

September 7, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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1 EXECUTIVE SUMMARY

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

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

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey public school districts in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Macopin Middle School is a 120,000 square foot facility comprised of classroom space, a gymnasium, auxiliary gymnasiums, kitchen, cafeteria, library, auditorium and office space. The building is one floor which spans different elevations. The school was originally built in 1959 with an addition in 1962. The building is in operation September through June. The building is occupied by about 83 full time staff members and about 527 students. The general building schedule is from 6:30 AM to 2:20 PM, Monday through Friday. The building is mostly utilized for athletics on the weekends between 8:00 AM and 4:00 PM. The custodians that work a second shift occupy the building until 11:00 PM. This school does not run any summer programs, however it remains open for custodial work between 7:00 AM and 3:00 PM. The building is 100% heated and roughly 20% cooled. The building is generally in fair condition with no critical maintenance concerns.

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 15 measures that together represent an opportunity for Macopin Middle School to reduce annual energy costs by roughly $37,168 and annual greenhouse gas emissions by 303,152 lbs CO_2e. We estimate that if all evaluated measures were implemented, the project would pay for itself in 11.4 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2a, respectively. Together these measures represent an opportunity to reduce Macopin Middle School's annual energy use by 17%.

TRC recommends 11 measures that together represent an opportunity for Macopin Middle School to reduce annual energy costs by roughly $25,183 and annual greenhouse gas emissions by 191,082 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 5.0 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2b, respectively. Together these measures represent an opportunity to reduce Macopin Middle School's annual energy use by 9%.

Figure 1 – Previous 12 Month Utility Costs

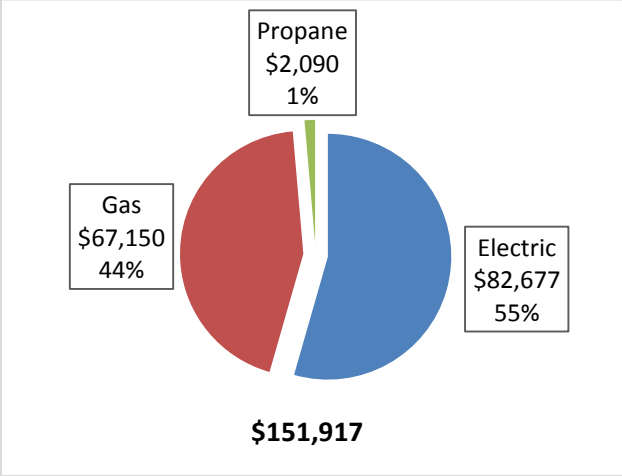


Figure 2a – Potential Post-Implementation Costs (All Measures)

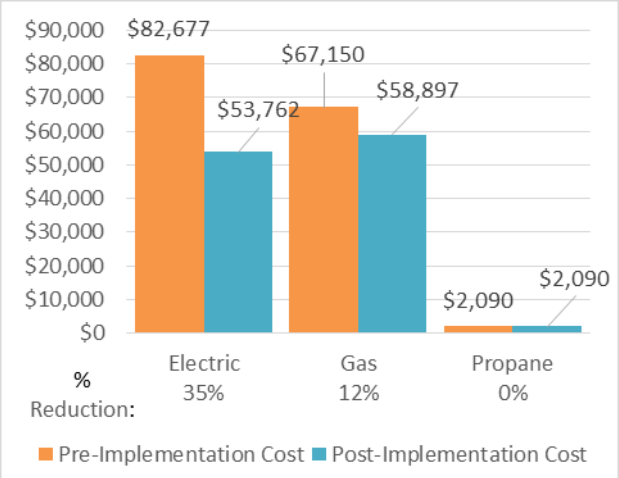
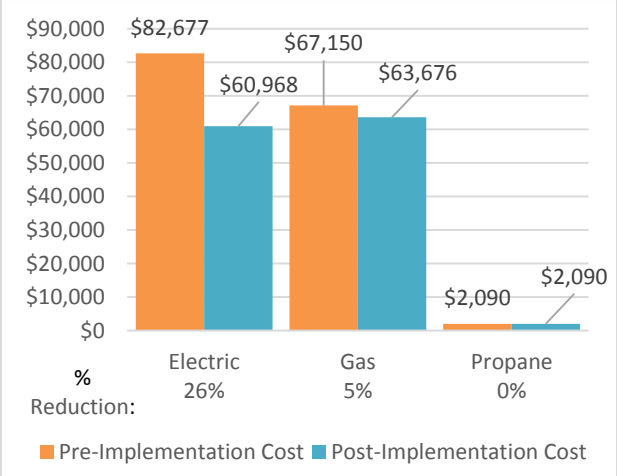


Figure 3b – Potential Post-Implementation Costs (High Priority Measures)



A detailed description of Macopin 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 4. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 4 – 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			**152,840**	**38.4**	**0.0**	**$23,126.14**	**$256,720.86**	**$27,815.00**	**$228,905.86**	**9.9**	**153,909**
	Install LED Fixtures	No	45,268	5.4	0.0	$6,849.55	$155,617.16	$10,900.00	$144,717.16	21.1	45,585
ECM 1	Retrofit Fixtures with LED Lamps	Yes	107,571	33.0	0.0	$16,276.58	$101,103.69	$16,915.00	$84,188.69	5.2	108,324
Lighting Control Measures			**10,316**	**2.4**	**0.0**	**$1,560.90**	**$12,330.00**	**$1,355.00**	**$10,975.00**	**7.0**	**10,388**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	6,877	1.7	0.0	$1,040.61	$10,070.00	$1,355.00	$8,715.00	8.4	6,925
ECM 3	Adjust Timeclock for Exterior Lighting Control	Yes	961	0.3	0.0	$145.39	$60.00	$0.00	$60.00	0.4	968
ECM 4	Install High/Low Lighitng Controls	Yes	2,478	0.5	0.0	$374.90	$2,200.00	$0.00	$2,200.00	5.9	2,495
Motor Upgrades			**673**	**0.3**	**0.0**	**$101.88**	**$2,687.10**	**$0.00**	**$2,687.10**	**26.4**	**678**
ECM 5	Premium Efficiency Motors	Yes	673	0.3	0.0	$101.88	$2,687.10	$0.00	$2,687.10	26.4	678
Variable Frequency Drive (VFD) Measures			**12,000**	**2.5**	**0.0**	**$1,815.74**	**$7,615.90**	**$0.00**	**$7,615.90**	**4.2**	**12,084**
ECM 6	Install VFDs on Hot Water Pumps	Yes	12,000	2.5	0.0	$1,815.74	$7,615.90	$0.00	$7,615.90	4.2	12,084
Electric Unitary HVAC Measures			**2,357**	**1.7**	**0.0**	**$356.61**	**$12,432.14**	**$276.00**	**$12,156.14**	**34.1**	**2,373**
	Install High Efficiency Electric AC	No	2,357	1.7	0.0	$356.61	$12,432.14	$276.00	$12,156.14	34.1	2,373
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**519.1**	**$4,530.33**	**$154,227.03**	**$17,765.00**	**$136,462.03**	**30.1**	**60,777**
	Install High Efficiency Hot Water Boilers	No	0	0.0	519.1	$4,530.33	$154,227.03	$17,765.00	$136,462.03	30.1	60,777
Domestic Water Heating Upgrade			**0**	**0.0**	**57.5**	**$501.69**	**$4,729.03**	**$152.00**	**$4,577.03**	**9.1**	**6,730**
	Install High Efficiency Gas Water Heater	No	0	0.0	28.5	$248.63	$4,392.04	$152.00	$4,240.04	17.1	3,335
ECM 7	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	29.0	$253.06	$336.99	$0.00	$336.99	1.3	3,395
Food Service Equipment & Refrigeration Measures			**1,007**	**0.1**	**0.0**	**$152.32**	**$2,116.40**	**$0.00**	**$2,116.40**	**13.9**	**1,014**
ECM 8	Replace Refrigeration Equipment	Yes	1,007	0.1	0.0	$152.32	$2,116.40	$0.00	$2,116.40	13.9	1,014
Plug Load Equipment Control - Vending Machine			**3,224**	**0.0**	**0.0**	**$487.77**	**$690.00**	**$0.00**	**$690.00**	**1.4**	**3,246**
ECM 9	Vending Machine Control	Yes	3,224	0.0	0.0	$487.77	$690.00	$0.00	$690.00	1.4	3,246
Custom Measures			**8,684**	**0.0**	**369.0**	**$4,534.77**	**$17,489.80**	**$0.00**	**$17,489.80**	**3.9**	**51,953**
ECM 10	Computer Power Management Software	Yes	8,663	0.0	0.0	$1,310.80	$5,845.00	$0.00	$5,845.00	4.5	8,724
ECM 11	Building Envelope Weatherization	Yes	21	0.0	369.0	$3,223.97	$11,644.80	$0.00	$11,644.80	3.6	43,230
TOTALS FOR HIGH PRIORITY MEASURES			**143,475**	**38.3**	**398.0**	**$25,183.02**	**$144,369.88**	**$18,270.00**	**$126,099.88**	**5.0**	**191,082**
TOTALS FOR ALL EVALUATED MEASURES			**191,101**	**45.3**	**945.6**	**$37,168.14**	**$471,038.26**	**$47,363.00**	**$423,675.26**	**11.4**	**303,152**

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

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

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

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

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.

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

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

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

Energy Efficient Practices

TRC also identified 11 low cost or no cost energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Macopin Middle School include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Install Destratification Fans
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Perform Maintenance on Compressed Air Systems
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

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

Figure 5 – Photovoltaic Potential

Potential	High	
System Potential	149	kW DC STC
Electric Generation	177,514	kWh/yr
Displaced Cost	$15,440	/yr
Installed Cost	$387,400	

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

1.3 Implementation Planning

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

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

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

- SmartStart
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)

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 4 are based on the SmartStart program. More details on this program and others are available in Section 8.

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

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

Additional information on relevant incentive programs is located in Section 8. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 6 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Chris Kelly	Supervisor Buildings & Grounds	chris.kelly@wmtps.org	973-229-5929
Barbara Francisco	Buisness Administrator	barbara.francisco@wmtps.org	973-697-1700 ext 5050
TRC Energy Services			
Aimee Lalonde	Auditor	Alalonde@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On March 28, 2018, TRC performed an energy audit at Macopin Middle School located in West Milford, New Jersey. TRC met with facility personnel to review the facility operations and help focus our investigation on specific energy-using systems.

