Local Government Energy Audit:
Energy Audit Report

Morris Knolls High School

50 Knoll Drive

Rockaway, NJ 07866

Morris Hills Regional District

May 16, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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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 Morris Knolls High School.

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

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist the Morris Hills Regional School District in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Morris Knolls High School is a 263,065 square foot facility comprised of two floors of classroom space, office space, gymnasiums, an auditorium, library, two cafeterias, a kitchen, locker rooms and a health center. The kitchen is complete with food prep equipment and prepares two meals a day for students. The building was originally built in 1963 and is in fair condition.

The building is in operation year round, occupied weekdays between 6:00 AM and 10:00 PM with custodians on site 24 hours a day, seven days a week. The facility is also typically in use from 7:00 AM to 5:00 PM on Saturdays and Sundays. The auditorium and gymnasium are often rented to outside organizations including for dance and religious services. The building is occupied by approximately 1700 students, 180 staff and is used additionally by many visitors.

The building is 100% heated and approximately 30% cooled. Per discussions with facility personnel, their main concerns include the original light fixtures. Additionally, they would like to switch from fuel oil to natural gas for the space heating boilers. We recommend further study of the implications of fuel switching, which is outside of the scope of this review. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC recommends 11 measures which together represent an opportunity for Morris Knolls High School to reduce annual energy costs by $81,694 and annual greenhouse gas emissions by 816,530 lbs CO_2e. We estimate that if all recommended measures were implemented, the project would pay for itself in 11.3 years. The breakdown of existing and potential utility costs after project implementation are illustrated in

Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Morris Knolls High School's annual energy costs by 20%.

Figure 1 – Previous 12 Month Utility Costs

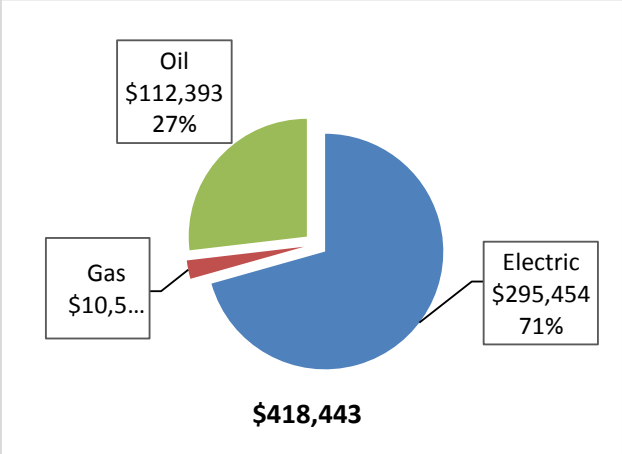


Figure 2 – Potential Post-Implementation Costs (High Priority Measures with an 11.3 year payback)

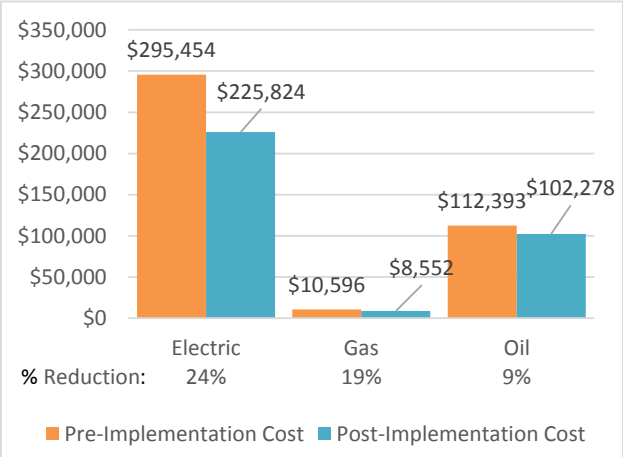
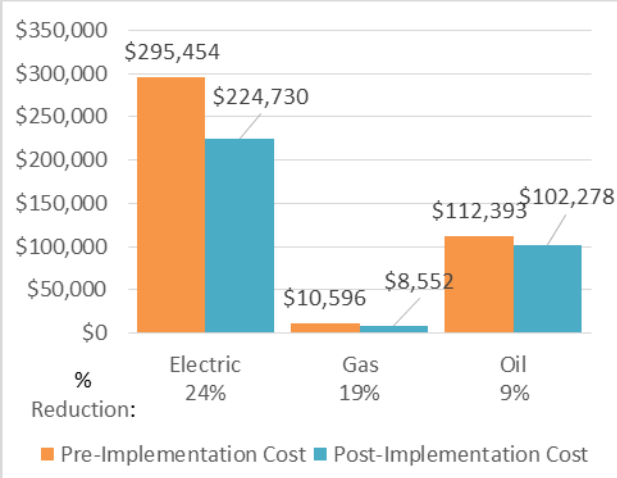


Figure 3 – Potential Post-Implementation Costs (Total Project Measures with an 11.4 year payback)



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

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 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			**443,592**	**96.2**	**0.0**	**$50,741**	**$811,798**	**$97,125**	**$714,673**	**14.1**	**446,693**
ECM 1	Install LED Fixtures	Yes	137,326	31.5	0.0	$15,708	$626,400	$68,415	$557,985	35.5	138,286
ECM 2	Retrofit Fixtures with LED Lamps	Yes	305,880	64.7	0.0	$34,988	$184,968	$28,710	$156,258	4.5	308,019
ECM 3	Install LED Exit Signs	Yes	385	0.0	0.0	$44	$430	$0	$430	9.8	388
Lighting Control Measures			**74,565**	**15.7**	**0.0**	**$8,529**	**$107,404**	**$13,185**	**$94,219**	**11.0**	**75,086**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	74,365	15.7	0.0	$8,506	$107,134	$13,050	$94,084	11.1	74,885
ECM 5	Install Photocell Controls	Yes	200	0.0	0.0	$23	$270	$135	$135	5.9	201
Electric Unitary HVAC Measures			**6,670**	**2.2**	**0.0**	**$763**	**$10,474**	**$644**	**$9,830**	**12.9**	**6,716**
	Install High Efficiency Electric AC	No	6,670	2.2	0.0	$763	$10,474	$644	$9,830	12.9	6,716
Domestic Water Heating Upgrade			**0**	**0.0**	**97.2**	**$1,090**	**$409**	**$0**	**$409**	**0.4**	**11,383**
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	97.2	$1,090	$409	$0	$409	0.4	11,383
Food Service Equipment & Refrigeration Measures			**3,421**	**0.4**	**0.0**	**$391**	**$6,035**	**$230**	**$5,805**	**14.8**	**3,445**
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	524	0.1	0.0	$60	$607	$80	$527	8.8	528
	Replace Refrigeration Equipment	No	2,897	0.3	0.0	$331	$5,428	$150	$5,278	15.9	2,917
Plug Load Equipment Control - Vending Machine			**11,283**	**0.0**	**0.0**	**$1,291**	**$1,610**	**$0**	**$1,610**	**1.2**	**11,362**
ECM 8	Vending Machine Control	Yes	11,283	0.0	0.0	$1,291	$1,610	$0	$1,610	1.2	11,362
Custom Measures			**78,768**	**0.0**	**1,198.7**	**$19,984**	**$113,125**	**$0**	**$113,125**	**5.7**	**271,478**
ECM 9	Computer Power Management Software	Yes	13,403	0.0	0.0	$1,533	$8,170	$0	$8,170	5.3	13,497
ECM 10	Retro-Commissioning Study & HVAC Improvements	Yes	63,643	0.0	666.0	$13,377	$78,920	$0	$78,920	5.9	170,844
ECM 11	Building Envelope Weatherization	Yes	1,721	0.0	532.8	$5,074	$26,035	$0	$26,035	5.1	87,137
TOTALS			**618,297**	**114.5**	**1,295.9**	**$82,789**	**$1,050,853**	**$111,184**	**$939,669**	**11.4**	**826,163**
			24%	**16%**							
TOTALS (High Priority)			**608,731**	**112.0**	**1,295.9**	**$81,694**	**$1,034,952**	**$110,390.00**	**$924,561.60**	**11.3**	**816,530**

* - 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.

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.

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 25 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 Morris Knolls High School include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Turn Off Unneeded Motors
- Reduce Motor Short Cycling
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Install Destratification Fans
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- Assess Chillers & Request Tune-Ups
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Repair/Replace Steam Traps
- Perform Boiler Maintenance
- Perform Furnace Maintenance
- Perform Water Heater Maintenance
- Perform Maintenance on Compressed Air Systems
- Install Plug Load Controls
- Replace Computer Monitors
- 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 Morris Knolls High School. Based on the configuration of the site and its loads there is a high potential for installing additional PV systems, however there is no potential for combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Pay for Performance - Existing Building (P4P)

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 SS 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.

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Steven Ternosky	Supervisor of Buildings and Grounds	sternosky@mhrd.org	973-664-2277
Robert O'Boyle	Assistant to the Supervisor of Buildings and Grounds	roboyle@mhrd.org	973-664-2277
Anthony	HVAC Technician		973-997-7606
TRC Energy Services			
Aimee Lalonde	Auditor	alalonde@trcsolutions.com	732-855-0033

2.2 General Site Information

On August 8, 2017, TRC performed an energy audit at Morris Knolls High School located in Rockaway, New Jersey. TRC's team met with Steven and Larry to review the facility operations and help focus our investigation on specific energy-using systems.

Morris Knolls High School is a 263,065 square foot facility comprised of two floors of classroom space, office space, gymnasiums, an auditorium, library, two cafeterias, a kitchen, locker rooms and a health center. The kitchen is complete with food prep equipment and prepares two meals a day for students. The building was originally built in 1963 and is in fair condition.

The building is 100% heated and about 30% cooled. Per discussions with facility personnel, their main concerns include the original light fixtures. Additionally, they would like to switch from fuel oil to natural gas for their space heating boilers. The cost per unit of energy demonstrates that fuel oil is cheaper than natural gas at this time. However, the fuel industry can experience fluctuations in costs and produces much more carbon emissions than natural gas. We recommend moving forward with an investigation of fuel switching as a potential improvement outside of this energy study.

2.3 Building Occupancy

The building is in operation year round. It is occupied weekdays between 6:00 AM and 10:00 PM, and there are custodians on site 24 hours a day, seven days a week. The facility is also typically in use from 7:00 AM to 5:00 PM on Saturdays and Sundays. The auditorium and gymnasium are often rented to outside organizations including for dance and religious services. The building is occupied by approximately 1700 students, 180 staff and is used additionally by many visitors.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Morris Knolls High School	Weekday	6 AM - 10 PM
Morris Knolls High School	Weekend	7 AM - 5 PM

2.4 Building Envelope

The building is constructed of composite walls with a brick façade. The building has both flat and pitched roof sections which appear in good condition. Windows are operable double-paned with metal frames and interior shades. The exterior doors are typically metal with glass panes and metal frames.

The building envelope has deficiencies and contributes to a significant amount of air infiltration. The building envelope has many wall cracks and cracked caulk at the window frame joists. Exterior doors also exhibit missing or worn weather-stripping materials.

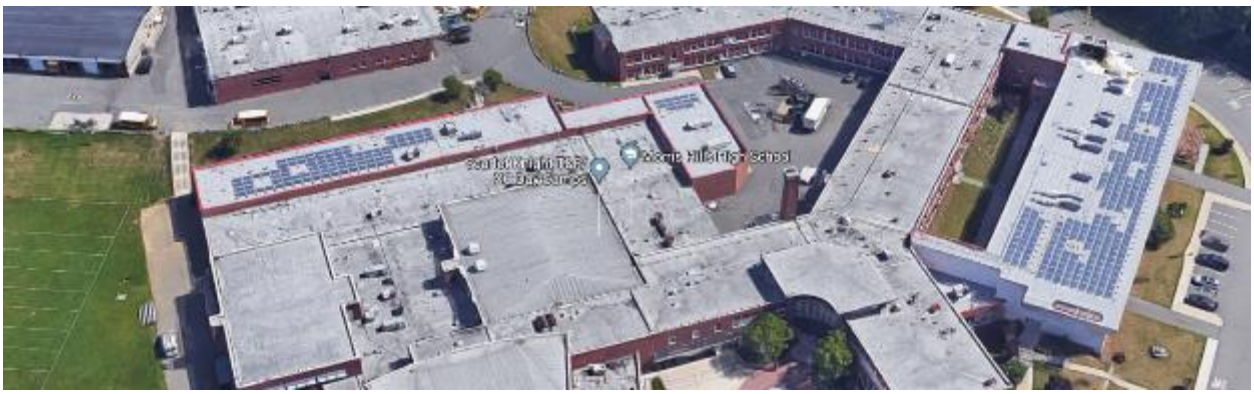
There is an opportunity for energy savings by implementing air sealing strategies to reduce air infiltration, thus reducing the load on the building's HVAC systems.

Building Envelope

2.5 On-Site Generation

The Morris Knolls High School has installed a 145 kW roof mounted photovoltaic (PV) solar energy generation system. Based on the information provided by the facility, their PV system generates about 7% of the total building electrical consumption.

