Local Government Energy Audit Report

Central High School

August 26, 2019

Prepared for:

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Disclaimer

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

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

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

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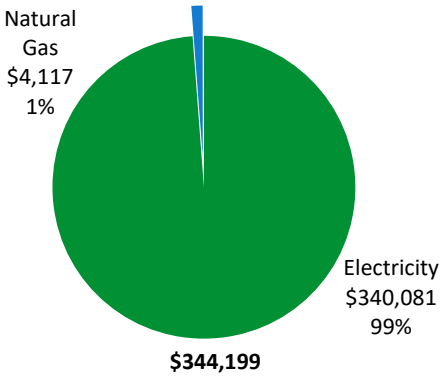
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Central High School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $344,199 Electricity: 3,243,713 kWh Natural Gas: 3,796 Therms	
ENERGY STAR® Benchmarking Score	61 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

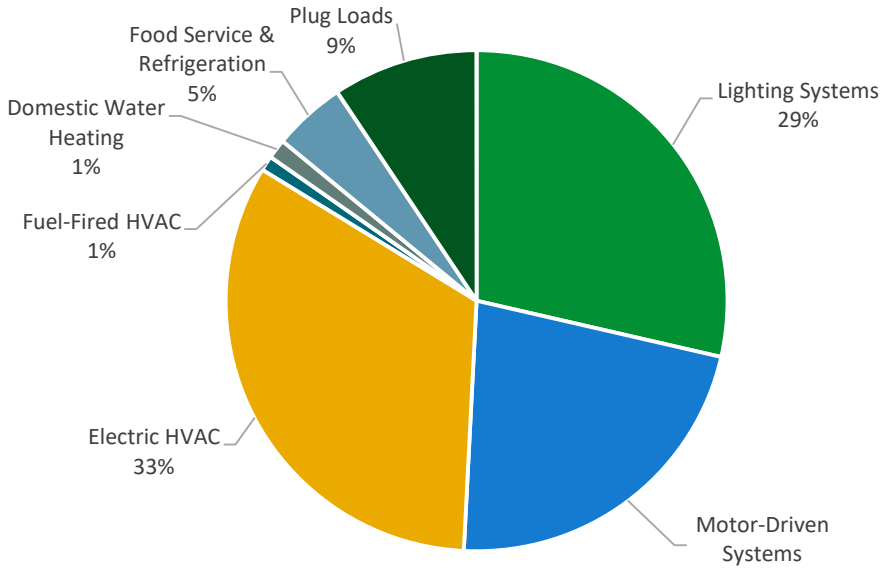


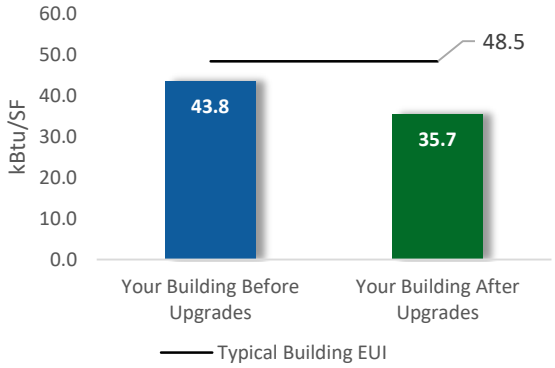
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

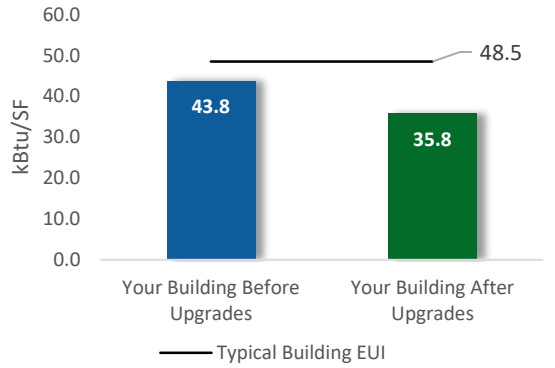
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$482,952
Potential Rebates & Incentives[1]	$52,633
Annual Cost Savings	$69,120
Annual Energy Savings	Electricity: 681,634 kWh
Greenhouse Gas Emission Savings	331 Tons
Simple Payback	6.2 Years
Site Energy Savings (all utilities)	18%



Scenario 2: Cost Effective Package[2]

Installation Cost	$467,267
Potential Rebates & Incentives	$52,633
Annual Cost Savings	$68,518
Annual Energy Savings	Electricity: 675,892 kWh
Greenhouse Gas Emission Savings	328 Tons
Simple Payback	6.1 Years
Site Energy Savings (all utilities)	18%