Macopin Middle School is a 120,000 square foot facility comprised of classroom space, a gymnasium, auxiliary gymnasiums, a kitchen, a cafeteria, a library, an auditorium, and office spaces. The building is one floor that spans different elevations. The school was originally built in 1959 with an addition in 1962. The building is in operation September through June. The building is 100% heated and roughly 20% cooled. The building is generally in fair condition.

The lighting fixtures throughout the building vary in type. There are older style finned fixtures in half of the classrooms but are in fair condition. There are older style wrap fixtures in the kitchen and locker rooms, which are in poor condition, and the majority are missing lenses. Due to the age of this equipment, these lenses are no longer available in the market today and were evaluated for replacement. The HVAC systems and equipment are also aging and inefficient; however, there are no critical maintenance concerns.

2.3 Building Occupancy

The building is occupied by about 83 full time staff members and about 527 students. The general building schedule is from 6:30 AM to 2:20 PM, Monday through Friday. The building is mostly utilized for athletics on the weekends between 8:00 AM and 4:00 PM. The custodians that work a second shift occupy the building until 11:00 PM. This school does not run any summer programs, however it remains open for custodial work between 7:00 AM and 3:00 PM. The typical schedule is presented in the table below.

Figure 7 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Middle School (Sept-June) - Students	Weekday	6:30AM - 3:00PM
Middle School (Sept-June) - Students	Weekend	8:00AM - 4:00PM
Middle School (Sept-June) - Staff	Weekday	6:30AM - 11:00PM
Middle School (Sept-June) - Staff	Weekend	8:00AM - 4:00PM
Middle School (July & Aug) - Staff Only	Weekday	8:00AM - 4:00PM
Middle School (July & Aug) - Staff Only	Weekend	8:00AM - 4:00PM

2.4 Building Envelope

The building has a flat roof that is in fair condition. The building has double-pane windows with metal frames in fair condition. The exterior doors are constructed of aluminum or metal with glass panes and are in good condition. However, the door seals have worn out, which increases the level of outside air infiltration. Based on visual inspections of the building envelope, there are wall cracks as well as some cracks around window frames. These building envelope deficiencies can lead to excessive infiltration.

Figure 8-Building Envelope

Figure 9-Building Envelope Deficiencies

2.5 On-Site Generation

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

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts, as well as some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Fixture types include 2-lamp or 4-lamp, 2-foot or 4-foot long troffers, surface mounted wraparound fixtures and some of the original finned continuous row fixtures. Most fixtures are in fair condition; however, some fixtures are missing lenses, which are no longer available in the market.

Most lighting fixtures in classrooms and break rooms are controlled by occupancy sensors. The remainder are manually controlled by wall switches. The gym rooms contain 4-lamp T5HO (high output) high bay fixtures which are controlled by occupancy sensors. The exit signs throughout the building are LED.

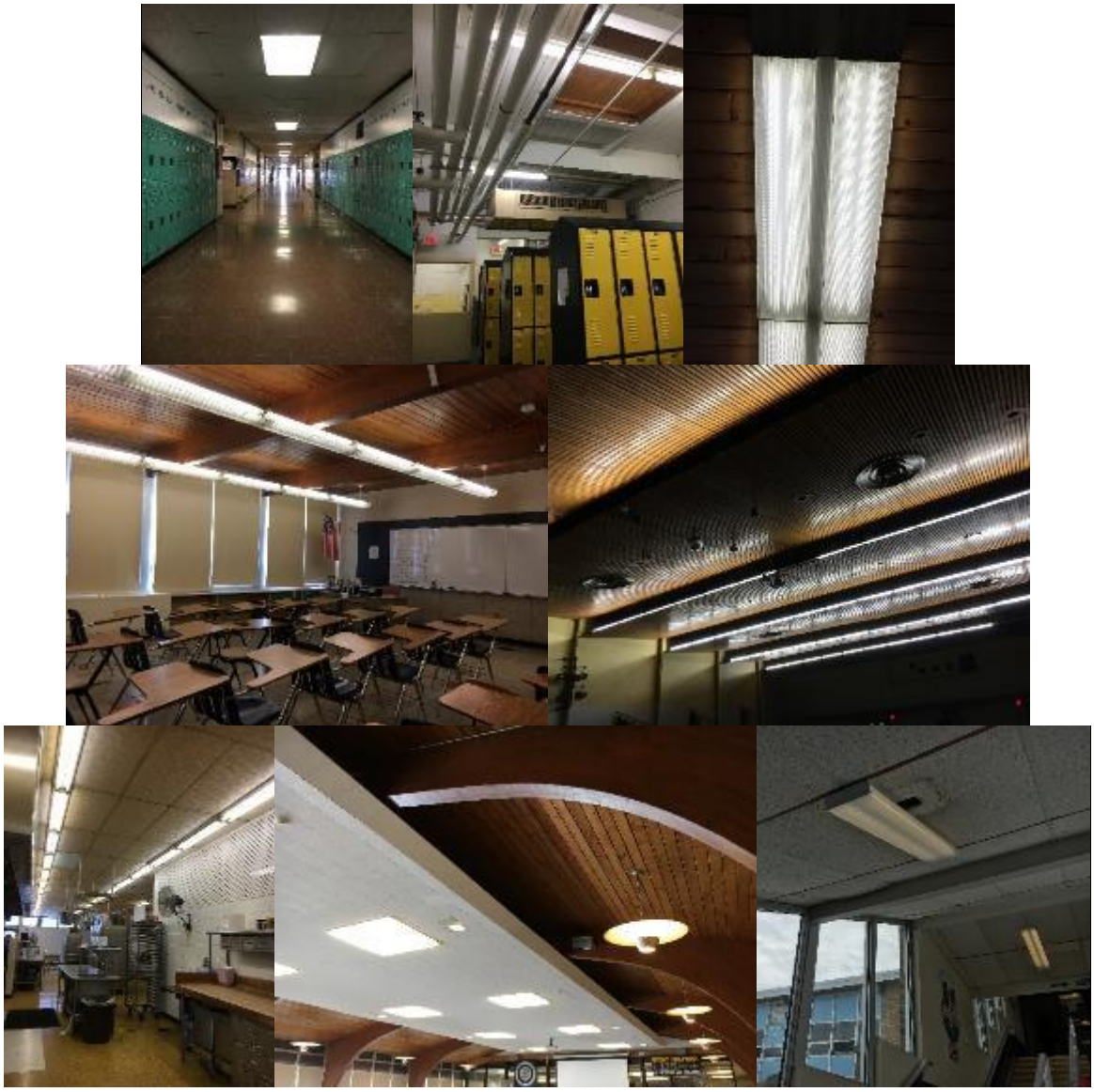


Figure 10-Lighting Systems

Exterior wall pack fixtures include metal halide lamps and ballasts. The building overhang canopies have compact fluorescent lamp fixtures. The pole mounted flood fixtures are either metal halide or high pressure sodium and illuminate the parking lot areas. There are also a few LED flood and spot light fixtures. Exterior light fixtures are controlled by a time clock or photocell, depending on the location.

Figure 11-Exterior Lighting and Timeclock Control

Hot Water Heating System

The building is heated by a hot water system which includes five (5) gas-fired, 1,615 MBH non-condensing hot water boilers. The boilers are fully modulating. They are in fair condition, installed about 16 years ago and are well maintained. The boilers have a nominal thermal efficiency of 83%. The hot water system includes a total of four zones. The constant flow primary distribution to Zone one is provided by two 10 HP hot water pumps operating in lead/lag fashion. These are in poor condition. Zone two is provided by two (2) 2 HP hot water pumps and Zones three & four are provided by 1/3 HP hot water pumps, which are all in fair condition. All pumps operate at constant speed and are driven by standard efficiency motors.

The heating system is equipped with basic heat timer controls, which includes outdoor air temperature reset. Hot water is supplied at 180°F when the outside air temperature is low, and the setpoint is adjusted linearly to 130°F when the outside air is above 65°F. The boilers provide hot water to unit ventilators throughout the building, perimeter radiators, and hot water unit heaters. The boiler system cannot be locked out at higher outside air temperatures because the indirect domestic hot water system is dependent upon the operation of the boiler.

Figure 12-Hot Water Heating System

Figure 13-Hot Water Pumps and Motors

Larger building spaces, such as the gymnasium, auditorium, and cafeteria, are conditioned by heating-ventilating (HV) units equipped with hot water heating coils and 1 HP supply fan motors. The remainder of HVAC equipment, such as classroom unit ventilators, have fractional horsepower motors.

Figure 14-Unit Ventilators and larger Heating-Ventilation Units

Air Conditioning Equipment

There is a packaged roof top unit that was installed about 15 years ago serving the office area. This equipment was not accessible during the audit; however, based on discussions with facility personnel, this is about three tons in capacity and is assumed to be standard efficiency for the age of the equipment. Some classrooms and offices are equipped with window air conditioning (AC) units, which are manually turned on and off during the summer months for cooling. These range in capacity, efficiency and condition. They range in efficiency between 9.2 EER to 12.0 EER.

Figure 15-Window AC Units

HVAC Controls

The unit ventilators throughout the building have supply fan motors, dampers, and valves that operate through the use of a pneumatic control system. This system is original to the building and appears to be in fair operating condition. The air compressor for this system is located in the boiler room, was recently installed, and is in good condition with high efficiency motors.

Figure 16-Pneumatic Control System

Domestic Hot Water Heating System

The domestic hot water heating is an indirect system which includes the use of a 79-gallon storage tank. The main hot water heating system boilers provide hot water for this system via a heat exchanger. The system is in good condition. Hot water is provided to hand washing sinks throughout the building and the kitchen.

Figure 17-Domestic Hot Water System

Food Service Equipment

The school has a kitchen that is used to prepare lunches for almost every student each school day. Most of the cooking is done using a number of electric ovens and one (1) propane stove. There is an electric fryer and bulk prepared foods are held in a number of electric holding cabinets. A majority of this equipment is high efficiency and in good condition.

Figure 18-Food Service Equipment

Refrigeration

The kitchen has a walk-in low temperature freezer and a cooler. These are used to store food prepared for school lunches. The walk-in cooler temperature is maintained at about 35°F. There are a few glass front free standing refrigerators and a refrigerated chest. All equipment is standard to high efficiency and in fair to good condition.