There may be an opportunity to install ground mounted PV systems in the parking lot areas. A high level screening of this opportunity is provided as part of this energy audit report.



On-Site Generation

2.6 Energy-Using Systems

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

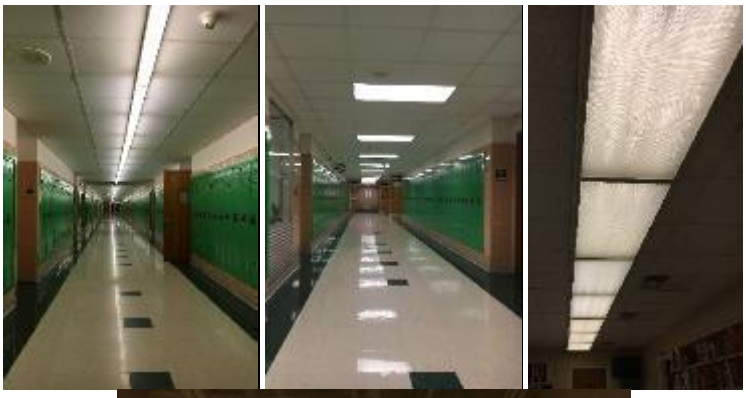
Lighting System

The building is primarily lit by linear fluorescent fixtures which contain 32-Watt T8 lamps. Fixture types include surface mounted continuous row wrap fixtures, recessed troffer fixtures, indirect/direct fixtures and industrial fixtures. Approximately half of the T8 fixtures are in good condition and are good candidates for retrofitting to LED technology. The other half have missing, cracked or yellowed lenses. Many of these fixtures are original to the building, and replacement lenses are no longer available for purchase. All light fixtures that are in poor condition are recommended for replacement with new LED fixtures.

Additional findings regarding lighting systems include

- There are a few areas such as the gym, kitchen and the general office space which were already converted to LED technology.
- Hallways and restrooms contain compact fluorescent fixtures with screw in, plug in, or flood lamps.
- Restrooms and storage rooms contain a number of incandescent and halogen lamp fixtures. There is an opportunity for energy savings by replacing these lamps with LED lamps.
- Exit signs are already LED.
- The boiler room contains metal halide low bay fixtures which provide an opportunity for energy savings by replacement with LED low bay fixtures.
- The auditorium has dimmable halogen incandescent fixtures which may be upgraded to dimmable LED technology. The gym lighting was replaced in the past few years to LED high bay fixtures. The fixtures are in good condition, and facility staff is happy with the result. There is an opportunity

for energy savings with the installation of occupancy based sensors which can be integrated with the LED high bay fixtures to work as a system. During the energy audit the gym was unoccupied and all of the lights were on.



Interior Lighting

The exterior lighting includes building mounted wall pack fixtures, flood fixtures, pole mounted shoebox fixtures and under-canopy light fixtures. Fixtures are either high pressure sodium or incandescent technology, and some were noted to be on during daylight hours. There is an opportunity for energy savings by upgrading the remaining fixtures to LED technology and installing photocell controls or (potentially to repair the electrical connection to the existing timeclocks) to ensure operation is limited to dusk to dawn hours.

Exterior Lighting

Light fixtures in the majority of individual rooms are manually controlled via wall switches, however there are automated occupancy sensor based switching systems present in some locations. Some of these occupancy sensors were noted to be broken at the time of the audit and should be replaced. The classrooms and office areas are equipped with bi-level switching; each row within the classroom are typically operated by a different switch. Most hallways, stairwells and restrooms are controlled by key switches and therefore operate throughout much of the day. There is an opportunity for energy savings through the installation of occupancy based sensors in locations including the gym, cafeterias, classrooms, hallways, restrooms and offices. The exterior lighting is either not controlled, has a photocell sensor or is controlled by a timeclock.

Lighting Controls

Motors

HVAC systems include fan and pump motors which are generally in good condition and range from standard to high efficiency. These include hot water pumps, chilled water pumps, water supply pumps, the cooling tower fan as well as supply and exhaust fans for air handling systems. The majority of equipment appears or is assumed to be in good condition. The majority of pumps motors are premium efficiency.

The heating hot water and chilled water pump motors are variable speed. All other motors operate at constant speed.

Motors

Chilled and Condenser Water System

The new wing of the school has a chilled water system that is served by two variable speed, water cooled scroll chillers. Chilled water is distributed by variable speed pumps. The cooling towers are in good condition.

Chilled Water System

Hot Water Heating System

The building is heated by a two large oil-fired hot water boilers which are in fair condition. These serve the hydronic heating system which distributes heated water to baseboard radiators and hot water coils located in the air handling equipment. The boilers are standard efficiency with modulating burner controls. Operational savings opportunities should be addressed in the recommended retro-commissioning study, and replacement and conversion opportunities may be addressed as part of a future study related to switching the heating fuel from oil to natural gas.

Hot Water System

There are also a total of 27 natural gas-fired HVAC units which are either roof top package units or make up air units. These range in capacity, condition and efficiency. Those that are in poor condition and low efficiency are recommended for replacement with new high efficiency equipment. It is recommended to tie these heating units into the existing EMS as part of retro commissioning.

Roof Top Equipment

Direct Expansion Air Conditioning System (DX) and AC Units

The packaged rooftop units (RTUs) are equipped with DX cooling coils that vary in capacity, efficiency and condition. The outdoor condensing units that serve split AC systems range in condition as well. All equipment in poor condition was evaluated for replacement, however it is not recommended based on energy savings alone.

Direct Expansion Units

The office and classrooms in the original portion of the building are served by window AC units which vary in capacity, efficiency and condition. All those in poor condition and/or low efficiency are recommended for replacement. There is an opportunity for energy savings by replacing those with new high efficiency window AC units. Window AC units, when removable, should be removed during the heating season. We recommend installing thermal sleeves for units left in place throughout the winter months.

Unitary AC

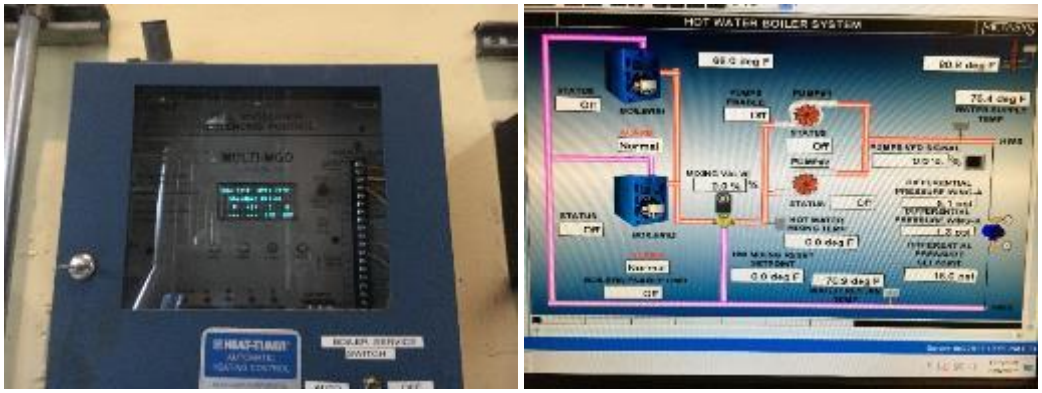
Energy Management System (EMS) and HVAC Controls

The building has an energy management system (EMS). The EMS is tied into the hot water boiler system, chilled water system, unit ventilators (UVs), make up air units (MUAs), fan coil units (FCUs), heating and ventilators (HVs), air-handling units (AHUs), roof-top units (RTUs), and ceiling air cassette units (CACs).

HVAC units provide heating and cooling based on a variety of zone setpoints, to maintain space temperature of as high as 78°F in heating mode during occupied hours. As a means to achieve comfort and energy savings, generally accepted best practice is to set zone setpoint temperatures to maintain 68°F for heating and 72°F for cooling during occupied hours. A temperature setback of approximately 5°F is generally recommended during unoccupied periods; 63°F during heating season and 77°F for cooling. Preferred temperature setpoints may vary by space, and the cooling and heating algorithms should be established based on available EMS inputs and tailored to specific system types.

Additionally, the schedules set for each should be revisited and adjusted to optimize energy efficiency where possible. This could be investigated in detail by an HVAC contractor who specializes in retro-commissioning studies and HVAC improvements. There is an opportunity for energy savings by performing a retro-commissioning study of the HVAC system and implementing improvements.

Area/Units Served	Schedule	
Cafeteria	Mon - Fri	4:30AM - 4PM
Wrestling Room	Mon - Sat	4AM - 8PM
Guidance Area	Mon - Fri	3AM - 3PM
Gyms	Mon - Sat	4:30AM - 4PM
Lockers & Team Rooms	Mon - Sat	3AM - 6PM
Chillers	Mon - Fri	5AM - 3PM
UVs - New	Mon - Fri	5AM - 3PM
FCUs	Mon - Fri	5AM - 3PM
UVs - Existing	Mon - Fri	4AM - 3PM
CACs	Mon - Fri	6AM - 4PM



Heating Controls, Energy Management System

Cooling Controls, Energy Management System

Office, Classroom and Hallway Manual Dial Thermostats
(Unknown functionality, may be used solely as temperature sensors that feedback to the EMS)

Domestic Water Heating System

The whole building is supplied domestic hot water by two gas-fired condensing hot water heaters which are new, high efficiency and in good condition. The sink aerators throughout the building are fit with higher flow devices (2.0 gallon per minute (gpm) or higher), have no aerators, or were already converted to low flow. There is an opportunity for energy savings by replacing the high flow aerators with low flow devices. This is a cost effective approach to reducing energy used to provide hot water throughout the building.

Domestic Hot Water

Food Service

There is gas fired and electric cooking equipment. The facility staff have recently been replacing older inefficient equipment with new high efficiency equipment.

Food Service

Refrigeration

There are several types of refrigeration equipment including walk-in coolers and a walk-in freezer. There is an opportunity for energy savings by upgrading the walk in cooler evaporator fan motors and replacing low efficiency refrigeration equipment with high efficiency ENERGY STAR® rated equipment. This is an evaluated measure, however it is not recommended.

Refrigeration

Building Plug Load

The building contains typical plug loads found in a school building, including:

- There is typical office equipment located throughout the building.
- There are entertainment and classroom equipment such as speakers and projectors and smart boards.
- Vending machines operate 24 hours a day, seven days a week. The refrigerated drink machine is a good candidate for vending machine controls.
- There are a number of computers throughout the building in classrooms, office areas, and in computer labs. Some of these were noted to be in idle mode or left on while not in use. This provides a potential for implementing computer power management software.

Building Plug Load

2.7 Water-Using Systems

There are a total of 57 faucets in the restrooms at this facility that are currently fit with higher flow aerators at 2.0 gallon per minute (gpm). There is an opportunity for energy savings by replacing these high flow aerators one for one with low flow aerators rated at 0.5 gpm.

3 SITE ENERGY USE AND COSTS

Utility data for electricity, natural gas and No. 2 fuel oil was analyzed to identify opportunities for savings. In addition, data for electricity, natural gas and No. 2 fuel oil 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

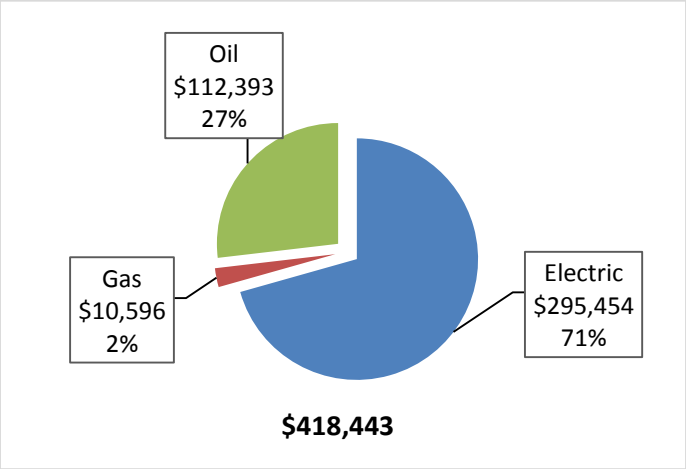
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Morris Knolls High School		
Fuel	**Usage**	**Cost**
Electricity	2,582,964 kWh	$295,454
Natural Gas	9,449 Therms	$10,596
No. 2 Fuel Oil	89,280 Gallons	$112,393
Total		**$418,443**

The current annual energy cost for this facility is $418,443 as shown in the chart below.