On-site Generation Potential

Photovoltaic	Medium
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other Program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	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		**392,425**	**79.0**	**0**	**$41,143**	**$283,992**	**$45,411**	**$238,581**	**5.8**	**395,169**
ECM 1	Install LED Fixtures	154,458	22.9	0	$16,194	$154,104	$15,385	$138,719	8.6	155,538
ECM 2	Retrofit Fixtures with LED Lamps	237,967	56.1	0	$24,949	$129,888	$30,026	$99,862	4.0	239,631
Lighting Control Measures		**58,473**	**9.9**	**0**	**$6,131**	**$63,931**	**$6,435**	**$57,496**	**9.4**	**58,882**
ECM 3	Install Occupancy Sensor Lighting Controls	32,599	6.9	0	$3,418	$45,931	$6,435	$39,496	11.6	32,827
ECM 4	Install High/Low Lighting Controls	25,874	3.1	0	$2,713	$18,000	$0	$18,000	6.6	26,055
Motor Upgrades		**505**	**0.2**	**0**	**$53**	**$3,256**	**$0**	**$3,256**	**61.5**	**508**
ECM 5	Premium Efficiency Motors	505	0.2	0	$53	$3,256	$0	$3,256	61.5	508
HVAC System Improvements		**4,217**	**0.0**	**0**	**$442**	**$10,875**	**$0**	**$10,875**	**24.6**	**4,247**
ECM 6	Implement Demand Control Ventilation (DCV)	4,217	0.0	0	$442	$10,875	$0	$10,875	24.6	4,247
Domestic Water Heating Upgrade		**0**	**0.0**	**28**	**$309**	**$430**	**$0**	**$430**	**1.4**	**3,333**
ECM 7	Install Low-Flow DHW Devices	0	0.0	28	$309	$430	$0	$430	1.4	3,333
Food Service & Refrigeration Measures		**20,552**	**1.9**	**0**	**$2,155**	**$8,992**	**$500**	**$8,492**	**3.9**	**20,696**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,587	0.6	0	$481	$1,213	$0	$1,213	2.5	4,619
ECM 9	Refrigeration Controls	5,858	0.2	0	$614	$4,385	$250	$4,135	6.7	5,899
ECM 10	Replace Refrigeration Equipment	1,020	0.1	0	$107	$1,554	$0	$1,554	14.5	1,027
ECM 11	Vending Machine Control	9,087	1.0	0	$953	$1,840	$250	$1,590	1.7	9,150
Custom Measures		**203,562**	**42.0**	**-245**	**$18,688**	**$111,475**	**$287**	**$111,188**	**5.9**	**176,341**
ECM 12	Computer Power Management Software	23,110	0.0	0	$2,423	$9,475	$0	$9,475	3.9	23,271
ECM 13	Retro-Commissioning Study & HVAC Improvements	114,753	0.0	5	$12,080	$78,000	$0	$78,000	6.5	116,083
ECM 14	Pool Heating System Upgrades	65,700	42.0	-249	$4,185	$24,000	$287	$23,713	5.7	36,987
TOTALS (COST EFFECTIVE MEASURES)		**673,992**	**132.7**	**-216**	**$68,319**	**$467,267**	**$52,633**	**$414,634**	**6.1**	**653,394**
TOTALS (ALL MEASURES)		**679,735**	**133.1**	**-216**	**$68,921**	**$482,952**	**$52,633**	**$430,319**	**6.2**	**659,176**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 2 – Evaluated Energy Improvements

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey's Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	x		x
ECM 2	Retrofit Fixtures with LED Lamps	x		x
ECM 3	Install Occupancy Sensor Lighting Controls	x		x
ECM 4	Install High/Low Lighting Controls			x
ECM 5	Install Low-Flow Domestic Hot Water Devices			x
ECM 6	Refrigerator/Freezer Case Electrically Commutated Motors			x
ECM 7	Refrigeration Controls			x
ECM 8	Vending Machine Control	x		x
ECM 9	Computer Power Management Software			x
ECM 10	Retro-Commissioning Study & HVAC Improvements			x
ECM 11	Pool Heating System Upgrades	x		x

Figure 3 – Funding Options

New Jersey's Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified partner to develop your energy reduction plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

For facilities wishing 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, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures. Direct Install contractors will assess and verify individual measure eligibility and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. 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.

More Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat & Power (CHP)

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce their electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Central High School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

2.1 Site Overview

On November 15, 2018, TRC performed an energy audit at Central High School located in Newark, New Jersey. TRC met with Mark Hurff, facility building engineer, to review facility operations and help focus our investigation on specific energy-using systems.

Central High School is a four-story, 261,361 square foot building built in 2008. Spaces include: classrooms, gymnasium, auxiliary gym, library/media center, natatorium, auditorium, offices, cafeteria, kitchen, restrooms, corridors, stairwells, and mechanical space. The building is 100 percent heated and 100 percent cooled.

Over the last five years the facility has replaced the existing metal halide lamp up light fixtures in the Natatorium with LED lamps. The LED retrofit lamps used within these indirect light fixtures did not result in adequate light levels in the space. Additionally, the facility has retrofitted existing metal halide light fixtures in the atrium with LED lamps. The LED retrofit lamps within these direct light fixtures did result in adequate light levels.

Facility staff's main concern is the energy management system (EMS) operation. Facility staff reported that the EMS was supposed to be upgraded a few years ago with about 5000 points added for expanding the EMS. There is a frequent issue with equipment falling offline. Another main concern is the light levels in the Natatorium. Other reported concerns from facility staff include the pool water heating system relying on an electric boiler, heat loss through double doors during security check at all four entrances, and the electric heaters in the ceiling circulating hot air without adequate throw fans.

2.2 Building Occupancy

The facility is occupied from September through June. Typical weekday occupancy is 135 staff and 845 students. Summer occupancy includes continuing custodial and maintenance activities. The sites used by the Newark Public School District for summer school varies on an annual basis. It should be noted that the energy and economic analysis for this building is based on the use of the building during the utility billing period; results will vary based on changes to building use patterns.

Occupancy	Weekday/Weekend	Operating Schedule
Normal School Day	Weekday	6:30AM - 7:00PM
	Weekend (Saturday)	6:30AM - 7:00PM
After Hours Cleaning	Weekday	7:00PM - 11:00PM
	Weekend	7:00PM - 11:00PM
Summer School	Weekday	6:30AM - 7:00PM
	Weekend (Saturday)	6:30AM - 7:00PM

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

The building is constructed of concrete masonry units (CMU) with structural steel framing. The façade is concrete panels, brick, and fixed glass panes. The interior walls are a mix of concrete, drywall, and CMU. It is assumed walls have adequate insulation. The roof is flat with built up system with a rubber membrane above steel decking.

Most of the windows are double pane with aluminum frames with a thermal break. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors are metal or double pane glass doors with metal frames. They are in good condition with undamaged door seals.