Figure 19-Walk-In Refrigeration Equipment

Figure 20-Stand-Up Refrigeration Equipment

Building Plug Load

There are roughly 223 computer work stations throughout the facility. It is assumed that there is no centralized PC power management software installed. Based on a visual inspection of computer labs, a majority of computers were left on. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart boards, projectors, and fans.

Figure 21-Plug Load Equipment

There are also several residential style refrigerators throughout the building. These vary in condition and efficiency. There were a few noted to be almost empty. These should be considered for consolidation and removal of unnecessary refrigerators throughout the building. Refrigerated drink machines located in the faculty room and cafeteria do not currently have controls.

Figure 22-Vending Machines

2.7 Water-Using Systems

There are restrooms throughout this facility. A sampling of restrooms found that majority of the faucets are rated for 2.0 gallons per minute (gpm) or higher. Toilets are rated at 1.6 gallons per flush (gpf) or higher.

3 SITE ENERGY USE AND COSTS

Utility data for electricity, natural gas and propane was analyzed to identify opportunities for savings. In addition, data for electricity, natural gas and propane 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 3.5 for additional information.

3.1 Total Cost of Energy

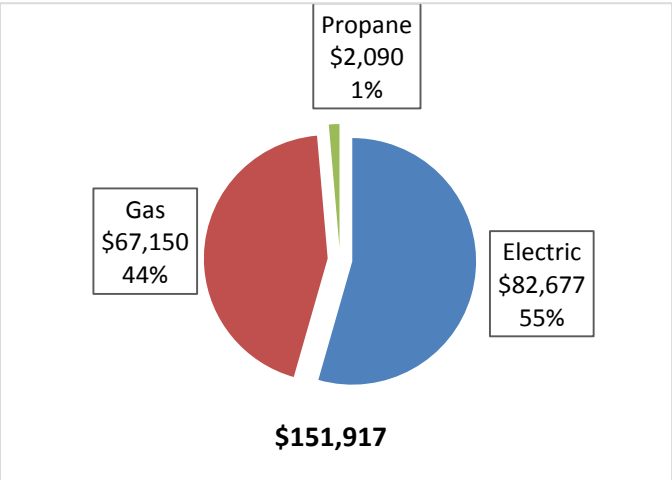
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 23 - Utility Summary

Utility Summary for Macopin Middle School		
Fuel	**Usage**	**Cost**
Electricity	546,411 kWh	$82,677
Natural Gas	76,938 Therms	$67,150
Propane	883 Gallons	$2,090
Total		**$151,917**

The current annual energy cost for this facility is $151,917 as shown in the chart below.

Figure 24 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by Rockland Electric. The average electric cost over the past 12 months was $0.151/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The facility pays electric demand charges. The monthly electricity consumption and peak demand are shown in the chart below. Low summer use is reflective of the scheduled use of the building.

Figure 25 - Electric Usage & Demand

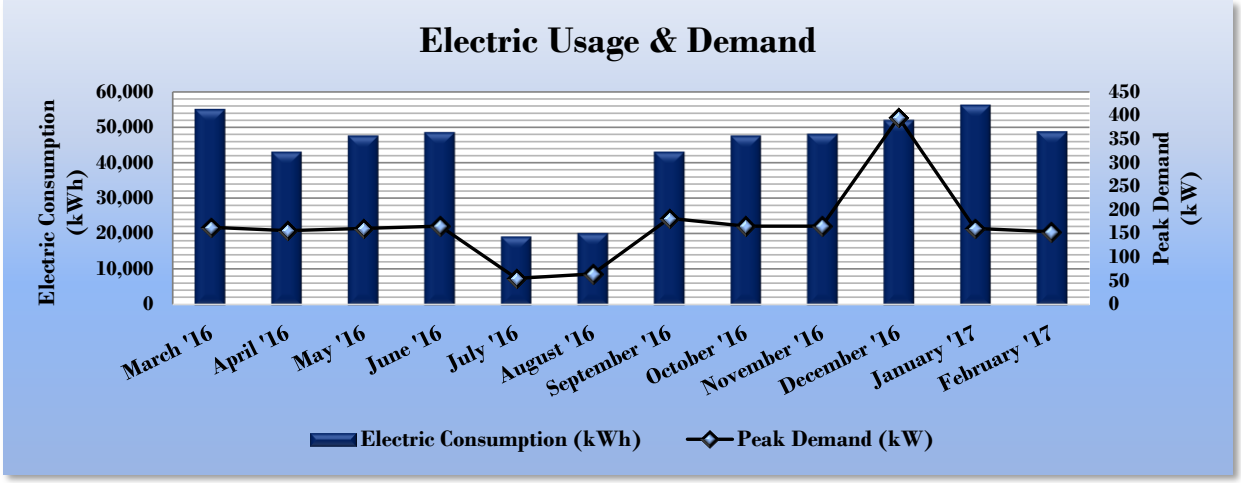


Figure 26 - Electric Usage & Demand

Electric Billing Data for Macopin Middle School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
3/23/16	28	55,082	163	$422	$8,028
4/20/16	27	43,082	156	$404	$6,472
5/19/16	28	47,642	161	$416	$7,076
6/22/16	33	48,602	166	$428	$7,325
7/22/16	29	19,322	55	$143	$3,022
8/23/16	31	20,282	65	$168	$3,190
9/23/16	30	43,082	182	$472	$6,742
10/24/16	30	47,642	166	$428	$7,096
11/22/16	28	48,122	166	$428	$7,119
12/21/16	28	51,962	396	$1,024	$8,711
1/25/17	34	56,282	161	$416	$8,257
2/23/17	28	48,842	154	$397	$7,147
Totals	**354**	**529,944**	**182**	**$5,147**	**$80,186**
Annual	**365**	**546,411**	**182**	**$5,307**	**$82,677**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.873/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. Usage is typical for a facility with a gas heating profile.

Figure 27 - Natural Gas Usage

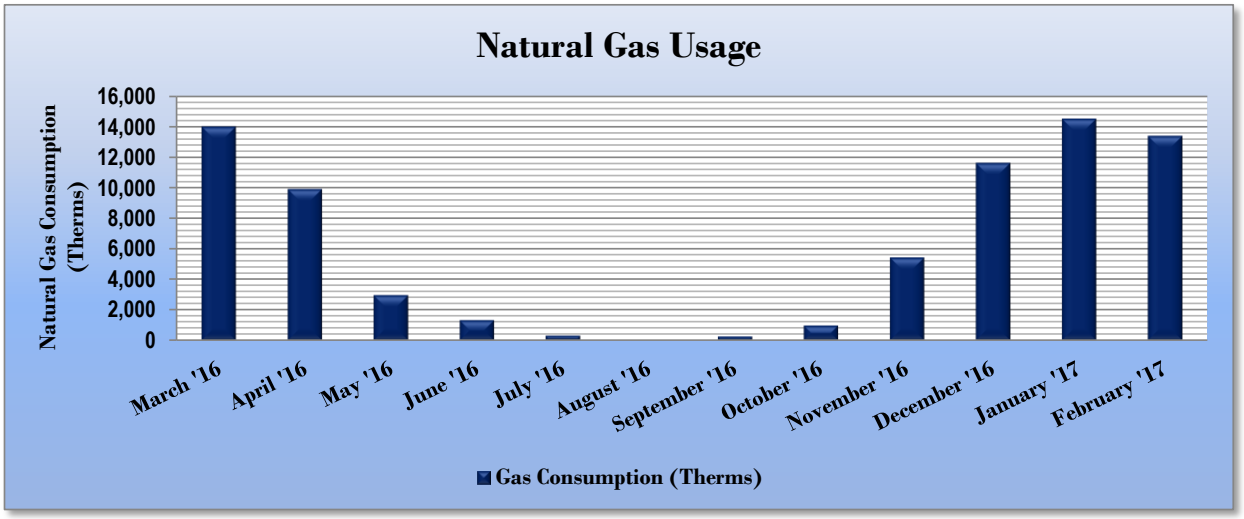


Figure 28 - Natural Gas Usage

Gas Billing Data for Macopin Middle School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
3/11/16	29	13,990	$11,762
4/12/16	31	9,906	$6,304
5/11/16	28	2,961	$1,961
6/10/16	29	1,320	$935
7/12/16	31	308	$301
8/10/16	28	4	$110
9/9/16	29	243	$260
10/10/16	30	970	$721
11/10/16	30	5,424	$6,223
12/12/16	31	11,615	$10,842
1/12/17	30	14,494	$13,741
2/10/17	28	13,384	$11,967
Totals	**354**	**74,620**	**$65,126**
Annual	**365**	**76,938**	**$67,150**

3.4 Propane Usage

Propane is provided by Eastern Propane. The average propane cost for the past 12 months is $2.367/gallon, which is the blended rate used throughout the analyses in this report. The propane deliveries are shown in the table below.

Figure 29 – Propane Usage

Propane Billing Data for Macopin Middle School			
Period Ending	Days in Period	Propane Usage (Gallons)	Fuel Cost
12/22/16	38	132	$275
1/13/17	22	30	$69
2/24/17	42	129	$317
3/27/17	31	107	$240
4/19/17	23	56	$126
6/23/17	65	98	$209
10/25/17	124	194	$484
11/28/17	34	131	$337
12/21/17	23	96	$245
Totals	**402**	**973**	**$2,302**
Annual	**365**	**883**	**$2,090**

3.5 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.