Figure 8 - Energy Cost Breakdown

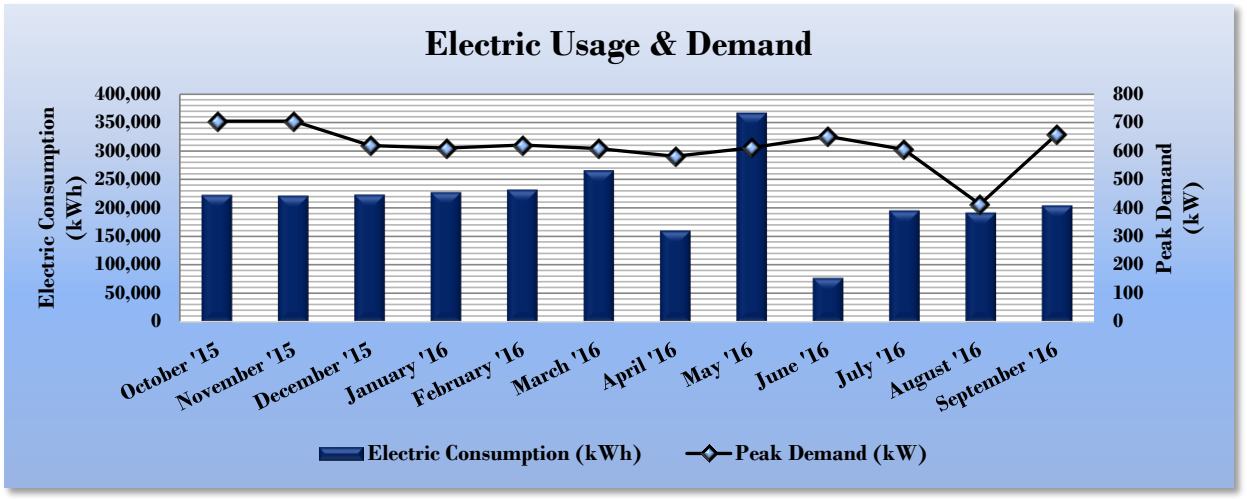


3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.114/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 electrical demand charges however these were not included as part of this analysis due to only sample bills being provided. The monthly electricity consumption and peak demand are shown in the chart below.

The PV system electric generation was provided by the facility. This electric generation was added to the existing utility consumption from the billing data. Therefore the graph below includes both the consumption provided on utility bills and the consumption of electricity that was generated by the PV system.

Figure 9 - Electric Usage & Demand



The graph below demonstrates the difference between the electric consumption from the grid and the electric consumption from the PV system.

Figure 10 - Electric Consumption- PV vs. Utility

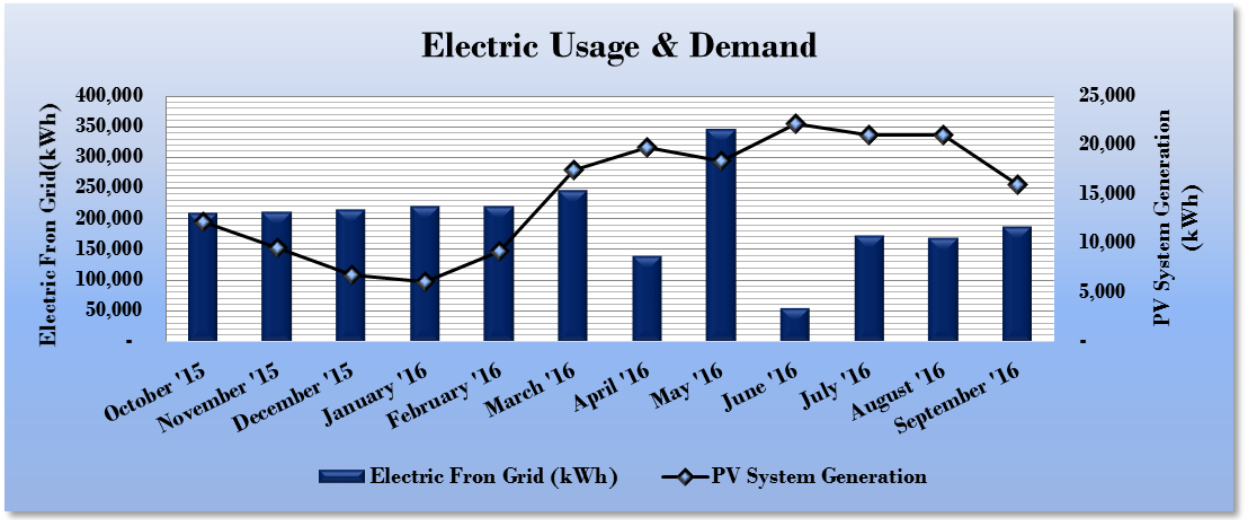


Figure 11 - Electric Usage & Demand

Electric Billing Data for Morris Knolls High School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
10/28/15	27	222,352	705	$0	$25,551
12/1/15	34	220,985	705	$0	$25,483
12/31/15	30	222,840	619	$0	$25,232
2/1/16	32	227,192	610	$0	$25,621
3/3/16	31	231,369	621	$0	$26,053
4/1/16	29	265,113	608	$0	$29,615
5/4/16	33	159,984	582	$0	$18,087
6/2/16	29	365,690	612	$0	$41,860
6/30/16	28	77,295	652	$0	$8,497
8/3/16	34	195,084	605	$0	$23,185
8/29/16	26	191,290	413	$0	$21,644
9/30/16	32	203,770	657	$0	$24,627
Totals	**365**	**2,582,964**	**705**	**$0**	**$295,454**
Annual	**365**	**2,582,964**	**705**	**$0**	**$295,454**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.121/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 12 - Natural Gas Usage

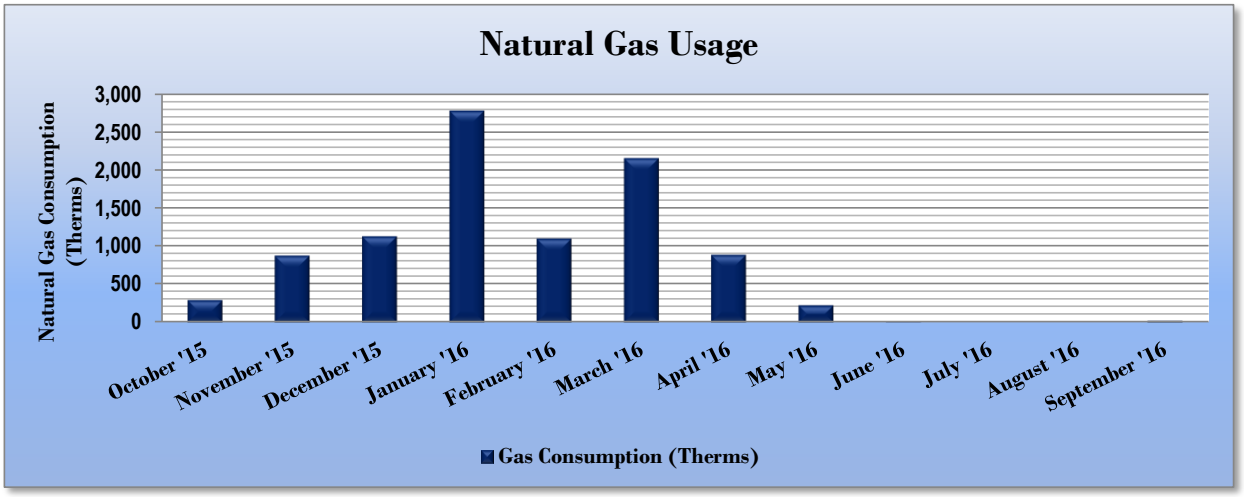


Figure 13 - Natural Gas Usage

Gas Billing Data for Morris Knolls High School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
10/28/15	27	293	$485
12/1/15	34	875	$951
12/31/15	30	1,126	$1,154
2/1/16	32	2,775	$2,470
3/3/16	31	1,097	$1,131
4/1/16	29	2,153	$1,974
5/4/16	33	886	$963
6/2/16	29	222	$432
6/30/16	28	1	$256
8/3/16	34	0	$255
8/29/16	26	0	$255
9/30/16	32	20	$271
Totals	**365**	**9,449**	**$10,596**
Annual	**365**	**9,449**	**$10,596**

3.4 No. 2 Fuel Oil Usage

The average cost of fuel oil for the past 12 months is $1.259/Gallon, which is the blended rate used throughout the analyses in this report. The oil consumption is shown in the table below.

Figure 14 –No. 2 Fuel Oil Usage

No. 2 Fuel Oil Billing Data for Morris Knolls High School			
Period Ending	**Days in Period**	**Oil Usage (Gallons)**	**Fuel Cost**
10/22/15	21	6,050	$9,009
12/1/15	40	10,822	$15,650
12/31/15	30	10,598	$13,228
1/21/16	21	19,533	$22,340
2/19/16	29	21,893	$26,061
3/16/16	26	10,044	$12,417
4/13/16	28	10,340	$13,688
5/30/16	47	0	$0
6/30/16	31	0	$0
8/3/16	34	0	$0
8/29/16	26	0	$0
9/30/16	32	0	$0
Totals	**365**	**89,280**	**$112,393**
Annual	**365**	**89,280**	**$112,393**

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.

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

Figure 15 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Morris Knolls High School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	156.5	141.4
Site Energy Use Intensity (kBtu/ft^2)	84.1	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 16 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Morris Knolls High School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	126.7	141.4
Site Energy Use Intensity (kBtu/ft^2)	71.3	58.2

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

This facility has a current score of 49.

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

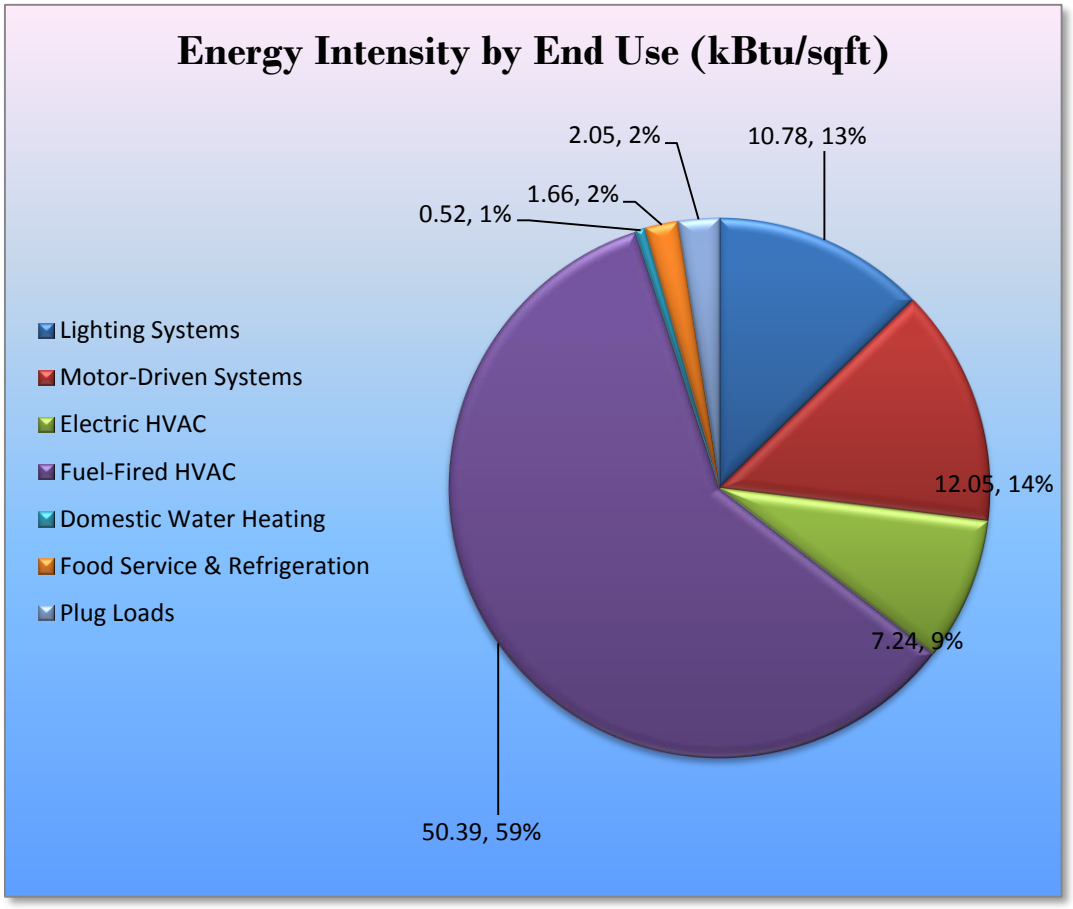
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