Building Facade

Building Facade

Roof

Roof

2.4 Lighting Systems

The primary interior lighting system uses 2' 17-Watt and 4' 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt compact fluorescent biax lamp fixtures in the auxiliary gym, hallways, and restrooms. The main gymnasium is lit by 8-lamp compact fluorescent high bay fixtures. The lobby, main gymnasium, and auditorium are also lit by metal halide lamp fixtures. The auditorium is also lit by high output halogen incandescent lamp fixtures. Additionally, there are several compact fluorescent lamp recessed can fixtures. Typically, fluorescent lamps use electronic ballasts. Fixtures throughout the building include wall mounted and pendant mounted up light fixtures, recessed troffer fixtures, and strip fixtures. Most fixtures are in good condition; however, kitchen light fixtures were noted to have missing or broken lenses. All exit signs throughout the building are LED.

All interior lighting levels were generally sufficient; however, the natatorium is under-lit. Over the last five years, the facility has replaced the existing metal halide lamp up light fixtures in the Natatorium with LED lamps. The LED retrofit lamps used within these indirect light fixtures did not result in adequate light levels in the space. Additionally, the facility has retrofitted existing metal halide light fixtures in the atrium with LED lamps. The LED retrofit lamps within these direct light fixtures did result in adequate light levels.

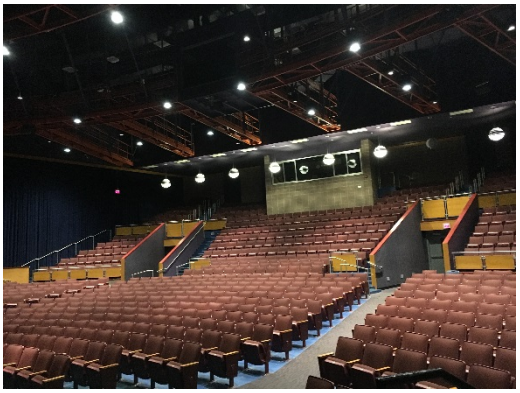
The majority of interior light fixtures are controlled by occupancy based sensors, some are manually controlled via wall switches. Restrooms and hallway area light fixtures are controlled by key switches.

Hallway T8 Lighting

Natatorium Lighting

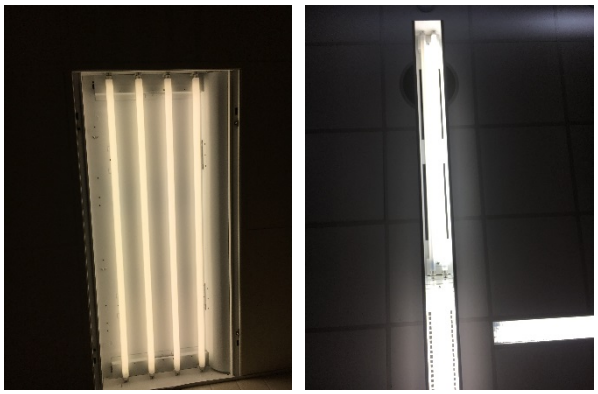
Main Gym Lighting

Auxiliary Gym Lighting

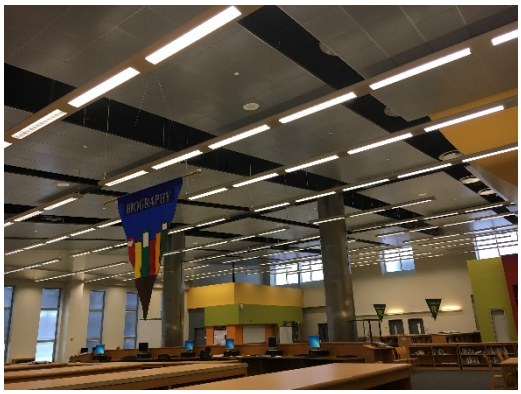


Auditorium Lighting

Cafeteria Lighting



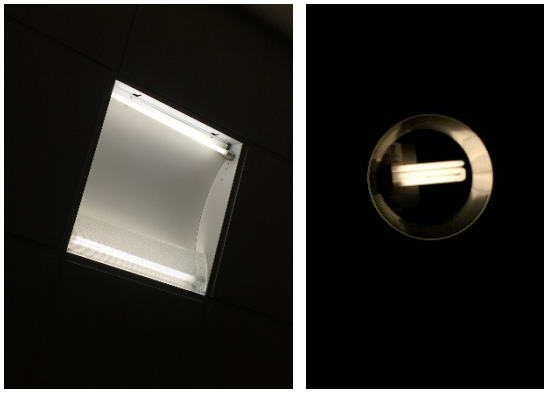
Linear Fluorescent T8 Fixtures



Library Lighting

Linear Fluorescent T8 Fixtures

Classroom Lighting



Compact Fluorescent Biax Lamp Fixtures

Compact Fluorescent Biax Lamp Fixtures

Wall Switches

Wall Switches

Exterior lighting is provided by pole-mounted walkway and parking lot fixtures as well as building-mounted fixtures with metal halide lamps and ballasts. The sports field lighting is provided by pole-mounted metal halide lamp fixtures. Exterior light fixtures are controlled by time clocks.

Wall Mounted Metal Halide Fixture

Pole Mounted Metal Halide Fixtures

2.5 Air Handling Systems

Ground Source Heat Pumps (GSHPs)

The building is conditioned by a high efficiency GSHP system. There are approximately 165 zones within the heat pump system that are part of a closed loop system served by geothermal wells and a cooling tower located on the roof of the building. The heat pumps are located above the corridor ceilings and are ducted into each room. The heat pumps serve the 1st, 2nd, and 3rd floor classrooms. The average cooling capacity is three tons, and the average heating capacity is 558 Mbh. The average cooling efficiency is 14.6 EER and the average heating efficiency is 4.5 COP. Equipment is in good condition, is controlled by the existing building EMS, and is scheduled to operate Monday through Friday, 7:00AM – 5:00PM.

Energy Recovery Ventilators (ERVs)

The 100 percent outdoor air ERVs located on the roof contain small electric pre-heat coils, supply, and exhaust motor driven fans and enthalpy heat wheels. The ERVs exhaust 100 percent of the conditioned air, which is used to pre-condition the outdoor air prior to final conditioning of the supply air by heat pumps to the building. Equipment is in good condition, is controlled by the EMS, and is scheduled to operate Monday through Saturday, 6:00 AM – 7:00 PM.