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 30 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Macopin Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	116.8	141.4
Site Energy Use Intensity (kBtu/ft^2)	80.3	58.2

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

Figure 31 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Macopin Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	100.5	141.4
Site Energy Use Intensity (kBtu/ft^2)	72.9	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. Your building is not is one of the building categories that are eligible to receive a score. **This facility has a current score of 66.**

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

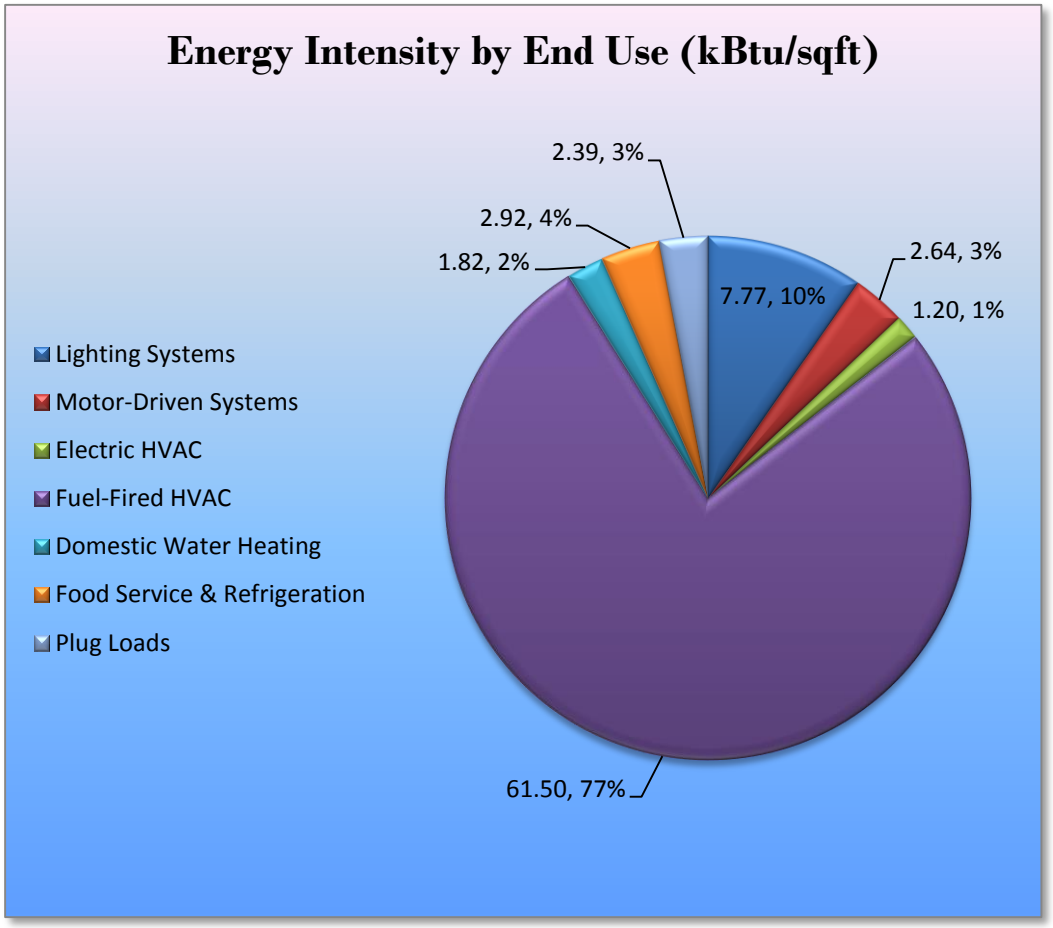
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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.

3.6 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed. 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 32 - 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 Macopin 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 33 – 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		**107,571**	**33.0**	**0.0**	**$16,276.58**	**$101,103.69**	**$16,915.00**	**$84,188.69**	**5.2**	**108,324**
ECM 1	Retrofit Fixtures with LED Lamps	107,571	33.0	0.0	$16,276.58	$101,103.69	$16,915.00	$84,188.69	5.2	108,324
Lighting Control Measures		**10,316**	**2.4**	**0.0**	**$1,560.90**	**$12,330.00**	**$1,355.00**	**$10,975.00**	**7.0**	**10,388**
ECM 2	Install Occupancy Sensor Lighting Controls	6,877	1.7	0.0	$1,040.61	$10,070.00	$1,355.00	$8,715.00	8.4	6,925
ECM 3	Install Daylight Dimming Controls	961	0.3	0.0	$145.39	$60.00	$0.00	$60.00	0.4	968
ECM 4	Install High/Low Lighitng Controls	2,478	0.5	0.0	$374.90	$2,200.00	$0.00	$2,200.00	5.9	2,495
Motor Upgrades		**673**	**0.3**	**0.0**	**$101.88**	**$2,687.10**	**$0.00**	**$2,687.10**	**26.4**	**678**
ECM 5	Premium Efficiency Motors	673	0.3	0.0	$101.88	$2,687.10	$0.00	$2,687.10	26.4	678
Variable Frequency Drive (VFD) Measures		**12,000**	**2.5**	**0.0**	**$1,815.74**	**$7,615.90**	**$0.00**	**$7,615.90**	**4.2**	**12,084**
ECM 6	Install VFDs on Hot Water Pumps	12,000	2.5	0.0	$1,815.74	$7,615.90	$0.00	$7,615.90	4.2	12,084
Domestic Water Heating Upgrade		**0**	**0.0**	**29.0**	**$253.06**	**$336.99**	**$0.00**	**$336.99**	**1.3**	**3,395**
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	29.0	$253.06	$336.99	$0.00	$336.99	1.3	3,395
Food Service Equipment & Refrigeration Measures		**1,007**	**0.1**	**0.0**	**$152.32**	**$2,116.40**	**$0.00**	**$2,116.40**	**13.9**	**1,014**
ECM 8	Replace Refrigeration Equipment	1,007	0.1	0.0	$152.32	$2,116.40	$0.00	$2,116.40	13.9	1,014
Plug Load Equipment Control - Vending Machine		**3,224**	**0.0**	**0.0**	**$487.77**	**$690.00**	**$0.00**	**$690.00**	**1.4**	**3,246**
ECM 9	Vending Machine Control	3,224	0.0	0.0	$487.77	$690.00	$0.00	$690.00	1.4	3,246
Custom Measures		**8,684**	**0.0**	**369.0**	**$4,534.77**	**$17,489.80**	**$0.00**	**$17,489.80**	**3.9**	**51,953**
ECM 10	Computer Power Management Software	8,663	0.0	0.0	$1,310.80	$5,845.00	$0.00	$5,845.00	4.5	8,724
ECM 11	Building Envelope Weatherization	21	0.0	369.0	$3,223.97	$11,644.80	$0.00	$11,644.80	3.6	43,230
TOTALS		**143,475**	**38.3**	**398.0**	**$25,183.02**	**$144,369.88**	**$18,270.00**	**$126,099.88**	**5.0**	**191,082**

* - 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).

4.2 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 34 below.

Figure 34 – 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		**107,571**	**33.0**	**0.0**	**$16,276.58**	**$101,103.69**	**$16,915.00**	**$84,188.69**	**5.2**	**108,324**
ECM 1	Retrofit Fixtures with LED Lamps	107,571	33.0	0.0	$16,276.58	$101,103.69	$16,915.00	$84,188.69	5.2	108,324

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: 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	107,221	33.0	0.0	$16,223.57	$100,673.67	$16,915.00	$83,758.67	5.2	107,971
Exterior	350	0.0	0.0	$53.02	$430.02	$0.00	$430.02	8.1	353

Measure Description

We recommend retrofitting existing incandescent, compact fluorescent and linear fluorescent T8 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 that are more than twice that of fluorescent tubes and more than 10 times longer than many incandescent lamps.

4.3 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 35 below.

Figure 35 – 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		**10,316**	**2.4**	**0.0**	**$1,560.90**	**$12,330.00**	**$1,355.00**	**$10,975.00**	**7.0**	**10,388**
ECM 2	Install Occupancy Sensor Lighting Controls	6,877	1.7	0.0	$1,040.61	$10,070.00	$1,355.00	$8,715.00	8.4	6,925
ECM 3	Install Daylight Dimming Controls	961	0.3	0.0	$145.39	$60.00	$0.00	$60.00	0.4	968
ECM 4	Install High/Low Lighitng Controls	2,478	0.5	0.0	$374.90	$2,200.00	$0.00	$2,200.00	5.9	2,495

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 2: 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)
6,877	1.7	0.0	$1,040.61	$10,070.00	$1,355.00	$8,715.00	8.4	6,925

Measure Description

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

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

ECM 3: Adjust Timeclock for Exterior Lighting 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)
961	0.3	0.0	$145.39	$60.00	$0.00	$60.00	0.4	968

Measure Description

We recommend adjusting the timeclock for exterior lighting control to dawn to dusk hours. The timeclock is currently scheduled for exterior lighting to operate between 4:00 PM and 7:00 AM every day. This may be adjusted back to an estimated 12 hours a day. The exterior lighting is currently operating 5,475 hours a year and may be reduced to a 4,380 hours annually.

ECM 4: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,478	0.5	0.0	$374.90	$2,200.00	$0.00	$2,200.00	5.9	2,495

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in hallways and lobby spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches. Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.4 Motor Upgrades

Our recommendations for motor upgrades are summarized in Figure 36 below.

Figure 36 – 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		**673**	**0.3**	**0.0**	**$101.88**	**$2,687.10**	**$0.00**	**$2,687.10**	**26.4**	**678**
ECM 5	Premium Efficiency Motors	673	0.3	0.0	$101.88	$2,687.10	$0.00	$2,687.10	26.4	678

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)
673	0.3	0.0	$101.88	$2,687.10	$0.00	$2,687.10	26.4	678

Measure Description

We recommend replacing two (2) 10 HP standard efficiency hot water pump motors that are in poor condition with *NEMA Premium™* efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type, and that they will be inverter duty rated to ensure compatibility with ECM 6,"Install VFD on Hot Water Pumps." 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.

4.5 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 37 below.

Figure 37 – 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		**12,000**	**2.5**	**0.0**	**$1,815.74**	**$7,615.90**	**$0.00**	**$7,615.90**	**4.2**	**12,084**
ECM 6	Install VFDs on Hot Water Pumps	12,000	2.5	0.0	$1,815.74	$7,615.90	$0.00	$7,615.90	4.2	12,084

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)
12,000	2.5	0.0	$1,815.74	$7,615.90	$0.00	$7,615.90	4.2	12,084

Measure Description

We recommend installing a variable frequency drives (VFD) to control the two (2) new 10 HP hot water pumps and motors. 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.

4.6 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 38 below.

Figure 38 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**29.0**	**$253.06**	**$336.99**	**$0.00**	**$336.99**	**1.3**	**3,395**
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	29.0	$253.06	$336.99	$0.00	$336.99	1.3	3,395

ECM 7: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	29.0	$253.06	$336.99	$0.00	$336.99	1.3	3,395

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy. Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.7 Food Service Equipment & Refrigeration Measures

Food service and refrigeration measures recommendations are summarized in Figure 39 below.