Figure 17 - 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 Morris Knolls High School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 18 – 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		**443,592**	**96.2**	**0.0**	**$50,741**	**$811,798**	**$97,125**	**$714,673**	**14.1**	**446,693**
ECM 1	Install LED Fixtures	137,326	31.5	0.0	$15,708	$626,400	$68,415	$557,985	35.5	138,286
ECM 2	Retrofit Fixtures with LED Lamps	305,880	64.7	0.0	$34,988	$184,968	$28,710	$156,258	4.5	308,019
ECM 3	Install LED Exit Signs	385	0.0	0.0	$44	$430	$0	$430	9.8	388
Lighting Control Measures		**74,565**	**15.7**	**0.0**	**$8,529**	**$107,404**	**$13,185**	**$94,219**	**11.0**	**75,086**
ECM 4	Install Occupancy Sensor Lighting Controls	74,365	15.7	0.0	$8,506	$107,134	$13,050	$94,084	11.1	74,885
ECM 5	Install Daylight Dimming Controls	200	0.0	0.0	$23	$270	$135	$135	5.9	201
Domestic Water Heating Upgrade		**0**	**0.0**	**97.2**	**$1,090**	**$409**	**$0**	**$409**	**0.4**	**11,383**
ECM 6	Install Low-Flow Domestic Hot Water Devices	0	0.0	97.2	$1,090	$409	$0	$409	0.4	11,383
Food Service Equipment & Refrigeration Measures		**524**	**0.1**	**0.0**	**$60**	**$607**	**$80**	**$527**	**8.8**	**528**
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	524	0.1	0.0	$60	$607	$80	$527	8.8	528
Plug Load Equipment Control - Vending Machine		**11,283**	**0.0**	**0.0**	**$1,291**	**$1,610**	**$0**	**$1,610**	**1.2**	**11,362**
ECM 8	Vending Machine Control	11,283	0.0	0.0	$1,291	$1,610	$0	$1,610	1.2	11,362
Custom Measures		**78,768**	**0.0**	**1,198.7**	**$19,984**	**$113,125**	**$0**	**$113,125**	**5.7**	**271,478**
ECM 9	Computer Power Management Software	13,403	0.0	0.0	$1,533	$8,170	$0	$8,170	5.3	13,497
ECM 10	Retro-Commissioning Study & HVAC Improvements	63,643	0.0	666.0	$13,377	$78,920	$0	$78,920	5.9	170,844
ECM 11	Building Envelope Weatherization	1,721	0.0	532.8	$5,074	$26,035	$0	$26,035	5.1	87,137
TOTALS		**608,731**	**112.0**	**1,295.9**	**$81,694**	**$1,034,952**	**$110,390**	**$924,562**	**11.3**	**816,530**

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

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

4.1.1 Lighting Upgrades

Recommended upgrades to existing lighting fixtures are summarized in Figure 19 below.

Figure 19 – 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		**443,592**	**96.2**	**0.0**	**$50,740.51**	**$811,797.81**	**$97,125.00**	**$714,672.81**	**14.1**	**446,693**
ECM 1	Install LED Fixtures	137,326	31.5	0.0	$15,708.10	$626,399.78	$68,415.00	$557,984.78	35.5	138,286
ECM 2	Retrofit Fixtures with LED Lamps	305,880	64.7	0.0	$34,988.32	$184,967.81	$28,710.00	$156,257.81	4.5	308,019
ECM 3	Install LED Exit Signs	385	0.0	0.0	$44.09	$430.22	$0.00	$430.22	9.8	388

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	115,535	28.7	0.0	$13,215.58	$594,193.99	$63,905.00	$530,288.99	40.1	116,343
Exterior	21,791	2.8	0.0	$2,492.52	$32,205.79	$4,510.00	$27,695.79	11.1	21,943

Measure Description

We recommend replacing the linear fluorescent T8 fixtures that are in poor condition with new high performance LED fixtures. We also recommend replacing the metal halide high bay fixtures in the boiler room one-for-one with new LED high bay fixtures. This measure includes the replacement of fixtures and assumes the ability to reuse the existing mounting configuration. The existing lamps frequently burn out and the maintenance is problematic due to the need to use a lift. The proposed fixtures are new high performance LEDs which have much longer lifespans. Therefore this measure saves energy by reducing the electrical demand. Use of the gymnasium light fixtures will improve light output as well as significantly reduces required maintenance.

This measure also recommends replacing the exterior high pressure sodium fixtures with LED fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable or improved light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice than older technologies.

This measure is recommended for other reasons regardless of the economic results. These fixtures are in poor condition but their replacement cannot be justified by energy savings alone. However, based on the existing condition and the request to evaluate their replacement, we recommend this measure for implementation. It should be noted that the same range of energy savings may be achieved through retrofitting the fixtures rather than replacing them with the resulting payback period being similar to the recommended lighting measure. Lighting fixture replacements could be implemented as a recapitalization

effort, based on benefits such as improved conditions, improved light quality and reduced maintenance. The energy savings with the efficiency gain is a bonus.

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	298,172	63.7	0.0	$34,106.54	$183,086.45	$28,625.00	$154,461.45	4.5	300,256
Exterior	7,709	0.9	0.0	$881.78	$1,881.36	$85.00	$1,796.36	2.0	7,763

Measure Description

We recommend retrofitting existing incandescent, halogen incandescent, compact fluorescent, high pressure sodium and linear fluorescent T8 fixtures with LED lamps. Existing fixtures in the interior and exterior applications are included within this measure. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent lamps and more than 10 times longer than many incandescent lamps.

ECM 3: Install LED Exit Signs

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	385	0.0	0.0	$44.09	$430.22	$0.00	$430.22	9.8	388
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

4.1.2 Lighting Control Measures

Figure 20 – 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		**74,565**	**15.7**	**0.0**	**$8,529.12**	**$107,404.00**	**$13,185.00**	**$94,219.00**	**11.0**	**75,086**
ECM 4	Install Occupancy Sensor Lighting Controls	74,365	15.7	0.0	$8,506.25	$107,134.00	$13,050.00	$94,084.00	11.1	74,885
ECM 5	Install Daylight Dimming Controls	200	0.0	0.0	$22.87	$270.00	$135.00	$135.00	5.9	201

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

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
74,365	15.7	0.0	$8,506.25	$107,134.00	$13,050.00	$94,084.00	11.1	74,885

Measure Description

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

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

ECM 5: Install Photocell 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)
200	0.0	0.0	$22.87	$270.00	$135.00	$135.00	5.9	201

Measure Description

We recommend installing photocell controls for the exterior walkway fixtures. These were noted to be on during the daylight hours. This will limit the use of these fixtures to dusk to dawn operation.

4.1.3 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 21 below.

Figure 21 - 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**	**97.2**	**$1,090.19**	**$408.69**	**$0.00**	**$408.69**	**0.4**	**11,383**
ECM 6	Install Low-Flow Domestic Hot Water Devices	0	0.0	97.2	$1,090.19	$408.69	$0.00	$408.69	0.4	11,383

ECM 6: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	97.2	$1,090.19	$408.69	$0.00	$408.69	0.4	11,383

Measure Description

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

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

4.1.4 Food Service Equipment & Refrigeration Measures

Our recommended food service and refrigeration measures are summarized in Figure 22 below.

Figure 22 - 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		**524**	**0.1**	**0.0**	**$59.97**	**$606.60**	**$80.00**	**$526.60**	**8.8**	**528**
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors	524	0.1	0.0	$59.97	$606.60	$80.00	$526.60	8.8	528

ECM 7: Refrigerator/Freezer Case Electrically Commutated Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
524	0.1	0.0	$59.97	$606.60	$80.00	$526.60	8.8	528

Measure Description

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

4.1.5 Plug Load Equipment Control - Vending Machines

Our recommended plug load equipment control measures are summarized in Figure 23 below.

Figure 23 - 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		**11,283**	**0.0**	**0.0**	**$1,291**	**$1,610**	**$0**	**$1,610**	**1.2**	**11,362**
ECM 8	Vending Machine Control	11,283	0.0	0.0	$1,291	$1,610	$0	$1,610	1.2	11,362

ECM 8: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
11,283	0.0	0.0	$1,290.60	$1,610.00	$0.00	$1,610.00	1.2	11,362

Measure Description

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

4.1.6 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 24 below.

Figure 24 - 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		**78,768**	**0.0**	**1,198.7**	**$19,983.86**	**$113,124.50**	**$0.00**	**$113,124.50**	**5.7**	**271,478**
ECM 9	Computer Power Management Software	13,403	0.0	0.0	$1,533.15	$8,170.00	$0.00	$8,170.00	5.3	13,497
ECM 10	Retro-Commissioning Study & HVAC Improvements	63,643	0.0	666.0	$13,376.56	$78,919.50	$0.00	$78,919.50	5.9	170,844
ECM 11	Building Envelope Weatherization	1,721	0.0	532.8	$5,074.15	$26,035.00	$0.00	$26,035.00	5.1	87,137

ECM 9: 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)
13,403	0.0	0.0	$1,533.15	$8,170.00	$0.00	$8,170.00	5.3	13,497

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. The image to the right is for demonstration purposes only and represents the difference between potential duration of devices being in Power-On States vs. the duration of User Activity. This difference provides an opportunity for energy savings by implementing power management software.

ECM 10: Retro-Commissioning Study & HVAC Improvements

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)
63,643	0.0	666.0	$13,376.56	$78,919.50	$0.00	$78,919.50	5.9	170,844

Measure Description

Due to the complexity of today's HVAC systems and controls, systems may be operating incorrectly or not as efficiently as they could be. Retro-commissioning reveals hidden deficiencies, highlights operational & maintenance (O&M) opportunities and can expose hidden control system problems. There are valuable benefits to retro-commissioning in existing buildings. It is a detailed and specialized process that reviews how an HVAC system is designed to operate and how it is currently controlled. Applying retro-commissioning to existing facilities includes planning, discovering root causes of inefficiencies, development of a cost-effective project delivery and a focus on optimizing value to the building owner.

Such a study would include functional system testing under various modes, such as heating or cooling loads, occupied and unoccupied modes, and under a variety of outside air and space temperature conditions. This is a systematic process to ensure that the building energy systems perform interactively according to the original design intent and the current operational needs of the facility. Retro-commissioning is a common practice recommended by the American Society of Heating Refrigeration and Energy (ASHRAE). It is recommended to be undertaken every few years.

We recommend that an engineering firm who specializes in energy control systems and retro-commissioning be contacted for a detailed evaluation and implementation costs. Facility operations personnel would work with the engineers to develop goals and objectives. During on site testing, the qualified personnel conducting the study would immediately make any no/low-cost improvements as identified. Furthermore, for any suggested corrective actions which require the purchase of material, a contractor who specializes in that scope of work would be contacted to implement the remaining improvements. Part of the retro-commissioning study should include an evaluation of the cost effectiveness of installing or upgrading a comprehensive building management (BMS) or energy management system (EMS). Typically, such a system would replace all manual dial thermostats with a networked series of digital input sensors and solid state control points, including for valves and dampers.

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)
1,721	0.0	532.8	$5,074.15	$26,035.00	$0.00	$26,035.00	5.1	87,137

Measure Description

We recommend weather-stripping the exterior doors throughout the building. The majority of the exterior doors were noted to have missing or worn weather-stripping with clearly visible air gaps. We also recommend caulking the perimeter of window frames to reduce air infiltration.

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 your 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 seasonally mitigate heat loss and heat gain and thus reduce the load on the facility's heating and cooling equipment. 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.

4.2 ECMs Evaluated But Not Recommended

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

Figure 25 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures	**6,670**	**2.2**	**0.0**	**$762.93**	**$10,473.54**	**$644.00**	**$9,829.54**	**12.9**	**6,716**
Install High Efficiency Electric AC	6,670	2.2	0.0	$762.93	$10,473.54	$644.00	$9,829.54	12.9	6,716
Food Service Equipment & Refrigeration Measures	**2,897**	**0.3**	**0.0**	**$331.33**	**$5,428.00**	**$150.00**	**$5,278.00**	**15.9**	**2,917**
Replace Refrigeration Equipment	2,897	0.3	0.0	$331.33	$5,428.00	$150.00	$5,278.00	15.9	2,917
TOTALS	**9,566**	**2.6**	**0.0**	**$1,094.26**	**$15,901.54**	**$794.00**	**$15,107.54**	**13.8**	**9,633**

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

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

Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
6,670	2.2	0.0	$762.93	$10,473.54	$644.00	$9,829.54	12.9	6,716

Measure Description

We generally recommend replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units when cost effective. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. This should be done in the course of replacing failed equipment. 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

This measure is not recommended based on the poor payback period. These units are in poor condition but their replacement cannot be justified by energy savings alone. However, based on the existing condition we suggest considering this measure for implementation based on other benefits such as improved indoor air quality, reduced maintenance and increased efficiency.

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)
2,897	0.3	0.0	$331.33	$5,428.00	$150.00	$5,278.00	15.9	2,917

Measure Description

We generally recommend replacing existing commercial refrigerators and freezers with new ENERGY STAR® high efficiency equipment when cost effective. This should be done in the course of replacing failed 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.

Reasons for not Recommending

This measure is not recommended based on the economic results. Replacing refrigeration equipment with high efficiency equipment is recommended as they reach the end of their useful lives.

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.

Use Window Treatments/Coverings

A substantial amount of heat gain can occur through uncovered or untreated windows, especially older single pane windows and east or west-facing windows. Treatments such as high-reflectivity films or covering windows with shades or shutters can reduce solar heat gain and, consequently, cooling load and can reduce internal heat loss and the associated heating load.