ERVs

ERVs

General Building Exhaust

The restrooms and other areas are exhausted by motor driven exhaust fans. Some classrooms including science rooms, art rooms, and fabrication rooms have specialty exhaust and fume-hood exhaust fans, which are not frequently in use. The kitchen has an exhaust fan that serves all of the kitchen hoods. There are also general exhaust fans throughout the building that exhaust corridors and miscellaneous rooms. Equipment is in good condition and is controlled by the existing EMS.

Roof Top Units (RTUs)

Heating and cooling for larger occupied areas such as the cafeteria, auditorium, gymnasiums, and media center are provided by roof-mounted packaged geothermal heat pump units connected to ducted distribution systems. These range between 7.5 Ton and 92 Ton units, which have cooling efficiencies between 14.5 EER and 15.6 EER. These range between 197 Mbh and 1196 Mbh in heating capacity with an average efficiency of three coefficient of performance. Equipment is in good condition and is controlled by the EMS.

RTU with Gas Heat

RTUs

Make Up Air Units (MUAs)

The kitchen areas are served by makeup air units with gas fired furnaces. These are about 40 Mbh in heating capacity and operate with an 80 percent heating efficiency. Equipment is in good condition and is controlled by the EMS.

MUAs

Unit	Description / Area Served	EMS Schedule	Manufacturer	Model
RTU-1	48 Ton Rooftop Heat Pump Serving the Stage	M-F, 8:00AM - 4:00PM	Coolbreeze	CWEBCP-504HP
RTU-2	92 Ton Rooftop Heat Pump Serving Auditorium	M-F, 8:00AM - 4:00PM	Coolbreeze	CWEBDP-906HP
RTU-3a	27 Ton Rooftop Heat Pump Serving the Lobby	M-F, 6:00AM - 7:00PM	Addison	DW300K24A with 40kW Heating Coil
RTU-3b	19 Ton Rooftop Heat Pump Serving the Lobby	M-F, 6:00AM - 7:00PM	Addison	Unreadable with 40kW Heating Coil
RTU-3c	19 Ton Rooftop Heat Pump Serving the Lobby	M-F, 6:00AM - 7:00PM	Addison	DW180K24A with 40kW Heating Coil
RTU-8a	50 Ton Rooftop Heat Pump Serving the Media Center	M-F, 8:00AM - 4:00PM	Coolbreeze	CWEBDP-504HP
RTU-13	27 Ton Rooftop Heat Pump Serving the Cafeteria	M-F, 8:00AM - 5:00PM	Addison	DW300N24A

RTU-15	24 Ton Make Up Air Unit w/Gas Heat Serving the Kitchen	M-F, 7:00AM - 3:00PM	Addison	DW240H24A
RTU-9	7.5 Ton Roof Top Unit Serves the Aux Gym	M-S, 6:00AM - 7:00PM	Venmar	15kW Electric Heating Coil
RTU-11	20 Ton Roof Top Unit Serves the Main Gym	M-S, 6:00AM - 7:00PM	Venmar	80kW Electric Heating Coil
RTU-14	15 Ton Roof Top Unit Serves the Pool	M-F, 7:00AM - 7:00PM	PoolPak	SWHP190-25E-B08-R22 with 45kW Duct Heater
MUA-1	40 Mbh Gas Furnace within a Make Up Air Unit serving a Kitchen	M-F, 7:00AM - 3:00PM	Captive-Aire	A2-D.500-G10
MUA-2	40 Mbh Gas Furnace within a Make Up Air Unit serving a Kitchen	M-F, 7:00AM - 3:00PM	Captive-Aire	A1-D.250-G10

2.6 Heat Pump System

This building is heated and cooled by a geothermal heat pump system. The closed loop system is connected to a bore field array located beneath the sports field. This includes about 500 vertical wells that run about 500 feet deep into the ground. The geothermal water is circulated throughout the system by three 50 hp pumps that operate with two lead pumps and one backup and are controlled by variable frequency drives (VFDs). There are also two 5 hp pumps that operate with a lead/lag control scheme and are controlled by VFDs. The loop temperature averages about 60°F in the winter and 90°F in the summer.

The water source heat pumps also provide the cooling for the majority of the building. Heat is rejected from the system loop to two cooling towers located on the roof when the water temperature exceeds 90°F. Each cooling tower has one 40 hp cooling tower fan motor and one 5 hp pump that runs in the winter for freeze protection. Equipment is in good condition and is controlled by the existing building EMS.

GSHP System Wells

Evapco Cooling Tower

50 hp GSHP Loop Pumps

5 hp GSHP Loop Pumps

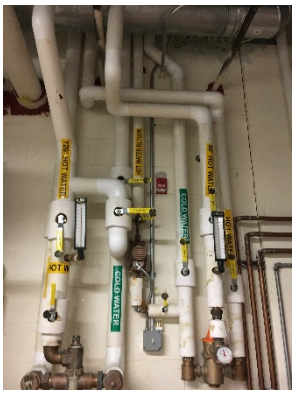
2.7 Building Energy Management Systems

This building is controlled by a Honeywell building EMS. The system was not accessible at the time of the audit; however, detailed information regarding set points and schedules were provided by the building engineer. The computerized system is set up with graphics that display information for the majority of HVAC equipment and systems. The EMS provides equipment schedule control and controls space temperatures, supply air temperatures, humidity, heat pump loop temperatures flows, damper positions, pressure, etc. In general, heating set points were 70-74°F with a setback to 60-64°F during unoccupied periods of time. In general, cooling set points were 70-74°F with a setback to 80°F during unoccupied periods of time. EMS sensors need to be recalibrated every few years, and this system has not been recalibrated since it was installed in 2008. The site staff expressed an interest in retro-commissioning and expanding the level of control provided by the EMS.