Figure 39 - Summary of Food Service Equipment & Refrigeration ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Food Service Equipment & Refrigeration Measures		**1,007**	**0.1**	**0.0**	**$152.32**	**$2,116.40**	**$0.00**	**$2,116.40**	**13.9**	**1,014**
ECM 8	Replace Refrigeration Equipment	1,007	0.1	0.0	$152.32	$2,116.40	$0.00	$2,116.40	13.9	1,014

ECM 8: Replace Refrigeration Equipment

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)
1,007	0.1	0.0	$152.32	$2,116.40	$0.00	$2,116.40	13.9	1,014

Measure Description

We recommend replacing the chest style refrigerator with a new comparable ENERGY STAR® high efficiency piece of equipment. There have been many improvements in refrigeration system equipment, operation, and insulation. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

4.8 Plug Load Equipment Control - Vending Machines

Figure 40-Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine		**3,224**	**0.0**	**0.0**	**$487.77**	**$690.00**	**$0.00**	**$690.00**	**1.4**	**3,246**
ECM 9	Vending Machine Control	3,224	0.0	0.0	$487.77	$690.00	$0.00	$690.00	1.4	3,246

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)
3,224	0.0	0.0	$487.77	$690.00	$0.00	$690.00	1.4	3,246

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce their 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.

4.9 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 41 below.

Figure 41 - Summary of Custom 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)
Custom Measures		**8,684**	**0.0**	**369.0**	**$4,534.77**	**$17,489.80**	**$0.00**	**$17,489.80**	**3.9**	**51,953**
ECM 10	Computer Power Management Software	8,663	0.0	0.0	$1,310.80	$5,845.00	$0.00	$5,845.00	4.5	8,724
ECM 11	Building Envelope Weatherization	21	0.0	369.0	$3,223.97	$11,644.80	$0.00	$11,644.80	3.6	43,230

ECM 10: Computer Power Management Software

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)
8,663	0.0	0.0	$1,310.80	$5,845.00	$0.00	$5,845.00	4.5	8,724

Measure Description

We recommend the implementation of computer power management software. The computing environment in most school and office facilities includes desktops, which are typically left on over nights, weekends and holidays. Screen savers are commonly confused as a power management strategy. This contributes to excessive electrical energy consumption, which may be avoided by proper management. There are innovative software packages available in the market today that are designed to deliver significant energy saving and provide ongoing tracking measurements. Operational and maintenance benefits are captured through the use of a central power management platform where issues may be diagnosed and problematic devices may be isolated. Energy savings policies may be enforced as well as identifying and eliminating underutilized devices. This measure investigates the potential benefits to implementing computer power management software to better match the energy use to user needs.

ECM 11: Building Envelope Weatherization

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)
21	0.0	369.0	$3,223.97	$11,644.80	$0.00	$11,644.80	3.6	43,230

Measure Description

We recommend weather-stripping the exterior doors, caulking perimeter of window frames and sealing wall cracks throughout the building. Exterior doors should be properly weather-stripped which may include the installation of a bottom sweep, center sweep and weather-stripping around the perimeter of the door.

Building envelopes that limit air infiltration and that have adequate insulation play a key role in optimizing heating and cooling efficiency, controlling moisture, and providing occupant comfort. Cracks and gaps throughout the building – around windows and doors, through utility openings, at the foundation and roof – may not seem significant, but their effects add up. Reducing uncontrolled air infiltration through air sealing is a cost-effective way to improve the performance and energy efficiency of your facility. The proper sealing of sources for air infiltration and exfiltration will mitigate the air through the building and thus reduce the load on the facility's heating and cooling equipment.

4.10 ECMs Evaluated, But Not Recommended as High Priority

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 42 – Summary of Measures Evaluated, But Not Recommended as High Priority

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	**45,268**	**5.4**	**0.0**	**$6,849.55**	**$155,617.16**	**$10,900.00**	**$144,717.16**	**21.1**	**45,585**
Install LED Fixtures	45,268	5.4	0.0	$6,849.55	$155,617.16	$10,900.00	$144,717.16	21.1	45,585
Electric Unitary HVAC Measures	**2,357**	**1.7**	**0.0**	**$356.61**	**$12,432.14**	**$276.00**	**$12,156.14**	**34.1**	**2,373**
Install High Efficiency Electric AC	2,357	1.7	0.0	$356.61	$12,432.14	$276.00	$12,156.14	34.1	2,373
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**519.1**	**$4,530.33**	**$154,227.03**	**$17,765.00**	**$136,462.03**	**30.1**	**60,777**
Install High Efficiency Hot Water Boilers	0	0.0	519.1	$4,530.33	$154,227.03	$17,765.00	$136,462.03	30.1	60,777
Domestic Water Heating Upgrade	**0**	**0.0**	**28.5**	**$248.63**	**$4,392.04**	**$152.00**	**$4,240.04**	**17.1**	**3,335**
Install High Efficiency Gas Water Heater	0	0.0	28.5	$248.63	$4,392.04	$152.00	$4,240.04	17.1	3,335
TOTALS	**47,625**	**7.0**	**547.6**	**$11,985.12**	**$326,668.37**	**$29,093.00**	**$297,575.37**	**24.8**	**112,070**

* - 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 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	17,905	4.4	0.0	$2,709.23	$131,198.77	$9,255.00	$121,943.77	45.0	18,030
Exterior	27,363	1.0	0.0	$4,140.32	$24,418.39	$1,645.00	$22,773.39	5.5	27,555

Measure Description

We evaluated replacing linear fluorescent high bay fixtures in the gymnasium and linear fluorescent fixtures with missing or damaged lenses located in the locker rooms and kitchen with new high-performance LED light fixtures.

We also evaluated the replacement of exterior fixtures containing metal halide and high pressure sodium lamps with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are much longer than traditional lighting technologies.

Reasons for not Recommending as a High Priority Measure

The projected payback period for this measure based on the energy savings exceeds the expected useful life of the replacement equipment.

The installation of the interior fixtures cannot be justified by energy savings alone.

Considerations

If the school district moves forward toward implementation of a comprehensive project under the Energy Savings Improvement Program, we would recommend including this measure. It should also be noted that the cost effectiveness for LED fixture replacements depends on the application. Exterior fixture upgrades are typically more cost effective than the interior applications.

Based on the difficulty of performing maintenance on elevated fixtures and the maintenance savings associated with longer life equipment, we suggest considering replacing the high bay gym based on benefits such as improved light quality, reduced maintenance and increased efficiency. Replacement of interior fixtures with damaged or missing lenses will provide for a more aesthetic environment and improved lighting.

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)
2,357	1.7	0.0	$356.61	$12,432.14	$276.00	$12,156.14	34.1	2,373

Measure Description

We evaluated replacing the standard efficiency packaged unit and several unitary air conditioning units with high efficiency equipment. All units with an energy efficiency rating of less than 10.8 EER and that are about 15 years old, were evaluated for upgrade. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

Reasons for not Recommending as a High Priority Measure

The projected payback period for this measure based on the energy savings exceeds the expected useful life of the replacement equipment. The upgrade to high efficiency is not justified by energy savings alone.

Considerations

If the school district moves forward toward implementation of a comprehensive project under the Energy Savings Improvement Program, we would recommend including this measure.

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	519.1	$4,530.33	$154,227.03	$17,765.00	$136,462.03	30.1	60,777

Measure Description

We evaluated replacing older inefficient hot water boilers with high efficiency condensing 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 should only be considered when the return water temperature of the boiler system can be tuned to less than 130°F during most of the operating hours. As a result condensing hydronic boilers are conservatively considered for the cost and savings values generated for this measure.

Reasons for not Recommending as a High Priority Measure

The projected payback period for this measure based on the energy savings exceeds the expected useful life of the replacement equipment. The upgrade to high efficiency, condensing hot water boilers is not justified by energy savings alone. However, we suggest considering this measure once the existing units reach the end of their useful life.

Considerations

If the school district moves forward toward implementation of a comprehensive project under the Energy Savings Improvement Program, we would recommend including this measure.

Install High Efficiency Gas Water Heater

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	28.5	$248.63	$4,392.04	$152.00	$4,240.04	17.1	3,335

Measure Description

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

Reasons for not Recommending as a High Priority Measure

The projected payback period for this measure based on the energy savings exceeds the expected useful life of the replacement equipment. The upgrade to high efficiency, condensing hot water heaters is not justified by energy savings alone. However, we suggest considering this measure once the existing equipment reaches the end of their useful life.

Considerations

If the school district moves forward toward implementation of a comprehensive project under the Energy Savings Improvement Program, we would recommend including this measure.

5 ENERGY EFFICIENT PRACTICES

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

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.

Perform Routine Motor Maintenance

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

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.

Install Destratification Fans

Allowing air to thermally stratify in spaces with high ceilings results in additional energy consumption by requiring the heating system to heat a volume of space much larger than the actual occupied space. Additional inefficiencies also occur because there are higher temperatures at the ceiling level than at the floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, requiring additional energy consumption by the heating equipment in order to compensate for the accelerated heat transfer.

Destratification fans are specially designed to deliver a columnar, laminar flow of air balancing the air temperature from floor to ceiling. In addition to fuel savings, the use of destratification fans will reduce the recovery time necessary to warm the space after nightly temperature setbacks and will increase the comfort level of the occupants.

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

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

Perform Maintenance on Pneumatic HVAC Control Systems

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

Plug Load Controls

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

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

Refer to Section 4.6 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

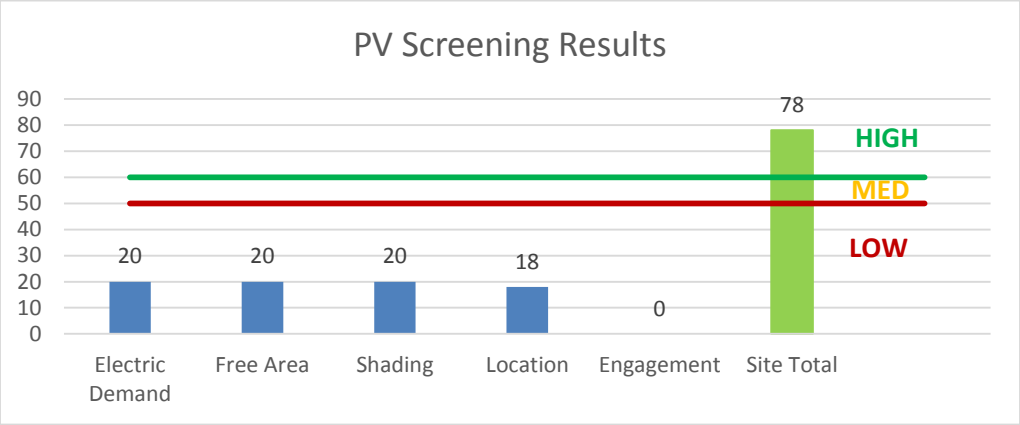
6.1 Photovoltaic

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

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

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

Figure 43 - Photovoltaic Screening



Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.2 for additional information.