Perform Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Turn Off Unneeded Motors

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

Reduce Motor Short Cycling

Frequent stopping and starting of motors subjects rotors and other parts to substantial stress. This can result in component wear, reducing efficiency, and increasing maintenance costs. Adjust the load on the motor to limit the amount of unnecessary stopping and starting to improve motor performance.

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.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Ensure Economizers are Functioning Properly

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

Assess Chillers & Request Tune-Ups

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

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Check for and Seal Duct Leakage

Duct leakage in commercial buildings typically accounts for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building, significantly increasing cooling and heating costs. By sealing sources of leakage, cooling, heating, and ventilation energy use can be reduced significantly, depending on the severity of air leakage.

Repair/Replace Steam Traps

Properly functioning steam traps ensure that all latent heat in the steam is delivered to the end use by preventing pressurized steam from leaking. Steam traps should be inspected as part of the regular steam system maintenance. Traps that are blocked, venting, or allowing steam to leak through should be repaired or replaced. Repairing or replacing existing steam traps will reduce steam losses.

Perform 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 Furnace Maintenance

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

Perform 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 Compressed Air Systems

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

Plug Load Controls

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

Replace Computer Monitors

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

Water Conservation

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

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

Refer to Section 4.1.3 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

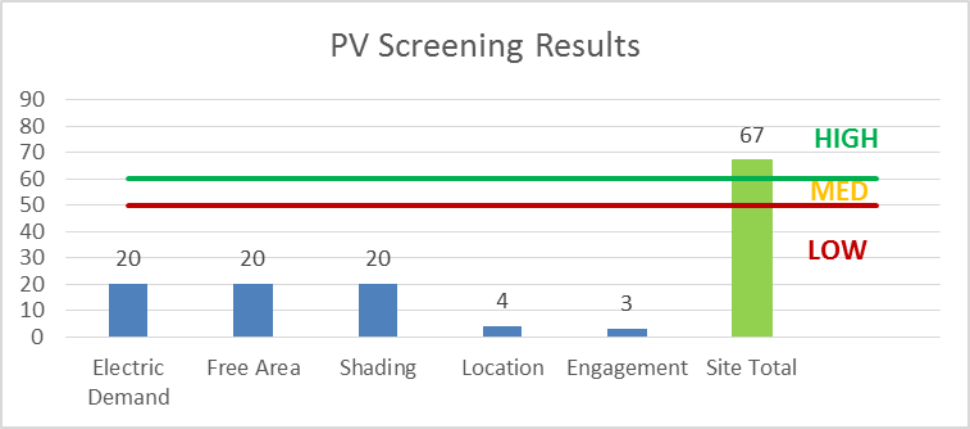
6.1 Photovoltaic

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

The Morris Knolls High School has previously installed a 145 kW roof mounted photovoltaic (PV) solar energy generation system. Based on the information provided by the facility, their PV system generates about 7% of the total building electrical consumption. There may be an opportunity to install ground mounted PV systems in the parking lot areas. 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 additional PV arrays.

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 may be feasible. If the facility is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 26 - Photovoltaic Screening



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

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

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

6.2 Combined Heat and Power

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

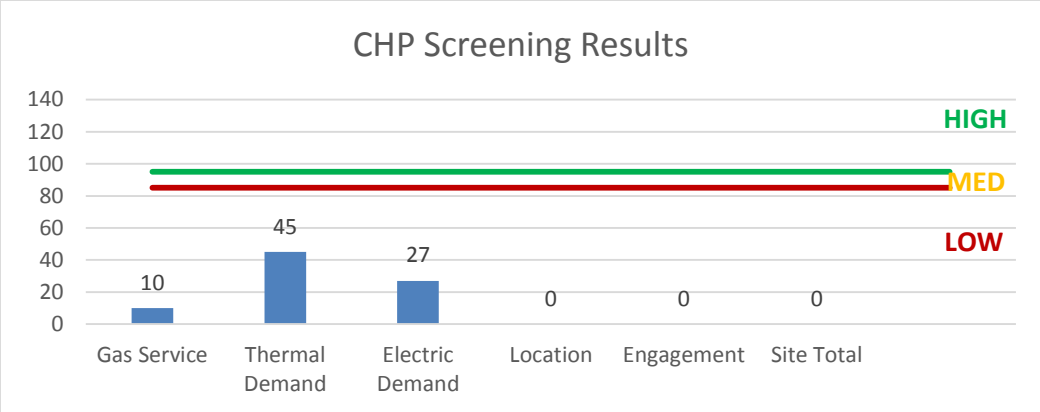
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

Lack of gas service, low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the no 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 27 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 28 for a list of the eligible programs identified for each recommended ECM.

Figure 28 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x			x		
ECM 2	Retrofit Fixtures with LED Lamps	x			x		
ECM 3	Install LED Exit Signs	x			x		
ECM 4	Install Occupancy Sensor Lighting Controls	x			x		
ECM 5	Install Photocell Controls				x		
ECM 6	Install Low-Flow Domestic Hot Water Devices				x		
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors				x		
ECM 8	Vending Machine Control				x		
ECM 9	Computer Power Management Software				x		
ECM 10	Retro-Commissioning Study & HVAC Improvements				x		
ECM 11	Building Envelope Weatherization				x		

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Pay for Performance - Existing Buildings

Overview

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

Incentives

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

How to Participate

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

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

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

8.3 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.

8.4 Energy Savings Improvement Program

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

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

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

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

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program 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
Nurses Office A1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	2,350	0.04	155	0.0	$17.74	$836.33	$90.00	42.07
Nurses Office A1	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Fixture Replacement	No	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	58	2,350	0.15	605	0.0	$69.24	$1,672.66	$180.00	21.56
Nurses Office A1A	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Fixture Replacement	No	6	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	58	2,350	0.22	908	0.0	$103.87	$2,509.00	$270.00	21.56
Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,350	Fixture Replacement	No	2	LED - Fixtures: Ambient - 2' - Direct Fixture	Wall Switch	14	2,350	0.02	103	0.0	$11.75	$418.17	$40.00	32.19
A1F	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,350	Fixture Replacement	No	2	LED - Fixtures: Ambient - 2' - Direct Fixture	Wall Switch	14	2,350	0.02	103	0.0	$11.75	$418.17	$40.00	32.19
A1E	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,350	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,350	0.02	86	0.0	$9.89	$96.40	$20.00	7.72
A1D	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.02	89	0.0	$10.20	$58.50	$10.00	4.75
A1C	1	Incandescent: Screw in Lamp	Wall Switch	60	2,350	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,350	0.03	138	0.0	$15.77	$53.75	$5.00	3.09
Closet A1B	1	Incandescent: Dome	Wall Switch	180	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	27	500	0.10	88	0.0	$10.06	$53.75	$5.00	4.84
Child Team Study A3	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,645	0.43	1,785	0.0	$204.21	$1,126.20	$215.00	4.46
Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,350	0.04	151	0.0	$17.31	$95.13	$20.00	4.34
Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,350	0.04	151	0.0	$17.31	$95.13	$20.00	4.34
Conference Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,645	0.10	397	0.0	$45.38	$306.27	$60.00	5.43
Private Offices	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	No	5	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,350	0.18	757	0.0	$86.56	$475.67	$100.00	4.34
Private Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,645	0.10	397	0.0	$45.38	$306.27	$60.00	5.43
Receiving Room	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.52	2,141	0.0	$244.92	$1,381.50	$225.00	4.72
Receiving Room Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,750	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,925	0.03	138	0.0	$15.81	$187.80	$30.00	9.98
Storage Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.07	60	0.0	$6.91	$215.40	$30.00	26.85
Storage 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	$2.17	$58.50	$10.00	22.35
General Office A7	20	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,350	None	Yes	20	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,645	0.23	940	0.0	$107.58	$270.00	$35.00	2.18
General Office Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.04	178	0.0	$20.40	$117.00	$20.00	4.75
Private Offices	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.13	535	0.0	$61.21	$300.80	$60.00	3.93
Private Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,645	0.19	793	0.0	$90.76	$496.53	$100.00	4.37
Private Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.11	451	0.0	$51.56	$350.00	$60.00	5.62
Private Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.02	89	0.0	$10.20	$58.50	$10.00	4.75

	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 Room	1	Incandescent: Screw in Lamp	Wall Switch	100	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	14	500	0.06	49	0.0	$5.66	$53.75	$5.00	8.62
Hallway	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	3,640	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,640	0.28	1,796	0.0	$205.41	$760.50	$130.00	3.07
Display Cases	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	5,200	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	5,200	0.07	628	0.0	$71.82	$215.40	$30.00	2.58
Faculty Room A10	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.82	3,381	0.0	$386.72	$1,774.00	$335.00	3.72
Work Room A10A	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$416.80	$80.00	4.35
Lobby	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,900	Relamp	No	15	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,900	0.17	1,177	0.0	$134.67	$538.50	$75.00	3.44
Girl's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,750	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,750	0.05	221	0.0	$25.32	$143.60	$20.00	4.88
Girl's Restroom	1	Incandescent: Screw in Lamp	Wall Switch	60	2,750	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	2,750	0.03	161	0.0	$18.45	$53.75	$5.00	2.64
Boy's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,750	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,750	0.04	209	0.0	$23.88	$117.00	$20.00	4.06
Hallway	48	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	3,640	Fixture Replacement	No	48	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	15	3,640	0.53	3,416	0.0	$390.72	$20,071.97	$2,160.00	45.84
Support Services A9	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.35	1,427	0.0	$163.22	$936.00	$160.00	4.75
Offices A11	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	No	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	2,350	0.26	1,070	0.0	$122.41	$5,017.99	$540.00	36.58
Private Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	No	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	2,350	0.09	357	0.0	$40.80	$1,672.66	$180.00	36.58
Private Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,350	Fixture Replacement	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	15	2,350	0.02	95	0.0	$10.82	$836.33	$90.00	68.98
Classroom A13	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom A15	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Comp Art Room A17	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
A17A	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$1,788.66	$200.00	20.54
A17B	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$1,788.66	$200.00	20.54
Classroom A19	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	30	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.82	3,237	0.0	$370.26	$13,354.98	$1,455.00	32.14
Classroom A12	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.33	1,295	0.0	$148.10	$5,827.99	$645.00	35.00
Classroom A14	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.33	1,295	0.0	$148.10	$5,827.99	$645.00	35.00
Classroom A16	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom A18	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom A20	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	21	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.57	2,266	0.0	$259.18	$9,591.49	$1,050.00	32.96

	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 A24	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.49	1,942	0.0	$222.16	$8,336.99	$915.00	33.41
Attendance Office A22	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	44	1,645	0.74	3,043	0.0	$348.05	$8,066.99	$880.00	20.65
Attendance Office A22A	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	8	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	44	1,645	0.33	1,352	0.0	$154.69	$3,615.33	$395.00	20.82
Career Center A2	10	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Occupancy Sensor	53	2,350	Relamp	No	10	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	2,350	0.18	743	0.0	$85.01	$617.00	$150.00	5.49
Conference Room	7	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	2,350	Relamp	Yes	7	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,645	0.16	665	0.0	$76.06	$547.90	$125.00	5.56
Private Offices	44	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	2,350	Relamp	Yes	44	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,645	1.01	4,180	0.0	$478.10	$3,990.80	$880.00	6.51
Hallway	28	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Occupancy Sensor	53	3,640	Relamp	No	28	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	3,640	0.50	3,223	0.0	$368.69	$1,727.60	$420.00	3.55
Faculty Restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	2,750	Relamp	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,925	0.04	200	0.0	$22.90	$202.60	$30.00	7.54
Faculty Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,750	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,925	0.01	69	0.0	$7.90	$93.90	$5.00	11.25
Storage Room	1	Incandescent: Screw in Lamp	Wall Switch	75	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	11	500	0.04	37	0.0	$4.21	$53.75	$5.00	11.58
Faculty Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.05	264	0.0	$30.17	$233.00	$20.00	7.06
Faculty Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.05	264	0.0	$30.17	$233.00	$20.00	7.06
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.01	10	0.0	$1.15	$35.90	$5.00	26.85
Safe	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	500	0.02	19	0.0	$2.17	$58.50	$10.00	22.35
Mail Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,350	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.05	225	0.0	$25.78	$233.00	$20.00	8.26
Closet	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	7	500	None	No	1	LED Screw-In Lamps: Screw in Lamp	Wall Switch	7	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage Room	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	500	0.03	29	0.0	$3.35	$53.75	$5.00	14.53
Storage Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.03	30	0.0	$3.45	$107.70	$15.00	26.85
Office Work Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.19	786	0.0	$89.89	$1,788.66	$200.00	17.67
Boy's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$504.00	$75.00	7.11
Boy's Restroom	1	Incandescent: Screw in Lamp	None	60	2,750	Relamp	Yes	1	LED Screw-In Lamps: Screw in Lamps	Occupancy Sensor	9	1,925	0.04	170	0.0	$19.43	$53.75	$5.00	2.51
Elevator Mech Room	2	Incandescent: Screw in Lamp	Wall Switch	60	1,000	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	1,000	0.07	117	0.0	$13.42	$107.51	$10.00	7.27
Elevator Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None	93	1,000	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	None	44	1,000	0.03	57	0.0	$6.51	$75.20	$15.00	9.25
Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	3,900	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,730	0.07	490	0.0	$56.05	$449.50	$25.00	7.57
Storage Rooms	2	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	500	0.07	59	0.0	$6.71	$107.51	$10.00	14.53