2.8 Domestic Hot Water (DHW)

Hot water is produced with three 800 Mbh gas fired storage tank water heaters with an efficiency of 80 percent. These are custom built AO Smith DHW boilers equipped with PowerFlame burners that modulate between 600-1260 Mbh. Each has a capacity of 300 gallons. There are several fractional horsepower circulation pumps distribute water to end uses. The domestic hot water pipes are insulated, and the insulation is in good condition.

Custom Storage Tank Water Heaters



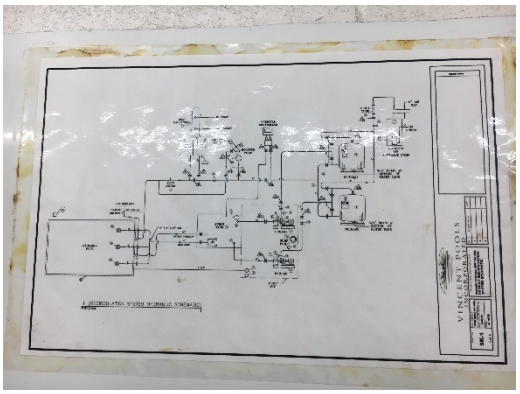
Distribution Piping

Restroom Hand Washing Sinks

High Flow Sink Aerator

2.9 Pool Water Heating System

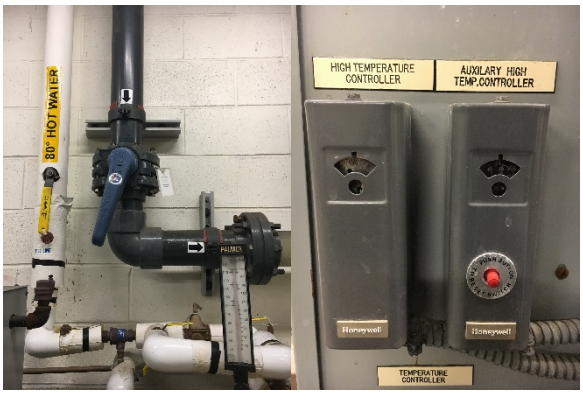
Pool water is heated by a 60kW electric pool hot water boiler. The system includes the use of a heat exchanger, filter tanks with two 7.5 HP motor driven pumps, two 1 hp circulation pumps, and four fractional horsepower water circulators. The pool is open year round and does not currently have a cover. The Natatorium is occupied 7:00AM – 7:00PM every day. Facility staff reported that the water is maintained at 84°F and the space conditions are maintained at 85°F and 60 percent humidity. The natatorium is ventilated and de-humidified by a PoolPak unit located on the roof.



System Schematic

Heat Exchanger

Filter Tanks



Piping and Temperature Gauges

2.10 Food Service Equipment

The kitchen is used for heat food for students. Majority of cooking is done off-site and equipment in the building is used to re-heat. Equipment includes electric oven. There is a gas oven as well as an electric fryer, griddle, and oven. Equipment is high efficiency and in good condition. Per discussions with kitchen staff, the electric heating cabinets are broken, and the dishwasher is not used.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Food Service Equipment

Food Service Equipment

2.11 Refrigeration

The kitchen has two stand-up refrigerators with solid doors and a stand-up freezer with solid doors. This equipment is in good condition and has high efficiency. There is a refrigerator chest in an office lounge area. The kitchen also has an ice maker that is in good condition. The kitchen has a walk-in cooler with a walk-in freezer.

The walk-in refrigerator has an estimated 2 ton compressor and a two-fan evaporator. The walk-in medium temperature freezer has an estimated 3 ton compressor and a two-fan evaporator. Both walk-ins appear to not have evaporator fan or electric defrost controls.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Stand-up Refrigeration Equipment

Ice Maker

Walk-in Refrigeration Indoor Evaporator

Walk-in Refrigeration Outdoor Compressors

2.12 Plug Load & Vending Machines

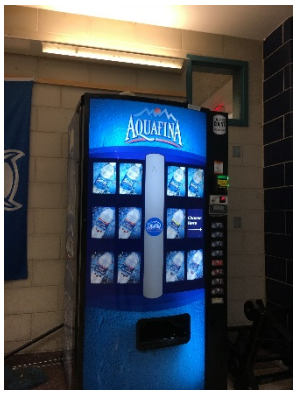
The utility bill analysis indicates that plug loads consume approximately 9 percent of total building energy use. This is higher than a typical building. You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area as well as energy efficient best practices.

There are approximately 465 computer work stations throughout the facility and about 845 laptops/chrome-books on site. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as small office printers, smart boards, and projectors.

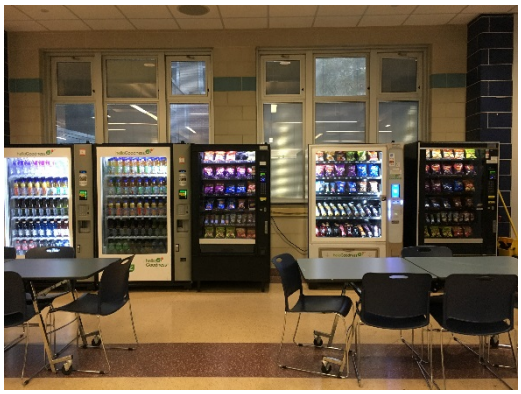
There are several residential style refrigerators throughout the building. These vary in condition and efficiency. There are five refrigerated beverage vending machines and three non-refrigerated vending machines. Vending machines are/not equipped with occupancy-based controls.