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

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

6.2 Combined Heat and Power

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

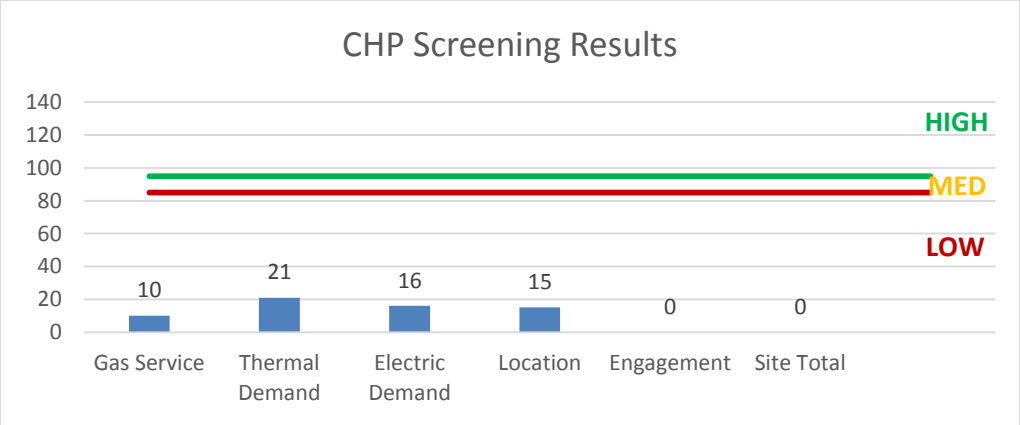
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

Figure 44 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion, DR is not recommended for this site.

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

Figure 45 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Retrofit Fixtures with LED Lamps	x					
ECM 2	Install Occupancy Sensor Lighting Controls	x					
ECM 3	Adjust Timeclock for Exterior Lighting Control						
ECM 4	Install High/Low Lighitng Controls						
ECM 5	Premium Efficiency Motors	x					
ECM 6	Install VFDs on Hot Water Pumps	x					
ECM 7	Install Low-Flow Domestic Hot Water Devices						
ECM 8	Replace Refrigeration Equipment						
ECM 9	Vending Machine Control						
ECM 10	Computer Power Management Software						
ECM 11	Building Envelope Weatherization						

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 SREC Registration Program

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

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

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

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

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,014	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,014	0.03	57	0.0	$8.59	$95.13	$20.00	8.74
Boiler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,014	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,014	0.04	77	0.0	$11.65	$117.00	$20.00	8.33
Boiler Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,014	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,014	0.13	231	0.0	$34.94	$351.00	$60.00	8.33
Custodian Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.08	219	0.0	$33.11	$291.50	$50.00	7.29
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,014	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,014	0.01	20	0.0	$3.09	$35.90	$5.00	10.01
Restroom	1	Compact Fluorescent: Plug in Lamps	Wall Switch	26	1,014	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	1,014	0.01	14	0.0	$2.12	$107.51	$0.00	50.77
Hallway	1	Compact Fluorescent: Plug in Lamps	Wall Switch	26	3,042	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	3,042	0.01	42	0.0	$6.35	$107.51	$0.00	16.92
Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.11	584	0.0	$88.29	$434.00	$40.00	4.46
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.41	2,188	0.0	$331.09	$1,077.50	$150.00	2.80
Vestibule	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.02	115	0.0	$17.47	$58.50	$10.00	2.78
Classroom 110	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 112	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 114	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 116	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 118	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 120	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 122	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Vestibule	1	Incandescent: Screw in Lamp	Wall Switch	60	3,042	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	3,042	0.03	178	0.0	$27.00	$53.75	$5.00	1.81
Classroom 123	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 121	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Break Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.09	291	0.0	$44.02	$234.00	$40.00	4.41
Classroom 119	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 117	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,014	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	710	0.11	195	0.0	$29.43	$504.00	$75.00	14.58
Custodial Closet	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.03	29	0.0	$4.44	$53.75	$5.00	10.99

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,014	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	710	0.11	195	0.0	$29.43	$504.00	$75.00	14.58
Classroom 115	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Classroom 113	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Classroom 111	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Classroom 109	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Vestibule	1	Incandescent: Screw in Lamp	Wall Switch	60	3,042	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	3,042	0.03	178	0.0	$27.00	$53.75	$5.00	1.81
Breezeway	5	Compact Fluorescent: Plug in Lamps	Wall Switch	26	3,042	Relamp	No	5	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	3,042	0.04	210	0.0	$31.76	$537.53	$0.00	16.92
Classroom 107	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Classroom 106	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.19	655	0.0	$99.04	$526.50	$90.00	4.41
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.87	$58.50	$10.00	16.89
Classroom 105	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.43	1,455	0.0	$220.09	$1,170.00	$200.00	4.41
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,014	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,014	0.02	38	0.0	$5.82	$58.50	$10.00	8.33
Computer Lab	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.98	2,626	0.0	$397.31	$2,916.00	$465.00	6.17
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$350.00	$60.00	6.57
Hallway	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.36	1,896	0.0	$286.95	$960.50	$130.00	2.89
Music Room 102	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.52	1,746	0.0	$264.11	$1,404.00	$240.00	4.41
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Hallway	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.08	438	0.0	$66.22	$375.50	$30.00	5.22
Private Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Kitchenette	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Restroom	1	Compact Fluorescent: Plug in Lamps	Wall Switch	26	500	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	500	0.01	7	0.0	$1.04	$107.51	$0.00	102.97
Music Room 101	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Auditorium 100	60	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	60	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	1.30	1,139	0.0	$172.27	$3,510.00	$600.00	16.89
Stage	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	500	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	500	0.29	258	0.0	$38.98	$761.07	$160.00	15.42

	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
Auditorium 100	24	Metal Halide: (1) 50W Lamp	Wall Switch	72	500	None	No	24	Metal Halide: (1) 50W Lamp	Wall Switch	72	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Auditorium Lobby	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.16	875	0.0	$132.44	$551.00	$60.00	3.71
Auditorium Lobby	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,042	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,042	0.04	196	0.0	$29.64	$95.13	$20.00	2.53
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,521	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,521	0.01	31	0.0	$4.63	$35.90	$5.00	6.67
Custodial Closet	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.03	29	0.0	$4.44	$53.75	$5.00	10.99
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.08	219	0.0	$33.11	$445.50	$65.00	11.49
Vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.04	231	0.0	$34.94	$117.00	$20.00	2.78
Stairs	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.02	115	0.0	$17.47	$58.50	$10.00	2.78
Upper Storage	5	Incandescent: Screw in Lamp	Wall Switch	200	200	Relamp	No	5	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	200	0.56	196	0.0	$29.58	$268.77	$25.00	8.24
Upper Storage	3	Compact Fluorescent: Plug in Lamps	Wall Switch	26	200	Relamp	No	3	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	200	0.02	8	0.0	$1.25	$322.52	$0.00	257.43
Upper Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	200	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	200	0.02	8	0.0	$1.15	$58.50	$10.00	42.23
Book Room - Locked	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	200	0.04	15	0.0	$2.30	$117.00	$20.00	42.23
Nurses Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.13	346	0.0	$52.40	$351.00	$60.00	5.55
Restroom	1	Compact Fluorescent: Plug in Lamps	Wall Switch	26	1,521	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	1,521	0.01	21	0.0	$3.18	$107.51	$0.00	33.85
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Resting Area	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Closet	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.03	29	0.0	$4.44	$53.75	$5.00	10.99
Restroom Hall	1	Incandescent: Screw in Lamp	Wall Switch	60	1,521	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	1,521	0.03	89	0.0	$13.50	$53.75	$5.00	3.61
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	60	1,521	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	1,521	0.03	89	0.0	$13.50	$53.75	$5.00	3.61
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Child Study Offices	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.16	438	0.0	$66.22	$621.00	$95.00	7.94
Hallway	1	Incandescent: Screw in Lamp	Wall Switch	120	3,042	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	18	3,042	0.07	357	0.0	$53.99	$107.51	$10.00	1.81
Open Office Area	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.22	584	0.0	$88.29	$738.00	$115.00	7.06

	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
Private Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.02	58	0.0	$8.73	$58.50	$10.00	5.55
Private Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.02	58	0.0	$8.73	$58.50	$10.00	5.55
Copy Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Private Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Conference Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.16	438	0.0	$66.22	$467.00	$80.00	5.84
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$504.00	$75.00	9.72
Main Office	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.25	656	0.0	$99.33	$796.50	$125.00	6.76
Hallway	4	Compact Fluorescent: Plug in Lamps	Wall Switch	39	3,042	Relamp	No	4	LED Screw-In Lamps: Plug in Lamps	Wall Switch	21	3,042	0.05	252	0.0	$38.11	$645.04	$0.00	16.92
Kitchenette	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.87	$58.50	$10.00	16.89
Private Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,014	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	710	0.11	195	0.0	$29.43	$350.00	$60.00	9.85
Restroom - Locked	1	Compact Fluorescent: Plug in Lamps	Wall Switch	39	1,014	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	21	1,014	0.01	21	0.0	$3.18	$161.26	$0.00	50.77
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$350.00	$60.00	6.57
Conference Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$350.00	$60.00	6.57
Entrance Lobby	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.27	1,459	0.0	$220.73	$785.00	$100.00	3.10
Entrance Lobby	1	LED Screw-In Lamps: Track Lighting	Wall Switch	27	3,042	None	No	1	LED Screw-In Lamps: Track Lighting	Wall Switch	27	3,042	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Vestibule	2	Incandescent: Screw in Lamp	Wall Switch	120	3,042	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	18	3,042	0.13	714	0.0	$107.98	$215.01	$20.00	1.81
Gym	28	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	234	2,129	Fixture Replacement	No	28	LED - Fixtures: High-Bay	Occupancy Sensor	72	2,129	2.97	11,108	0.0	$1,680.72	$75,185.60	$4,200.00	42.24
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.06	57	0.0	$8.61	$175.50	$30.00	16.89
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.06	57	0.0	$8.61	$175.50	$30.00	16.89
Weight Room	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	234	2,129	Fixture Replacement	No	3	LED - Fixtures: High-Bay	Occupancy Sensor	72	2,129	0.32	1,190	0.0	$180.08	$8,055.60	$450.00	42.24
Locker Room Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Locker Room Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,521	Fixture Replacement	No	1	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	14	1,521	0.01	31	0.0	$4.76	$418.17	$45.00	78.33
Closets	2	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.07	59	0.0	$8.87	$107.51	$10.00	10.99
Restroom	2	Incandescent: Screw in Lamp	Wall Switch	200	1,521	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	1,521	0.22	595	0.0	$89.99	$107.51	$10.00	1.08