	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 A21	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom A23	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$1,687.50	$255.00	7.74
Room A23B	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$416.80	$80.00	4.35
Room A23C	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$416.80	$80.00	4.35
Classroom A25	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.14	539	0.0	$61.71	$1,102.50	$155.00	15.35
Office A25A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	No	1	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	2,350	0.02	89	0.0	$10.20	$418.17	$45.00	36.58
Classroom A27	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom A29	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Office A26A	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	44	1,645	0.08	338	0.0	$38.67	$952.33	$110.00	21.78
Office A28A	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Fixture Replacement	Yes	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	44	1,645	0.08	338	0.0	$38.67	$952.33	$110.00	21.78
Classroom A26	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom A28	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.49	1,942	0.0	$222.16	$8,336.99	$915.00	33.41
Classroom A29	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.49	1,942	0.0	$222.16	$8,336.99	$915.00	33.41
Classroom A30	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.49	1,942	0.0	$222.16	$8,336.99	$915.00	33.41
Classroom A32	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.49	1,942	0.0	$222.16	$8,336.99	$915.00	33.41
Classroom A34	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Hallway	45	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	3,900	Relamp	Yes	45	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,730	0.64	4,410	0.0	$504.43	$2,695.50	$225.00	4.90
Girl's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Fixture Replacement	Yes	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$1,942.66	$215.00	28.63
Storage Room	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	$13.02	$351.00	$60.00	22.35
Storage Room	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	500	0.03	29	0.0	$3.35	$53.75	$5.00	14.53
Boy's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Fixture Replacement	No	4	LED - Fixtures: Ambient - 4' - Direct Fixture	None	29	2,750	0.09	417	0.0	$47.75	$1,672.66	$180.00	31.26
Faculty Rooms A31	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	114	2,250	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,250	0.29	1,159	0.0	$132.60	$761.07	$160.00	4.53
Faculty Rooms A31	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.16	647	0.0	$74.05	$621.00	$95.00	7.10
Faculty Room A31A	15	Incandescent: Screw in Lamp	Wall Switch	75	2,250	Relamp	Yes	15	LED Screw-In Lamps: Screw in Lamps	Occupancy Sensor	11	1,575	0.66	2,612	0.0	$298.78	$1,076.30	$110.00	3.23
Faculty Hallway	2	Incandescent: Screw in Lamp	Wall Switch	60	3,900	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	Wall Switch	9	3,900	0.07	457	0.0	$52.33	$107.51	$10.00	1.86

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Girl's Restroom	2	Incandescent: Screw in Lamp	None	60	2,750	Relamp	No	2	LED Screw-In Lamps: Screw in Lamps	None	9	2,750	0.07	323	0.0	$36.90	$107.51	$10.00	2.64
Girl's Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	None	22	2,750	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	None	9	2,750	0.01	43	0.0	$4.88	$31.90	$5.00	5.51
Boy's Restroom	1	Incandescent: Screw in Lamp	None	60	2,750	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	None	9	2,750	0.03	161	0.0	$18.45	$53.75	$5.00	2.64
Boy's Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	None	22	2,750	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	None	9	2,750	0.02	85	0.0	$9.77	$63.80	$10.00	5.51
Classroom A35	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.25	971	0.0	$111.08	$1,336.50	$195.00	10.28
Room A35B	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,350	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,350	0.01	47	0.0	$5.41	$35.90	$5.00	5.71
Classroom A37	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.74	2,913	0.0	$333.24	$2,389.50	$375.00	6.05
Room A36	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.02	89	0.0	$10.20	$58.50	$10.00	4.75
Classroom A38	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$1,687.50	$255.00	7.74
Classroom A40	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$1,687.50	$255.00	7.74
Classroom A42	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$1,687.50	$255.00	7.74
Classroom A44	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$1,687.50	$255.00	7.74
Classroom A46	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$1,687.50	$255.00	7.74
Hallway	37	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,900	Relamp	Yes	37	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,730	0.53	3,626	0.0	$414.75	$2,408.30	$185.00	5.36
Chem Lab A50	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Room A48A	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.13	535	0.0	$61.21	$300.80	$60.00	3.93
Room A48B	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.03	134	0.0	$15.30	$75.20	$15.00	3.93
Chem Lab A48	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	3,640	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,640	0.45	2,901	0.0	$331.82	$1,052.80	$210.00	2.54
Hallway	34	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	3,640	Relamp	No	34	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,640	1.10	7,045	0.0	$805.85	$2,556.80	$510.00	2.54
Physics Lab A47	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Room A47A	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.16	669	0.0	$76.51	$376.00	$75.00	3.93
Physics Lab A51	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Room A51A	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.16	669	0.0	$76.51	$376.00	$75.00	3.93
Science Lab A53	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room A53A	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.16	669	0.0	$76.51	$376.00	$75.00	3.93
Foyer	5	Compact Fluorescent: Plug in Lamps	Occupancy Sensor	26	3,640	Relamp	No	5	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	3,640	0.04	251	0.0	$28.73	$268.77	$0.00	9.36
Room A52	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.06	268	0.0	$30.60	$150.40	$30.00	3.93
Chem Lab A54	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Room A54A	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.19	803	0.0	$91.81	$451.20	$90.00	3.93
Room A54B	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.03	134	0.0	$15.30	$75.20	$15.00	3.93
Physics Lab A49	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Room A49A	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,350	0.16	669	0.0	$76.51	$376.00	$75.00	3.93
Girl's Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	2,750	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,925	0.03	123	0.0	$14.07	$63.20	$0.00	4.49
Girl's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$504.00	$75.00	7.11
Boy's Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	2,750	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,925	0.03	123	0.0	$14.07	$63.20	$0.00	4.49
Boy's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$504.00	$75.00	7.11
Work Room A58	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,250	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,575	0.33	1,295	0.0	$148.10	$717.60	$140.00	3.90
Elec Room A60	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,250	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,250	0.26	1,025	0.0	$117.21	$601.60	$120.00	4.11
Office A62	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,250	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,575	0.12	486	0.0	$55.54	$341.60	$65.00	4.98
Stairwell	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,900	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	None	29	3,900	0.09	592	0.0	$67.72	$234.00	$40.00	2.86
Board of Education Hall	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,900	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,730	0.66	4,489	0.0	$513.43	$1,473.20	$240.00	2.40
File Storage 117	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,645	0.43	1,785	0.0	$204.21	$972.20	$200.00	3.78
File Storage 117	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.05	225	0.0	$25.78	$117.00	$20.00	3.76
Desk Light	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,350	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,350	0.01	47	0.0	$5.41	$35.90	$5.00	5.71
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.01	10	0.0	$1.15	$35.90	$5.00	26.85
Storage 116	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	500	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	500	0.13	114	0.0	$13.02	$300.80	$60.00	18.49
Work Room 115	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,250	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,575	0.06	226	0.0	$25.87	$259.60	$20.00	9.26
Work Room 114	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,250	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,575	0.06	226	0.0	$25.87	$259.60	$20.00	9.26
Buisness Office 118	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,250	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,575	0.66	2,590	0.0	$296.21	$1,473.20	$275.00	4.05

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Buisness Office 118	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,575	0.24	950	0.0	$108.62	$745.67	$135.00	5.62
Undercabinet	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.02	40	0.0	$4.60	$71.80	$10.00	13.42
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.01	10	0.0	$1.15	$35.90	$5.00	26.85
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,750	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	None	15	2,750	0.02	111	0.0	$12.66	$71.80	$10.00	4.88
Restroom	3	Compact Fluorescent: Screw in Lamp	None	26	2,750	Relamp	No	3	LED Screw-In Lamps: Screw in Lamps	None	14	2,750	0.02	114	0.0	$13.02	$161.26	$0.00	12.38
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,750	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	None	15	2,750	0.02	111	0.0	$12.66	$71.80	$10.00	4.88
Restroom	3	Compact Fluorescent: Screw in Lamp	None	26	2,750	Relamp	No	3	LED Screw-In Lamps: Screw in Lamps	None	14	2,750	0.02	114	0.0	$13.02	$161.26	$0.00	12.38
Buisness Admin 112	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,250	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,575	0.25	971	0.0	$111.08	$721.20	$125.00	5.37
Buisness Admin 112	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,575	0.05	190	0.0	$21.72	$365.13	$55.00	14.28
Conference Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,250	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,575	0.37	1,457	0.0	$166.62	$792.80	$155.00	3.83
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.01	10	0.0	$1.15	$35.90	$5.00	26.85
Closets	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	$2.30	$71.80	$10.00	26.85
Office 107	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,350	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,350	0.01	47	0.0	$5.41	$35.90	$5.00	5.71
Office 105	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.25	1,014	0.0	$116.02	$567.20	$110.00	3.94
Office 106	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$416.80	$80.00	4.35
Office 102	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.25	1,014	0.0	$116.02	$567.20	$110.00	3.94
Bathroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	5,200	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	5,200	0.01	81	0.0	$9.23	$31.90	$5.00	2.91
Closet	1	Incandescent: Screw in Lamp	Wall Switch	100	500	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	14	500	0.06	49	0.0	$5.66	$53.75	$5.00	8.62
Office 101	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$416.80	$80.00	4.35
Office 100	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.16	676	0.0	$77.34	$416.80	$80.00	4.35
Office 103	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.08	338	0.0	$38.67	$266.40	$50.00	5.60
Office 104	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.08	338	0.0	$38.67	$266.40	$50.00	5.60
Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,900	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	3,900	0.02	148	0.0	$16.93	$58.50	$10.00	2.86
Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,750	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$504.00	$75.00	7.11
Auditorium Hallway	8	Incandescent: Screw in Lamp	None	60	3,900	Relamp	No	8	LED Screw-In Lamps: Screw in Lamps	None	9	3,900	0.27	1,830	0.0	$209.31	$430.02	$40.00	1.86

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Auditorium Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None	93	3,900	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	None	44	3,900	0.13	888	0.0	$101.58	$300.80	$60.00	2.37
Auditorium	123	Halogen Incandescent: Screw in Lamp	High/Low Control	150	2,750	Relamp	No	123	LED Screw-In Lamps: Screw in Lamps	High/Low Control	23	2,750	10.24	49,401	0.0	$5,650.81	$26,482.64	$615.00	4.58
Auditorium	16	Halogen Incandescent: Screw in Lamp	High/Low Control	150	2,750	Relamp	No	16	LED Screw-In Lamps: Screw in Lamps	High/Low Control	23	2,750	1.33	6,426	0.0	$735.06	$3,444.90	$80.00	4.58
Stage	4	Halogen Incandescent: Screw in Lamp	Wall Switch	150	2,080	Relamp	No	4	LED Screw-In Lamps: Screw in Lamps	Wall Switch	23	2,080	0.33	1,215	0.0	$138.99	$430.61	$20.00	2.95
Stage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.10	354	0.0	$40.49	$601.60	$120.00	11.89
Boiler Room	10	Metal Halide: (1) 175W Lamp	Wall Switch	215	2,350	Fixture Replacement	No	10	LED - Fixtures: Low-Bay	Wall Switch	80	2,350	0.88	3,648	0.0	$417.32	$14,197.75	$1,500.00	30.43
Boiler Room	6	Incandescent: Screw in Lamp	Wall Switch	300	2,350	Relamp	No	6	LED Screw-In Lamps: Screw in Lamps	Wall Switch	45	2,350	1.00	4,135	0.0	$472.96	$322.52	$30.00	0.62
Electrical Service Room	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	17	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.37	1,516	0.0	$173.42	$994.50	$170.00	4.75
Hallway	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,900	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,730	0.60	4,115	0.0	$470.64	$1,557.00	$220.00	2.84
Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,900	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,730	0.22	1,496	0.0	$171.14	$738.00	$80.00	3.84
Cafeteria C1	103	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,750	Relamp	Yes	103	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,925	4.22	20,375	0.0	$2,330.59	$10,445.60	$1,895.00	3.67
Kitchen	12	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	None	No	12	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.04	133	0.0	$15.19	$225.60	$45.00	11.89
Cafeteria C3	98	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	98	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	4.02	16,566	0.0	$1,894.92	$10,069.60	$1,820.00	4.35
Special Ed Room C42	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Special Ed Room C42A	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Bathroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.06	114	0.0	$13.02	$175.50	$30.00	11.17
Special Ed Room 38	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$2,448.00	$385.00	5.97
Office C40	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.39	1,605	0.0	$183.62	$1,053.00	$180.00	4.75
Classroom B1	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Classroom B2	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Classroom B3	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Classroom B4	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	20	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.55	2,158	0.0	$246.84	$9,173.32	$1,005.00	33.09
Classroom B5	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	32	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.87	3,453	0.0	$394.95	$14,191.31	$1,545.00	32.02
Classroom B6	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	20	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.55	2,158	0.0	$246.84	$9,173.32	$1,005.00	33.09