Computers

Electric Ovens in Home Economics Classroom



Drink Vending Machine



Vending Machines

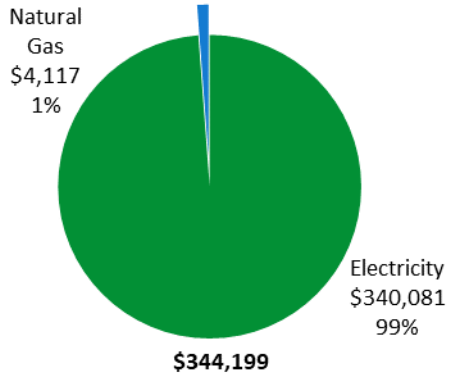
2.13 Water-Using Systems

There are restrooms with toilets, urinals, and sinks throughout the building. Faucet flow rates are high flow rated for 2.2 gpm gallons per minute (gpm) and a few sinks are low flow 0.5 gpm. Showers in the locker rooms are not used. Toilets and urinals vary in rated gallons per flush (gpf).

3 ENERGY USE AND COSTS

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	3,243,713 kWh	$340,081
Natural Gas	3,796 Therms	$4,117
Total		**$344,199**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

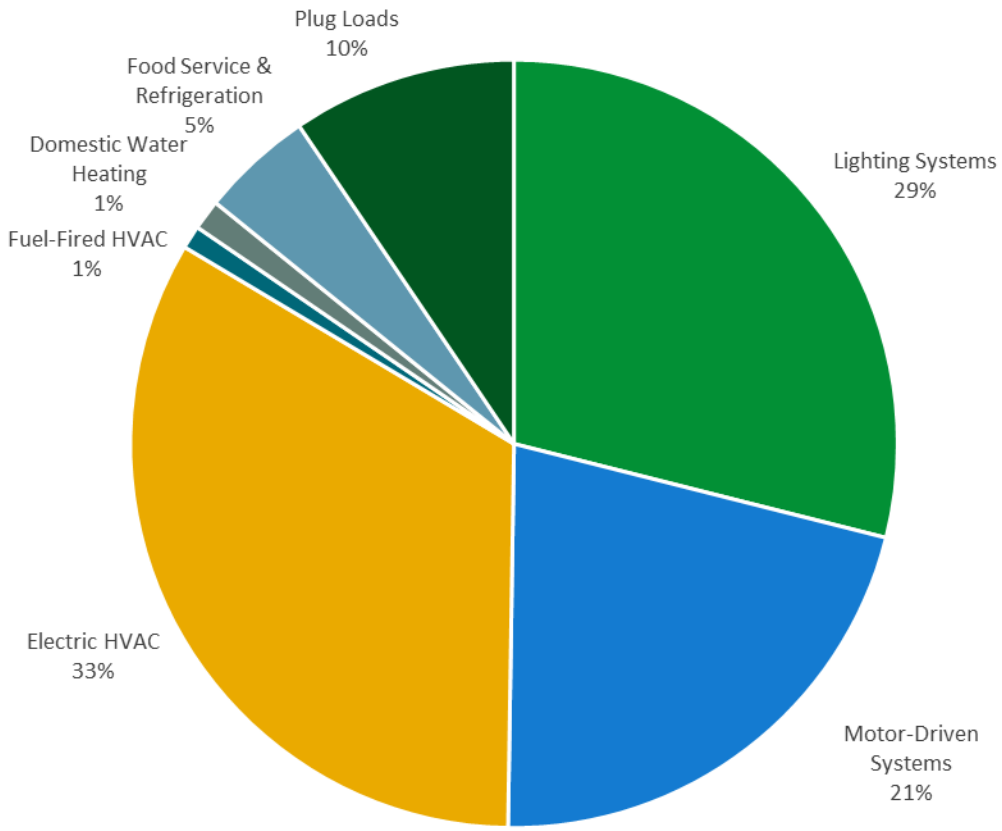
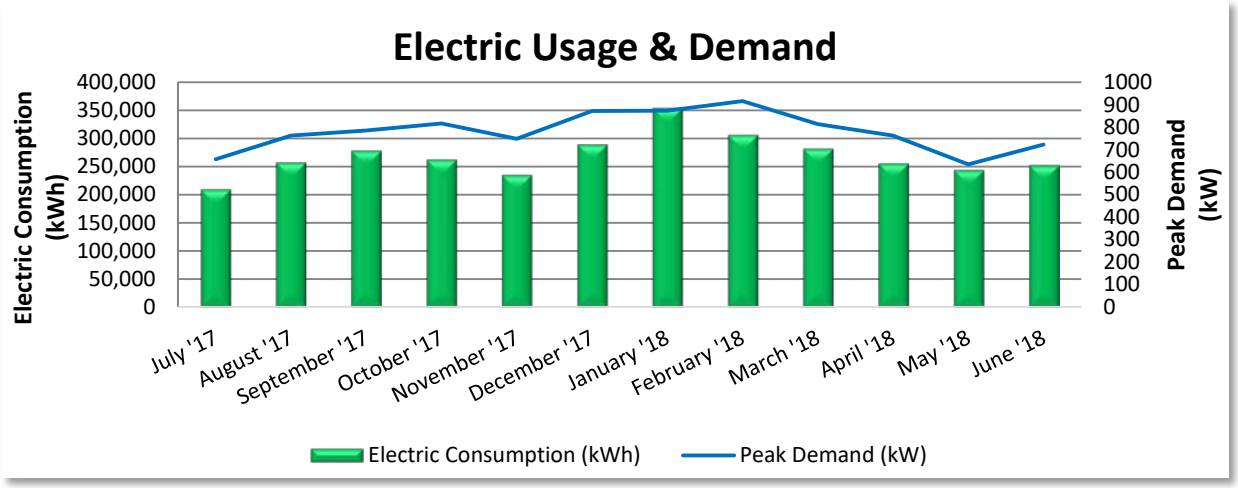


Figure 5 - Energy Balance

3.1 Electricity

PSE&G supplies and delivers electricity under rate class LPLS.