	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
Storage	2	Incandescent: Screw in Lamp	Wall Switch	200	500	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	30	500	0.22	196	0.0	$29.58	$107.51	$10.00	3.30
Locker Room	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,042	Fixture Replacement	Yes	21	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	14	2,129	0.31	1,631	0.0	$246.77	$9,591.49	$1,050.00	34.61
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	60	1,521	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	1,521	0.03	89	0.0	$13.50	$53.75	$5.00	3.61
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	60	1,521	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	1,521	0.03	89	0.0	$13.50	$53.75	$5.00	3.61
Small Gym	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	234	2,129	Fixture Replacement	No	4	LED - Fixtures: High-Bay	Occupancy Sensor	72	2,129	0.42	1,587	0.0	$240.10	$10,740.80	$600.00	42.24
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Physical Therapy Room	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,521	Fixture Replacement	Yes	14	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	14	1,065	0.20	544	0.0	$82.26	$6,394.32	$700.00	69.23
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Electric Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.87	$58.50	$10.00	16.89
Locker Room	23	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,042	Fixture Replacement	Yes	23	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	14	2,129	0.33	1,786	0.0	$270.27	$10,427.82	$1,140.00	34.36
Restroom	2	Incandescent: Screw in Lamp	Wall Switch	60	1,521	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	1,521	0.07	178	0.0	$27.00	$107.51	$10.00	3.61
Closet	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.03	29	0.0	$4.44	$53.75	$5.00	10.99
Storage	4	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	4	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.13	117	0.0	$17.75	$215.01	$20.00	10.99
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Restroom	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,704	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,704	0.04	125	0.0	$18.97	$192.80	$40.00	8.05
Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.22	1,167	0.0	$176.58	$668.00	$80.00	3.33
Classroom A	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom B	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.26	873	0.0	$132.06	$702.00	$120.00	4.41
Art Classroom	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.52	1,746	0.0	$264.11	$1,404.00	$240.00	4.41
Stairs	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.04	231	0.0	$34.94	$117.00	$20.00	2.78
Classroom D	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Faculty Room	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Lunch Room	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,065	0.05	136	0.0	$20.59	$126.40	$0.00	6.14

	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
Lunch Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,521	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,065	0.29	770	0.0	$116.56	$840.80	$155.00	5.88
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,521	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,521	0.01	31	0.0	$4.63	$35.90	$5.00	6.67
Closet	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.03	29	0.0	$4.44	$53.75	$5.00	10.99
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,521	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,521	0.01	31	0.0	$4.63	$35.90	$5.00	6.67
Kitchen	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Fixture Replacement	No	24	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	3,042	0.52	2,771	0.0	$419.23	$10,035.98	$1,080.00	21.36
Kitchen	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Fixture Replacement	No	6	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	3,042	0.13	693	0.0	$104.81	$2,509.00	$270.00	21.36
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.09	76	0.0	$11.48	$234.00	$40.00	16.89
Lockers	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.02	58	0.0	$8.73	$58.50	$10.00	5.55
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	60	1,521	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	1,521	0.03	89	0.0	$13.50	$53.75	$5.00	3.61
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.13	114	0.0	$17.23	$351.00	$60.00	16.89
Cafeteria	10	Compact Fluorescent: Screw in Lamp	Wall Switch	42	3,042	Relamp	Yes	10	LED Screw-In Lamps: Screw in Lamp	Occupancy Sensor	29	2,129	0.14	759	0.0	$114.86	$807.53	$35.00	6.73
Cafeteria	10	Linear Fluorescent - T8: 4' T8 (32W) - 6L	Wall Switch	176	3,042	Relamp	Yes	10	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	2,129	0.75	4,027	0.0	$609.25	$1,882.23	$370.00	2.48
Cafeteria	10	Incandescent: Screw in Lamp	Wall Switch	60	3,042	Relamp	Yes	10	LED Screw-In Lamps: Screw in Lamp	Occupancy Sensor	9	2,129	0.35	1,879	0.0	$284.25	$807.53	$85.00	2.54
Bookstore	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.02	115	0.0	$17.47	$58.50	$10.00	2.78
Bookstore	7	Linear Fluorescent - T8: 4' T8 (32W) - 6L	Wall Switch	176	3,042	Relamp	Yes	7	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	2,129	0.53	2,819	0.0	$426.48	$1,209.56	$245.00	2.26
Bookstore	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.11	577	0.0	$87.34	$292.50	$50.00	2.78
Stairs	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.04	231	0.0	$34.94	$117.00	$20.00	2.78
Walkway	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.08	438	0.0	$66.22	$375.50	$30.00	5.22
Hallway	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,042	Relamp	Yes	6	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	2,129	0.08	443	0.0	$67.01	$489.20	$60.00	6.40
Display Case	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.02	115	0.0	$17.47	$58.50	$10.00	2.78
Private Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.16	438	0.0	$66.22	$467.00	$80.00	5.84
Private Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.16	438	0.0	$66.22	$467.00	$80.00	5.84

	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
Vestibule	1	Incandescent: Screw in Lamp	Wall Switch	60	3,042	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	3,042	0.03	178	0.0	$27.00	$53.75	$5.00	1.81
Hallway	7	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,042	Relamp	Yes	7	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	2,129	0.10	517	0.0	$78.18	$537.40	$70.00	5.98
Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,042	0.02	115	0.0	$17.47	$58.50	$10.00	2.78
Woodshop	52	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	52	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	1.12	3,002	0.0	$454.16	$3,042.00	$520.00	5.55
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.09	76	0.0	$11.48	$234.00	$40.00	16.89
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.04	115	0.0	$17.47	$117.00	$20.00	5.55
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	500	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	500	0.07	64	0.0	$9.74	$190.27	$40.00	15.42
Maintenance Shop	45	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	45	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.97	2,597	0.0	$393.02	$2,632.50	$450.00	5.55
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.06	57	0.0	$8.61	$175.50	$30.00	16.89
Classroom 201	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,129	Relamp	No	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,129	0.78	2,909	0.0	$440.19	$2,106.00	$360.00	3.97
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.87	$58.50	$10.00	16.89
Storage	2	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	2	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	500	0.07	59	0.0	$8.87	$107.51	$10.00	10.99
Classroom 203	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.69	2,327	0.0	$352.15	$1,872.00	$320.00	4.41
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.87	$58.50	$10.00	16.89
Hallway	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,129	0.66	3,501	0.0	$529.75	$1,604.00	$240.00	2.57
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$504.00	$75.00	9.72
Custodial Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.02	19	0.0	$2.87	$58.50	$10.00	16.89
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$504.00	$75.00	9.72
Classroom 205	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Classroom 207	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.04	38	0.0	$5.74	$117.00	$20.00	16.89
Library	44	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,042	Relamp	Yes	44	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,129	2.12	11,298	0.0	$1,709.51	$5,265.87	$1,020.00	2.48
Library	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,042	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,129	0.19	1,021	0.0	$154.51	$679.50	$105.00	3.72
Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,521	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,521	0.04	98	0.0	$14.82	$95.13	$20.00	5.07

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Conference Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.08	219	0.0	$33.11	$291.50	$50.00	7.29
Supply Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.02	20	0.0	$3.05	$71.80	$10.00	20.29
TV Studio Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	500	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	500	0.11	97	0.0	$14.62	$285.40	$60.00	15.42
Classroom 209	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.65	2,182	0.0	$330.14	$1,755.00	$300.00	4.41
Classroom 211	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Classroom 213	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.52	1,746	0.0	$264.11	$1,404.00	$240.00	4.41
Classroom 215	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41
Classroom 217	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 219	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 221	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 223	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.52	1,746	0.0	$264.11	$1,404.00	$240.00	4.41
Classroom 225	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.52	1,746	0.0	$264.11	$1,404.00	$240.00	4.41
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,521	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,065	0.19	514	0.0	$77.71	$650.53	$115.00	6.89
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.02	58	0.0	$8.73	$58.50	$10.00	5.55
Vestibule	2	Compact Fluorescent: Plug in Lamps	Wall Switch	26	3,042	Relamp	No	2	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	3,042	0.02	84	0.0	$12.70	$215.01	$0.00	16.92
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,521	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,065	0.19	514	0.0	$77.71	$650.53	$115.00	6.89
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,521	0.02	58	0.0	$8.73	$58.50	$10.00	5.55
Storage	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.11	95	0.0	$14.36	$292.50	$50.00	16.89
Vestibule	1	Incandescent: Screw in Lamp	Wall Switch	60	3,042	Relamp	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	9	3,042	0.03	178	0.0	$27.00	$53.75	$5.00	1.81
Office - Locked	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,521	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,065	0.11	292	0.0	$44.15	$350.00	$60.00	6.57
Classroom 204	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 206	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 208	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 210	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.39	1,309	0.0	$198.08	$1,053.00	$180.00	4.41
Classroom 212	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.32	1,091	0.0	$165.07	$877.50	$150.00	4.41