	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 B7	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	27	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.74	2,913	0.0	$333.24	$12,100.48	$1,320.00	32.35
Classroom B7	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,250	Relamp	No	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,250	0.06	226	0.0	$25.90	$179.50	$25.00	5.97
Classroom B8	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	20	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.55	2,158	0.0	$246.84	$9,173.32	$1,005.00	33.09
Classroom B10	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	32	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.87	3,453	0.0	$394.95	$14,191.31	$1,545.00	32.02
Classroom B12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B14	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B16	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Fixture Replacement	Yes	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	700	0.11	192	0.0	$21.94	$1,942.66	$200.00	79.42
TV Studio	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.41	1,690	0.0	$193.36	$7,082.49	$780.00	32.59
Resource Room B20	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.41	1,690	0.0	$193.36	$7,082.49	$780.00	32.59
Classroom B22	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B24	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B26	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Resource Room B25	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.41	1,690	0.0	$193.36	$7,082.49	$780.00	32.59
Media Center B13	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	58	1,575	0.87	3,419	0.0	$391.04	$8,336.99	$915.00	18.98
Media Center B11	42	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Fixture Replacement	Yes	42	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	58	1,575	2.02	7,977	0.0	$912.42	$18,372.97	$1,995.00	17.95
Media Center B9	54	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Fixture Replacement	Yes	54	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	58	1,575	2.60	10,256	0.0	$1,173.12	$23,390.96	$2,535.00	17.78
Media Center B9	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Fixture Replacement	Yes	4	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	58	1,575	0.19	760	0.0	$86.90	$1,942.66	$215.00	19.88
Media Center B9	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,250	Fixture Replacement	Yes	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	58	1,575	0.58	2,279	0.0	$260.69	$5,827.99	$645.00	19.88
Classroom B27	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B28	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B29	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B30	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B31	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B32	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04

	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 B33	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B34	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B35	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Office B36	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.41	1,690	0.0	$193.36	$7,082.49	$780.00	32.59
Classroom B37	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B38	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Fixture Replacement	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	29	1,000	0.04	76	0.0	$8.68	$836.33	$90.00	85.96
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.03	60	0.0	$6.91	$107.70	$15.00	13.42
Classroom B39	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Computer Lab B41	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Computer Lab B42	23	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	23	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.63	2,482	0.0	$283.87	$10,427.82	$1,140.00	32.72
Classroom B43	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	15	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.41	1,618	0.0	$185.13	$7,082.49	$780.00	34.04
Classroom B44	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Office B45	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	Yes	6	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.16	676	0.0	$77.34	$2,779.00	$290.00	32.18
Computer Lab B46	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Faculty Room B47	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Fixture Replacement	Yes	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,645	0.33	1,352	0.0	$154.69	$5,827.99	$645.00	33.51
Computer Lab B48	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	18	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.49	1,942	0.0	$222.16	$8,336.99	$915.00	33.41
Computer Lab B49	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Fixture Replacement	Yes	28	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	1,575	0.77	3,021	0.0	$345.58	$12,518.65	$1,365.00	32.28
Classrom B50	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	0.26	1,025	0.0	$117.21	$702.00	$120.00	4.97
Bio Chem B51	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.65	2,562	0.0	$293.01	$1,504.00	$300.00	4.11
Prep Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,456	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.04	111	0.0	$12.64	$117.00	$20.00	7.67
Bio Chem B52	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.78	3,074	0.0	$351.62	$1,804.80	$360.00	4.11
Bio Chem B53	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Prep Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,456	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.04	111	0.0	$12.64	$117.00	$20.00	7.67
Bio Chem B54	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11

	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 B55	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.91	3,586	0.0	$410.22	$2,105.60	$420.00	4.11
Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,456	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.06	166	0.0	$18.96	$175.50	$30.00	7.67
Classroom B57	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.65	2,562	0.0	$293.01	$1,504.00	$300.00	4.11
Hum Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,456	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.06	166	0.0	$18.96	$150.40	$30.00	6.35
Classroom B59	22	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	22	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	0.71	2,818	0.0	$322.31	$1,654.40	$330.00	4.11
Classroom B60	42	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	42	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	1.36	5,379	0.0	$615.33	$3,158.40	$630.00	4.11
Science Lab B61	48	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	48	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	1.56	6,148	0.0	$703.23	$3,609.60	$720.00	4.11
Hallway	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	3,640	Relamp	No	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,640	0.37	2,348	0.0	$268.62	$994.50	$170.00	3.07
Hallway	2	Compact Fluorescent: Plug in Lamps	None	26	3,900	Relamp	No	2	LED Screw-In Lamps: Plug in Lamps	None	14	3,900	0.02	108	0.0	$12.31	$107.51	$0.00	8.73
Girl's Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	2,750	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,925	0.03	123	0.0	$14.07	$63.20	$0.00	4.49
Girl's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$504.00	$75.00	7.11
Boy's Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	2,750	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,925	0.03	123	0.0	$14.07	$63.20	$0.00	4.49
Boy's Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.11	528	0.0	$60.34	$504.00	$75.00	7.11
Hallway	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,900	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,730	0.57	3,928	0.0	$449.25	$1,768.50	$210.00	3.47
Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None	93	3,900	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,730	0.33	2,244	0.0	$256.71	$871.60	$120.00	2.93
Hallway	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,900	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,730	0.71	4,863	0.0	$556.22	$2,061.00	$260.00	3.24
Metal Shop C26	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	0.91	3,586	0.0	$410.22	$2,457.00	$420.00	4.97
Electronics Lab C30	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	0.32	1,281	0.0	$146.51	$877.50	$150.00	4.97
Wrestling Room C32	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	0.32	1,281	0.0	$146.51	$877.50	$150.00	4.97
Dance Room C34	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	0.32	1,281	0.0	$146.51	$877.50	$150.00	4.97
Trainer's Room C36	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	0.32	1,281	0.0	$146.51	$877.50	$150.00	4.97
Girl's Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	2,750	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,925	0.03	123	0.0	$14.07	$63.20	$0.00	4.49
Girl's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.05	264	0.0	$30.17	$387.00	$55.00	11.00
Boy's Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	None	62	2,750	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,925	0.03	123	0.0	$14.07	$63.20	$0.00	4.49
Boy's Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.05	264	0.0	$30.17	$387.00	$55.00	11.00

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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
Boy's Locker Room C21	73	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,750	Relamp	Yes	73	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,925	1.05	5,044	0.0	$577.00	$4,510.70	$610.00	6.76
Showers	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,750	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,750	0.09	417	0.0	$47.75	$234.00	$40.00	4.06
Toilets	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,750	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,750	0.09	417	0.0	$47.75	$234.00	$40.00	4.06
Phys Ed Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,350	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,350	0.11	446	0.0	$51.01	$292.50	$50.00	4.75
Trainer's Room C20	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.41	1,690	0.0	$193.36	$1,022.00	$185.00	4.33
Trainer's Room C20	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,350	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,350	0.19	803	0.0	$91.81	$451.20	$90.00	3.93
Office C20A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.04	178	0.0	$20.40	$117.00	$20.00	4.75
Boy's Team Room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.66	2,705	0.0	$309.37	$1,674.00	$275.00	4.52
Art Studio A24	41	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,250	Relamp	No	41	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,250	1.33	5,251	0.0	$600.68	$3,083.20	$615.00	4.11
Storage C24A	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	$4.34	$117.00	$20.00	22.35
Fitness Center C18	49	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,250	Relamp	No	49	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,250	1.06	4,184	0.0	$478.59	$2,866.50	$490.00	4.97
Girl's Team Room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,250	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,250	0.52	2,049	0.0	$234.41	$1,404.00	$240.00	4.97
Girl's Locker Room C19	73	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,750	Relamp	Yes	73	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,925	1.05	5,044	0.0	$577.00	$4,510.70	$610.00	6.76
Showers	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,750	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,750	0.09	417	0.0	$47.75	$234.00	$40.00	4.06
Toilets	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,750	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,750	0.09	417	0.0	$47.75	$234.00	$40.00	4.06
Phys Ed Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,350	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,350	0.11	446	0.0	$51.01	$292.50	$50.00	4.75
Hallway to Gym	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,900	Fixture Replacement	Yes	11	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	29	2,730	0.30	2,057	0.0	$235.32	$4,869.83	$495.00	18.59
Gym	60	LED - Fixtures: High-Bay	Wall Switch	180	3,900	None	Yes	60	LED - Fixtures: High-Bay	Occupancy Sensor	180	2,730	2.12	14,531	0.0	$1,662.18	$13,200.00	$2,100.00	6.68
Hallway	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	3,900	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,730	0.82	5,611	0.0	$641.79	$2,565.00	$300.00	3.53
Conference Room	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.60	2,479	0.0	$283.59	$1,557.00	$255.00	4.59
Band Room C10	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.66	2,705	0.0	$309.37	$1,473.20	$275.00	3.87
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.01	10	0.0	$1.15	$35.90	$5.00	26.85
Practice Rooms (6 Total)	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.26	1,070	0.0	$122.41	$702.00	$120.00	4.75
Sound Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.08	338	0.0	$38.67	$291.50	$50.00	6.24
Drum Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,645	0.11	451	0.0	$51.56	$350.00	$60.00	5.62

	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
Offices (2 Total)	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.09	357	0.0	$40.80	$234.00	$40.00	4.75
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	75	2,350	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	11	2,350	0.04	173	0.0	$19.78	$53.75	$5.00	2.46
Chorus Room C4	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,350	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,645	0.66	2,705	0.0	$309.37	$1,473.20	$275.00	3.87
Practice Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,350	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,350	0.01	47	0.0	$5.41	$35.90	$5.00	5.71
Practice Rooms (4 Total)	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,350	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,350	0.09	357	0.0	$40.80	$234.00	$40.00	4.75
Practice Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,350	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,350	0.04	151	0.0	$17.31	$95.13	$20.00	4.34
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	75	2,350	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	Wall Switch	11	2,350	0.04	173	0.0	$19.78	$53.75	$5.00	2.46
Vestibule	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	5,200	Relamp	No	7	LED - Linear Tubes: (1) 4' Lamp	None	15	5,200	0.08	733	0.0	$83.79	$251.30	$35.00	2.58
Vestibule	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	5,200	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	None	29	5,200	0.06	592	0.0	$67.72	$175.50	$30.00	2.15
Hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	5,200	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,640	0.26	2,352	0.0	$269.03	$1,186.20	$90.00	4.07
Hallway	6	Incandescent: Screw in Lamp	Wall Switch	75	5,200	Relamp	No	6	LED Screw-In Lamps: Screw in Lamps	Wall Switch	11	5,200	0.25	2,296	0.0	$262.67	$322.52	$30.00	1.11
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	5,200	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,640	0.21	1,960	0.0	$224.19	$808.50	$75.00	3.27
Hallway	112	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	5,200	Relamp	Yes	112	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,640	1.60	14,634	0.0	$1,673.95	$7,260.80	$560.00	4.00
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None	93	5,200	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,640	0.62	5,611	0.0	$641.79	$1,398.00	$225.00	1.83
Restrooms (3 Total)	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.33	1,583	0.0	$181.02	$1,512.00	$225.00	7.11
Restrooms (3 Total)	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,750	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,925	0.33	1,583	0.0	$181.02	$1,512.00	$225.00	7.11
Stairs (6 Total)	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	5,200	Relamp	No	36	LED - Linear Tubes: (2) 4' Lamps	None	29	5,200	0.78	7,104	0.0	$812.62	$2,106.00	$360.00	2.15
Exterior Building Mounted	19	High-Pressure Sodium: (1) 70W Lamp	None	95	4,380	Fixture Replacement	No	19	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	35	4,380	0.75	5,742	0.0	$656.82	$7,422.86	$1,900.00	8.41
Exterior Building Mounted	15	High-Pressure Sodium: (1) 35W Lamp	None	46	4,380	Fixture Replacement	No	15	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	14	4,380	0.31	2,418	0.0	$276.56	$5,860.16	$1,500.00	15.77
Exterior Building Mounted	2	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	180	4,380	0.37	2,871	0.0	$328.41	$781.35	$200.00	1.77
Exterior Canopy	17	Incandescent: Screw in Lamp	None	75	4,380	Relamp	No	17	LED Screw-In Lamps: Screw in Lamps	None	11	4,380	0.71	5,480	0.0	$626.86	$913.80	$85.00	1.32
Exterior Walkway	15	High-Pressure Sodium: (1) 35W Lamp	None	46	4,380	Relamp	No	15	LED Screw-In Lamps: Screw in Lamps	None	14	4,380	0.31	2,418	0.0	$276.56	$806.30	$0.00	2.92
Exterior Walkway	3	High-Pressure Sodium: (1) 35W Lamp	None	46	8,760	Relamp	Yes	3	LED Screw-In Lamps: Screw in Lamps	Daylight Dimming	14	4,000	0.08	1,197	0.0	$136.92	$431.26	$135.00	2.16
Roadway Pole	9	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	9	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	180	4,380	1.68	12,920	0.0	$1,477.85	$17,576.94	$900.00	11.28
Parking Lot Pole	2	High-Pressure Sodium: (1) 150W Lamp	None	188	4,380	Fixture Replacement	No	2	LED - Fixtures: Other	None	78	4,380	0.14	1,108	0.0	$126.76	$564.48	$10.00	4.37