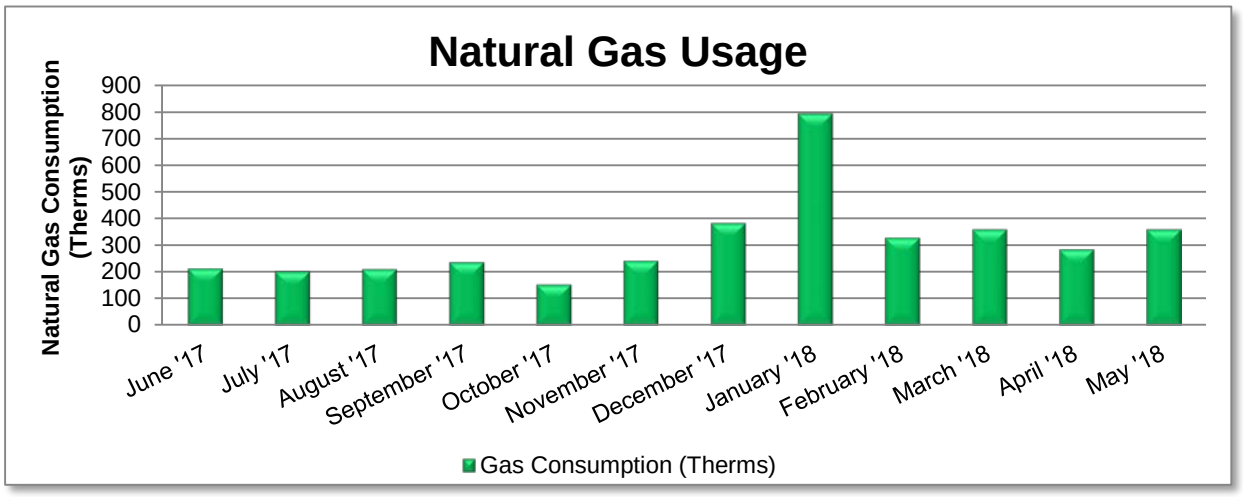
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/22/17	29	210,407	658	$2,478	$28,482
8/20/17	29	257,762	764	$2,876	$29,218
9/21/17	32	279,160	786	$2,962	$29,407
10/20/17	29	263,393	817	$3,076	$24,763
11/18/17	29	235,740	748	$2,819	$22,998
12/20/17	32	290,006	872	$3,284	$24,570
1/21/18	32	354,973	874	$3,294	$63,569
2/19/18	29	307,025	917	$3,455	$27,189
3/23/18	32	282,634	814	$3,066	$23,856
4/22/18	30	256,557	764	$2,876	$20,780
5/21/18	29	244,248	635	$2,392	$15,824
6/22/18	32	252,921	723	$2,724	$28,494
Totals	**364**	**3,234,826**	**917**	**$35,304**	**$339,149**
Annual	**365**	**3,243,713**	**917**	**$35,401**	**$340,081**

Notes:

- Peak demand of 917 kW occurred in February '18.
- The average electric cost over the past 12 months was $0.105/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.
- The average demand across these twelve months of data is 781 kW.
- PSE&G rents the roof space of this building for a PV System. The PV System is owned and maintained by PSE&G. All of the electrical generation is sent back to the grid. None of the electricity generated by this system is used to lower the building's demand or consumption.

3.2 Natural Gas

PSE&G supplies and delivers natural gas under rate class LVG.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
7/4/17	29	214	$246
8/3/17	30	204	$237
9/3/17	31	212	$240
10/2/17	29	238	$256
10/31/17	29	155	$268
12/3/17	33	243	$321
1/3/18	31	385	$431
2/1/18	29	796	$751
3/5/18	32	330	$427
4/4/18	30	361	$323
5/3/18	29	286	$279
6/4/18	32	361	$328
Totals	**364**	**3,785**	**$4,106**
Annual	**365**	**3,796**	**$4,117**

Notes:

- The average gas cost for the past 12 months is $1.085/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	61

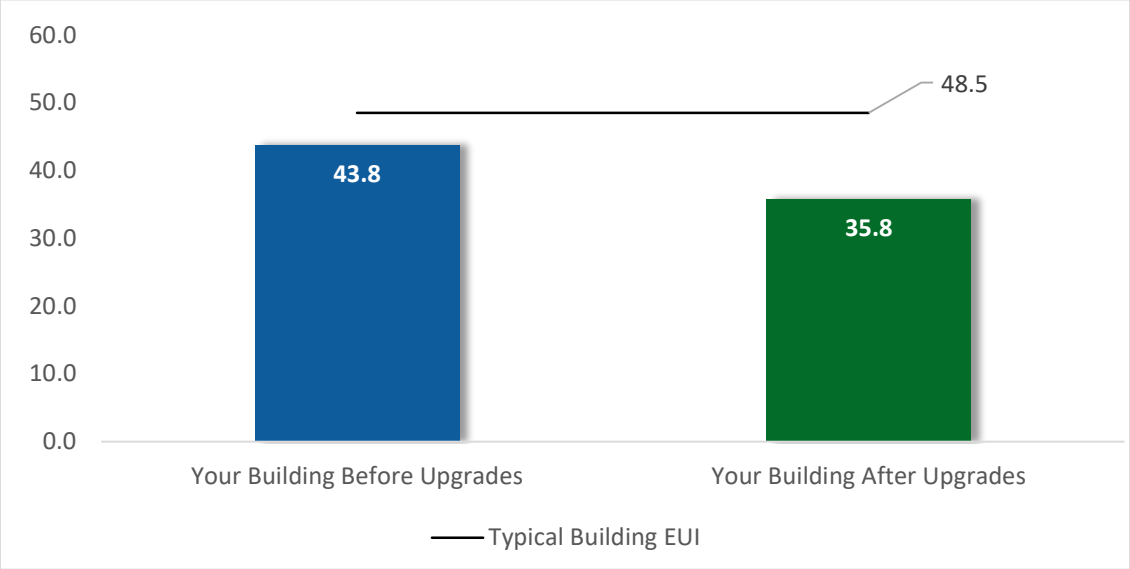


Figure 6 - Energy Use Intensity Comparison

This building performs at, or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause as building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[3].