	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
Classroom 214	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.45	1,527	0.0	$231.10	$1,228.50	$210.00	4.41
Classroom 216	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.91	3,055	0.0	$462.20	$2,457.00	$420.00	4.41
Classroom 218	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,916	Relamp	No	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,916	0.91	3,055	0.0	$462.20	$2,457.00	$420.00	4.41
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.09	76	0.0	$11.48	$234.00	$40.00	16.89
Transition Spaces	40	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	40	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	10	Metal Halide: (1) 175W Lamp	None	215	5,475	Fixture Replacement	Yes	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	65	4,380	1.20	10,288	0.0	$1,556.68	$3,926.77	$1,000.00	1.88
Exterior	1	Metal Halide: (1) 250W Lamp	None	295	5,475	Fixture Replacement	Yes	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	89	4,380	0.16	1,412	0.0	$213.59	$606.02	$100.00	2.37
Exterior	4	Compact Fluorescent: Screw in Lamp	None	52	5,475	Relamp	Yes	4	LED Screw-In Lamps: Screw in Lamp	Daylight Dimming	36	4,380	0.09	584	0.0	$88.41	$450.02	$0.00	5.09
Exterior	9	Metal Halide: (1) 400W Lamp	None	458	4,000	Fixture Replacement	No	9	LED - Fixtures: Other	None	137	4,000	0.00	11,542	0.0	$1,746.35	$10,160.64	$45.00	5.79
Exterior	3	Metal Halide: (1) 400W Lamp	None	458	4,000	Fixture Replacement	No	3	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	137	4,000	0.00	3,847	0.0	$582.12	$5,858.98	$300.00	9.55
Exterior	2	High-Pressure Sodium: (1) 400W Lamp	None	465	4,000	Fixture Replacement	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	140	4,000	0.00	2,604	0.0	$394.01	$3,905.99	$200.00	9.41
Exterior	3	LED - Fixtures: Other	None	78	4,000	None	No	3	LED - Fixtures: Other	None	78	4,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	2	LED - Fixtures: Other	None	26	4,000	None	No	2	LED - Fixtures: Other	None	26	4,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Zone 1 Heating System	1	Heating Hot Water Pump	10.0	88.5%	No	1,696	Yes	91.7%	Yes	1	1.37	6,337	0.0	$958.81	$5,151.50	$0.00	5.37
Boiler Room	Zone 1 Heating System	1	Heating Hot Water Pump	10.0	88.5%	No	1,696	Yes	91.7%	Yes	1	1.37	6,337	0.0	$958.81	$5,151.50	$0.00	5.37
Boiler Room	Zone 2 Heating System	1	Heating Hot Water Pump	2.0	86.5%	No	1,373	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Zone 2 Heating System	1	Heating Hot Water Pump	2.0	86.5%	No	1,373	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Zone 3 Heating System	2	Heating Hot Water Pump	0.3	74.0%	No	1,373	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Zone 4 Heating System	2	Heating Hot Water Pump	0.3	74.0%	No	1,373	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Boiler Feed Water Pumps	2	Boiler Feed Water Pump	0.3	74.0%	No	1,373	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Boiler Blowers	5	Other	2.0	86.5%	No	1,373	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Pneumatic HVAC Controls	2	Air Compressor	1.5	86.5%	No	2,479	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Pneumatic HVAC Controls	1	Air Compressor	3.0	86.5%	No	2,479	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Domestic Water Pump	3	Water Supply Pump	0.3	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Domestic Water Pump	1	Water Supply Pump	0.1	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Heating-Ventilation (HV) Units	13	Supply Fan	1.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Various	Unit Ventilators	47	Supply Fan	0.2	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	32	Exhaust Fan	0.1	74.0%	No	2,745	No	74.0%	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
Office Area	Office Area	1	Packaged AC	3.00		Yes	1	Packaged AC	3.00		14.00		No	0.69	972	0.0	$147.10	$6,806.88	$276.00	44.40
Office	Office	1	Window AC	0.67		Yes	1	Window AC	0.67		12.00		No	0.12	166	0.0	$25.09	$725.84	$0.00	28.93
Classrooms	Classrooms	4	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classrooms	5	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classrooms	2	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office	Office	2	Window AC	0.83		Yes	2	Window AC	0.83		12.00		No	0.34	479	0.0	$72.54	$1,814.60	$0.00	25.01
Office	Office	3	Window AC	0.83		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office	Office	2	Window AC	0.67		Yes	2	Window AC	0.67		12.00		No	0.21	299	0.0	$45.21	$1,451.68	$0.00	32.11
Office	Office	1	Window AC	0.83		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Conference Room	Conference Room	1	Window AC	0.67		Yes	1	Window AC	0.67		12.00		No	0.14	201	0.0	$30.38	$725.84	$0.00	23.89
Classrooms	Classrooms	4	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classrooms	1	Window AC	0.83		Yes	1	Window AC	0.83		12.00		No	0.17	240	0.0	$36.27	$907.30	$0.00	25.01
Classrooms	Classrooms	13	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Heating System	1	Non-Condensing Hot Water Boiler	1,615.00	Yes	1	Condensing Hot Water Boiler	1,615.00	91.00%	Et	0.00	0	216.3	$1,887.64	$30,845.41	$3,553.00	14.46
Boiler Room	Heating System	1	Non-Condensing Hot Water Boiler	1,615.00	Yes	1	Condensing Hot Water Boiler	1,615.00	91.00%	Et	0.00	0	140.6	$1,226.96	$30,845.41	$3,553.00	22.24
Boiler Room	Heating System	1	Non-Condensing Hot Water Boiler	1,615.00	Yes	1	Condensing Hot Water Boiler	1,615.00	91.00%	Et	0.00	0	81.1	$707.86	$30,845.41	$3,553.00	38.56
Boiler Room	Heating System	1	Non-Condensing Hot Water Boiler	1,615.00	Yes	1	Condensing Hot Water Boiler	1,615.00	91.00%	Et	0.00	0	54.1	$471.91	$30,845.41	$3,553.00	57.83
Boiler Room	Heating System	1	Non-Condensing Hot Water Boiler	1,615.00	Yes	1	Condensing Hot Water Boiler	1,615.00	91.00%	Et	0.00	0	27.0	$235.95	$30,845.41	$3,553.00	115.67

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Domestic Hot Water	1	Indirect System	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	92.00%	Et	0.00	0	28.5	$248.63	$4,392.04	$152.00	17.05

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	1	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	0.7	$5.95	$7.17	$0.00	1.20
Restrooms	8	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	4.5	$39.70	$57.36	$0.00	1.45
Classroom/Office Areas	6	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	3.4	$29.77	$43.02	$0.00	1.45
Restrooms	5	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	2.8	$24.81	$35.85	$0.00	1.45
Restrooms	6	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	3.4	$29.77	$43.02	$0.00	1.45
Locker Rooms	5	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	3.4	$29.77	$35.85	$0.00	1.20
Locker Rooms	2	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	1.1	$9.92	$14.34	$0.00	1.45
Restrooms	6	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	4.1	$35.73	$43.02	$0.00	1.20
Restrooms	8	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	5.5	$47.63	$57.36	$0.00	1.20

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Low Temp Freezer (-35F to -5F)	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
Kitchen	1	Refrigerator Chest	No	Yes	0.11	1,007	0.0	$152.32	$2,116.40	$0.00	13.89
Kitchen	2	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	4	Electric Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Electric Fryer	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Macopin Middle	223	Desktop Computer	120.0	
Macopin Middle	10	Coffee Maker	400.0	
Macopin Middle	5	Toaster	850.0	
Macopin Middle	9	Refrigerator	690.0	
Macopin Middle	11	Microwavee	1,100.0	
Macopin Middle	3	Small Fan	50.0	
Macopin Middle	4	Wheelchair Elevator	600.0	
Macopin Middle	24	Projector	200.0	
Macopin Middle	14	Laptop Cart	1,200.0	
Macopin Middle	8	Smart Board	316.0	
Macopin Middle	12	Mini Fridge	260.0	
Macopin Middle	6	Speaker	100.0	
Macopin Middle	49	Printer	40.0	
Macopin Middle	2	Large Aquarium	20.0	
Macopin Middle	2	Small Aquarium	60.0	
Macopin Middle	5	Stereo	400.0	
Macopin Middle	3	Misc. Sound Equipment	1,000.0	
Macopin Middle	4	Large Xerox- Type Printers	515.0	
Macopin Middle	3	Electric Heaters	1,500.0	
Macopin Middle	3	Shredder	360.0	
Macopin Middle	1	Scoreboard	500.0	
Macopin Middle	7	Tredmills	1,500.0	
Macopin Middle	3	TV	150.0	
Macopin Middle	1	Woodshop Equipment	3,500.0	
Macopin Middle	5	Orbital Sanders	250.0	
Macopin Middle	7	Large Floor Fans	100.0	
Macopin Middle	3	Scanners	18.0	

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Room	1	Refrigerated	Yes	0.00	1,612	0.0	$243.89	$230.00	$0.00	0.94
Faculty Room	1	Non-Refrigerated	No	0.00	0	0.0	$0.00	$230.00	$0.00	0.00
Cafeteria	1	Refrigerated	Yes	0.00	1,612	0.0	$243.89	$230.00	$0.00	0.94

Custom Recommendations

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode				
223	*Mon - Fri 8AM-5PM*	*Mon - Fri 5PM-8AM*	*Weekends & Holidays*	Energy Rate (W)*	Weekly Run Hours	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	*Weekends & Holidays*	*Energy Rate (W)**	*Weekly Run Hours*
Existing Conditions	25%	5%	0%	120	**14**	5%	5%	5%	80	**8**
Proposed Conditions	25%	0%	0%	120	**10**	0%	0%	0%	80	**0**

Usage per Device			Energy Impact & Financial Analysis					
Weeks of Use	Annual kWh Usage	*Diversity Factor***	Total Annual kWh Savings	Total Annual Energy Cost Savings	*Cost per Desktop*	*Add'l Hardware Cost*	Total Installation Cost	Simple Payback Period (Years)
44	136	90%	8,663	$1,311	$15.00	$2,500.0	$5,845	4.46
44	92							

Building Envelope Weatherization

Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis					
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Gas Use (mmBtu)*	*Annual Heating Oil Use (mmBtu)*	Assumed % Electric HVAC Savings	Assumed % Fuel HVAC Savings	Total Annual kWh Savings	Total Annual Gas mmBtu Savings	Total Annual Fuel mmBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Simple Payback Period (Years)
42,205	7,381	0	0.1%	5.0%	21	369	0	$3,224	$11,645	3.61

	qty	$/unit	est. costs
Weather-strip Exterior Double Doors	11	100	$ 1,100
Weather-strip Exterior Single Doors	3	60	$ 180
Caulk the Perimeter of Windows and Wall Cracks	2591	4	$ 10,365
		Total Estimated Costs	**$ 11,645**

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Macopin Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 120,000
Built: 1959

For Year Ending: January 31, 2017
Date Generated: April 25, 2018

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Macopin Middle School 70 Highlander Drive West Milford, New Jersey 07480	West Milford Township School District 46 Highlander Drive West Milford, NJ 07480 (973) 697-1700	Barbara Francisco 46 Highlander Drive West Milford, NJ 07480 (973) 697-1700 Ext. 5050 barbara.francisco@wmtps.org

Property ID: 6236017

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
76.2 kBtu/ft²

Source EUI
108.9 kBtu/ft²

Annual Energy by Fuel	
Propane (kBtu)	35,576 (0%)
Electric - Grid (kBtu)	1,659,503 (18%)
Natural Gas (kBtu)	7,446,570 (82%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	89.2
National Median Source EUI (kBtu/ft²)	127.6
% Diff from National Median Source EUI	-15%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	582

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)