	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
Parking Lot Pole	1	LED - Fixtures: Other	None	78	4,380	None	No	1	LED - Fixtures: Other	None	78	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Transition Spaces	4	Exit Signs: Fluorescent	None	14	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	3	8,760	0.03	443	0.0	$50.70	$430.22	$0.00	8.49
Transition Spaces	36	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	36	Exit Signs: LED - 2 W Lamp	None	6	8,760	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	Hydronic System	2	Heating Hot Water Pump	75.0	95.0%	Yes	3,730	No	95.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Domestic Water	1	Water Supply Pump	1.0	85.0%	No	2,745	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Air Compressor	2	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	Boiler Burner	2	Other	15.0	92.0%	No	3,391	No	92.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Condenser Water Supply	2	Condenser Water Pump	30.0	94.1%	No	3,050	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Chilled Water Supply	2	Chilled Water Pump	20.0	93.0%	Yes	2,543	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Chilled Water Return	3	Chilled Water Pump	3.0	89.5%	No	2,059	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHUs	Auditorium	3	Supply Fan	20.0	92.0%	No	2,543	No	92.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHUs	Auditorium	3	Exhaust Fan	5.0	87.0%	No	2,059	No	87.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof MUAs	Metal Shop	2	Supply Fan	0.8	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof MUAs	Metal Shop	2	Exhaust Fan	0.8	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERUs	Boys & Girls Locker Rooms	2	Supply Fan	1.5	89.0%	No	1,373	No	89.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERUs	Boys & Girls Team Rooms	2	Supply Fan	3.0	91.0%	No	1,373	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERUs	Boys & Girls Team Rooms	2	Exhaust Fan	1.0	89.0%	No	1,373	No	89.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof RTUs	Trainer's Room & Weight Room	2	Supply Fan	3.0	91.0%	No	1,373	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof RTUs	Trainer's Room & Weight Room	2	Exhaust Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERWs	Cafeterias	4	Supply Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERWs	Cafeterias	4	Exhaust Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof HVs	1st and 2nd Floor Hallways of Science Wing	2	Supply Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof MUAs	Science Classrooms	13	Supply Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Main Office	1	Supply Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Child's Study Team	1	Supply Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Guidance Offices	1	Supply Fan	5.0	92.0%	No	1,373	No	92.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Guidance Offices	1	Exhaust Fan	2.0	90.0%	No	1,373	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Cooling Tower	Cooling Tower	2	Cooling Tower Fan	5.0	92.0%	No	2,543	No	92.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Dust Collector	1	Exhaust Fan	5.0	90.0%	No	500	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building Exhaust	43	Exhaust Fan	0.5	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building Exhaust	39	Exhaust Fan	0.8	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gym Exhaust	8	Exhaust Fan	1.0	85.0%	No	2,059	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
NEW Unit Ventilators	Various	30	Supply Fan	1.0	88.0%	No	1,373	No	88.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
OLD Unit Ventilators	Various	50	Supply Fan	0.1	60.0%	No	1,373	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof ERUs	Boys & Girls Team Rooms	2	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof RTUs	Trainer's Room & Weight Room	2	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Band Room & Chorus Room	2	Split-System AC	10.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Athletic Office	1	Split-System AC	2.50		Yes	1	Split-System AC	2.50		14.00		No	0.80	2,382	0.0	$272.47	$3,740.55	$230.00	12.88
Roof Outdoor Condenser	Facility Break Room	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Server Rooms	2	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Server Room	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Adult Education Office	1	Split-System Air-Source HP	1.00	200.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Offices	1	Split-System AC	0.50		Yes	1	Split-System AC	0.50		14.00		No	0.16	476	0.0	$54.49	$748.11	$46.00	12.88
Roof Outdoor Condenser	Copy Room	1	Split-System AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Server Room	1	Split-System AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Office	1	Split-System AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Child's Study Team	1	Split-System AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Guidance Offices	1	Split-System AC	10.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Outdoor Condenser	Server Rooms	2	Split-System AC	2.00		Yes	2	Split-System AC	2.00		14.00		No	1.28	3,811	0.0	$435.96	$5,984.88	$368.00	12.88
Classrooms	Window AC Units	4	Window AC	2.75		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	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
Classrooms	Window AC Units	3	Window AC	1.96		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Window AC Units	3	Window AC	2.08		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Window AC Units	12	Window AC	2.08		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric Chiller Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	New Wing	2	Water-Cooled Scroll Chiller	90.00	No							0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Hydronic Heating System	2	Non-Condensing Hot Water Boiler	1,200.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof MUAs	Metal Shop	2	Furnace	75.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERUs	Boys & Girls Locker Rooms	2	Furnace	200.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERUs	Boys & Girls Team Rooms	2	Furnace	250.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof RTUs	Trainer's Room & Weight Room	2	Furnace	250.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof ERWs	Cafeterias	4	Furnace	250.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof HVs	1st and 2nd Floor Hallways of Science Wing	2	Furnace	240.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof MUAs	Science Classrooms	13	Furnace	80.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

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

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	57	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	97.2	$1,090.19	$408.69	$0.00	0.37

Reach-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions					Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Energy Efficient Doors?	Install Door Heater Control?	Install Aluminum Night Covers?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Medium Temp Freezer (0F to 30F)	No	No	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	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Medium Temp Freezer (0F to 30F)	Yes	No	No	0.06	524	0.0	$59.97	$606.60	$80.00	8.78
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
Work Room	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Health Office	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	Yes	0.05	402	0.0	$45.93	$1,280.00	$75.00	26.24
Faculty Rooms	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Science Labs	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	Yes	0.05	447	0.0	$51.19	$1,344.00	$75.00	24.79
Kitchen	3	Freezer Chest	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Refrigerator Chest	No	Yes	0.23	2,048	0.0	$234.22	$2,804.00	$0.00	11.97
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Trainers Room	1	Ice Making Head (<450 lbs/day), Continuous	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Ice Making Head (<450 lbs/day), Continuous	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Convection Oven (Half 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	4	Insulated Food Holding Cabinet (1/2 Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Electric Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	N/A	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Dishwasher	3	Under Counter (Low Temp)	None	N/A	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
High School	378	Computers	120.0	
High School	40	Projector	350.0	
High School	33	TV	120.0	
High School	68	Printer	250.0	
Kitchen	12	Buffett Tables	2,000.0	
High School	12	Mini Fridge	260.0	
High School	8	Coffee Maker	1,100.0	
High School	11	Microwave	1,500.0	
High School	3	Toaster	1,200.0	
High School	29	Fan	100.0	
High School	6	Speakers	150.0	

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Room	1	Refrigerated	Yes	0.00	1,612	0.0	$184.37	$230.00	$0.00	1.25
Faculty Room	1	Non-Refrigerated	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Cafeterias	2	Refrigerated	Yes	0.00	3,224	0.0	$368.74	$460.00	$0.00	1.25
Cafeterias	2	Refrigerated	Yes	0.00	3,224	0.0	$368.74	$460.00	$0.00	1.25
Cafeterias	2	Non-Refrigerated	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gym Hallway	1	Refrigerated	Yes	0.00	1,612	0.0	$184.37	$230.00	$0.00	1.25
Gym Hallway	1	Refrigerated	Yes	0.00	1,612	0.0	$184.37	$230.00	$0.00	1.25
Gym Hallway	1	Non-Refrigerated	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Custom Recommendations

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
378	*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*	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	Weekends & Holidays	Energy Rate (W)*	*Weekly Run Hours*
Existing Conditions	50%	5%	5%	120	**26**	5%	12%	6%	80	**14**	45%	83%	89%	5	**127**
Proposed Conditions	50%	5%	0%	120	**24**	5%	5%	0%	80	**6**	45%	90%	100%	5	**138**

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)
48	238	90%	13,403	$1,533	$15.00	$2,500.0	$8,170	5.33
48	199							

Retro-Commissioning Study & HVAC Improvements

Existing Conditions				Proposed Conditions			Energy Impact & Financial Analysis					
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Gas Use (mmBtu)*	*Annual Heating Oil Use (mmBtu)*	*Annual Motor HVAC Energy Use (kWh)*	Assumed % Cooling Savings	Assumed % Heating Savings	Assumed % Motor 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)
344,148	944.9	12,374.2	928,722	5%	5%	5%	63,643	47	619	$13,377	$78,920	5.90

Equations: (Based on Industry Standards)

Average Cost for retro-commissioining studies and control improvements is $0.30/sqft

Energy savings range between 5% and 20% with a typical payback of two years or less

Based on a comprehensive study by the Environmental Protection Agency, the value of energy savings range from $0.11 and $0.72/sqft

Check Valve Operatoin, Economizer Controls, Temperature and Humidity Sensors, Outdoor air intake contols, Water temperature sensors, Occupancy Schedules, Temperature Setpoints, etc.

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)
344,148	945	12,374	0.5%	4.0%	1,721	38	495	$5,074	$26,035	5.13

	qty	$/unit	est. costs
Weather-strip Exterior Double Doors	23	250	$ 5,750
Weather-strip Exterior Single Doors	9	125	$ 1,125
Caulk the Perimeter of Windows and Wall Cracks	4790	4	$ 19,160
		Total Estimated Costs	**$ 26,035**

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Morris Knolls High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 263,065
Built: 1964

For Year Ending: September 30, 2016
Date Generated: December 07, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Morris Knolls High School 48 Knoll Drive Rockaway, New Jersey 07866	Morris Hills Regional School District 1430 Broadway 10th Floor New York, NY 10018 (____)____-_____	Steven Ternosky 48 Knoll Drive Rockaway, NJ 07866 9736642277 sternosky@mhrd.org

Property ID: 6163854

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
82 kBtu/ft²

Source EUI
154.7 kBtu/ft²

Annual Energy by Fuel

Fuel Oil (No. 2) (kBtu)	11,755,008 (54%)
Natural Gas (kBtu)	942,910 (4%)
Electric - Solar (kBtu)	612,358 (3%)
Electric - Grid (kBtu)	8,253,865 (38%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	81.6
National Median Source EUI (kBtu/ft²)	154
% Diff from National Median Source EUI	0%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,906

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

Aimee Lalonde
1430 Broadway
10th Floor
New York, NY 10018
3479132422
alalonde@trcsolutions.com

Professional Engineer Stamp (if applicable)

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ENERGY STAR® Scorecard

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ENERGY STAR® Score

Morris Knolls High School

Primary Function: K-12 School
Gross Floor Area (ft²): 263,065
Built: 1964

For Year Ending: September 30, 2016
Date Generated: December 07, 2017

Property Address:
Morris Knolls High School
48 Knoll Drive
Rockaway, New Jersey 07866

For the year ending in September 2016, this building used 154.7 (kBtu/ft²) on a source energy basis. The Environmental Protection Agency's (EPA's) 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.

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

Signature of Verifying Professional

I _____ (Name) verify that the information regarding energy use and property use details is true and correct to the best of my knowledge.

Signature: _____Date: _____

ENERGY STAR® Data Verification Checklist

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ENERGY STAR ® Score[1]

Morris Knolls High School

Registry Name: Morris Knolls High School
Property Type: K-12 School
Gross Floor Area (ft²): 263,065
Built: 1964

For Year Ending: 09/30/2016
Date Generated: 12/07/2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Morris Knolls High School 48 Knoll Drive Rockaway, New Jersey 07866 **Property ID:** 6163854	Morris Hills Regional School District 1430 Broadway 10th Floor New York, NY 10018 (____)____-_____	Steven Ternosky 48 Knoll Drive Rockaway, NJ 07866 9736642277 sternosky@mhrd.org

1. Review of Whole Property Characteristics

Basic Property Information

1) **Property Name:** Morris Knolls High School
Is this the official name of the property? ☐ Yes ☐ No

If "No", please specify: _____

2) **Property Type:** K-12 School
Is this an accurate description of the primary use of this property? ☐ Yes ☐ No

3) **Location:** ☐ Yes ☐ No
48 Knoll Drive
Rockaway, New Jersey 07866

Is this correct and complete?

4) **Gross Floor Area:** 263,065 ft² ☐ Yes ☐ No