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1

4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is 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.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

#	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		**392,425**	**79.0**	**0**	**$41,143**	**$283,992**	**$45,411**	**$238,581**	**5.8**	**395,169**
ECM 1	Install LED Fixtures	154,458	22.9	0	$16,194	$154,104	$15,385	$138,719	8.6	155,538
ECM 2	Retrofit Fixtures with LED Lamps	237,967	56.1	0	$24,949	$129,888	$30,026	$99,862	4.0	239,631
Lighting Control Measures		**58,473**	**9.9**	**0**	**$6,131**	**$63,931**	**$6,435**	**$57,496**	**9.4**	**58,882**
ECM 3	Install Occupancy Sensor Lighting Controls	32,599	6.9	0	$3,418	$45,931	$6,435	$39,496	11.6	32,827
ECM 4	Install High/Low Lighting Controls	25,874	3.1	0	$2,713	$18,000	$0	$18,000	6.6	26,055
Motor Upgrades		**505**	**0.2**	**0**	**$53**	**$3,256**	**$0**	**$3,256**	**61.5**	**508**
ECM 5	Premium Efficiency Motors	505	0.2	0	$53	$3,256	$0	$3,256	61.5	508
HVAC System Improvements		**4,217**	**0.0**	**0**	**$442**	**$10,875**	**$0**	**$10,875**	**24.6**	**4,247**
ECM 6	Implement Demand Control Ventilation (DCV)	4,217	0.0	0	$442	$10,875	$0	$10,875	24.6	4,247
Domestic Water Heating Upgrade		**0**	**0.0**	**28**	**$309**	**$430**	**$0**	**$430**	**1.4**	**3,333**
ECM 7	Install Low-Flow DHW Devices	0	0.0	28	$309	$430	$0	$430	1.4	3,333
Food Service & Refrigeration Measures		**20,552**	**1.9**	**0**	**$2,155**	**$8,992**	**$500**	**$8,492**	**3.9**	**20,696**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,587	0.6	0	$481	$1,213	$0	$1,213	2.5	4,619
ECM 9	Refrigeration Controls	5,858	0.2	0	$614	$4,385	$250	$4,135	6.7	5,899
ECM 10	Replace Refrigeration Equipment	1,020	0.1	0	$107	$1,554	$0	$1,554	14.5	1,027
ECM 11	Vending Machine Control	9,087	1.0	0	$953	$1,840	$250	$1,590	1.7	9,150
Custom Measures		**203,562**	**42.0**	**-245**	**$18,688**	**$111,475**	**$287**	**$111,188**	**5.9**	**176,341**
ECM 12	Computer Power Management Software	23,110	0.0	0	$2,423	$9,475	$0	$9,475	3.9	23,271
ECM 13	Retro-Commissioning Study & HVAC Improvements	114,753	0.0	5	$12,080	$78,000	$0	$78,000	6.5	116,083
ECM 14	Pool Heating System Upgrades	65,700	42.0	-249	$4,185	$24,000	$287	$23,713	5.7	36,987
TOTALS		**679,735**	**133.1**	**-216**	**$68,921**	**$482,952**	**$52,633**	**$430,319**	**6.2**	**659,176**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 7 – All Evaluated 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		**392,425**	**79.0**	**0**	**$41,143**	**$283,992**	**$45,411**	**$238,581**	**5.8**	**395,169**
ECM 1	Install LED Fixtures	154,458	22.9	0	$16,194	$154,104	$15,385	$138,719	8.6	155,538
ECM 2	Retrofit Fixtures with LED Lamps	237,967	56.1	0	$24,949	$129,888	$30,026	$99,862	4.0	239,631
Lighting Control Measures		**58,473**	**9.9**	**0**	**$6,131**	**$63,931**	**$6,435**	**$57,496**	**9.4**	**58,882**
ECM 3	Install Occupancy Sensor Lighting Controls	32,599	6.9	0	$3,418	$45,931	$6,435	$39,496	11.6	32,827
ECM 4	Install High/Low Lighting Controls	25,874	3.1	0	$2,713	$18,000	$0	$18,000	6.6	26,055
Domestic Water Heating Upgrade		**0**	**0.0**	**28**	**$309**	**$430**	**$0**	**$430**	**1.4**	**3,333**
ECM 7	Install Low-Flow DHW Devices	0	0.0	28	$309	$430	$0	$430	1.4	3,333
Food Service & Refrigeration Measures		**19,532**	**1.8**	**0**	**$2,048**	**$7,438**	**$500**	**$6,938**	**3.4**	**19,668**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,587	0.6	0	$481	$1,213	$0	$1,213	2.5	4,619
ECM 9	Refrigeration Controls	5,858	0.2	0	$614	$4,385	$250	$4,135	6.7	5,899
ECM 11	Vending Machine Control	9,087	1.0	0	$953	$1,840	$250	$1,590	1.7	9,150
Custom Measures		**203,562**	**42.0**	**-245**	**$18,688**	**$111,475**	**$287**	**$111,188**	**5.9**	**176,341**
ECM 12	Computer Power Management Software	23,110	0.0	0	$2,423	$9,475	$0	$9,475	3.9	23,271
ECM 13	Retro-Commissioning Study & HVAC Improvements	114,753	0.0	5	$12,080	$78,000	$0	$78,000	6.5	116,083
ECM 14	Pool Heating System Upgrades	65,700	42.0	-249	$4,185	$24,000	$287	$23,713	5.7	36,987
TOTALS		**673,992**	**132.7**	**-216**	**$68,319**	**$467,267**	**$52,633**	**$414,634**	**6.1**	**653,394**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	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		**392,425**	**79.0**	**0**	**$41,143**	**$283,992**	**$45,411**	**$238,581**	**5.8**	**395,169**
ECM 1	Install LED Fixtures	154,458	22.9	0	$16,194	$154,104	$15,385	$138,719	8.6	155,538
ECM 2	Retrofit Fixtures with LED Lamps	237,967	56.1	0	$24,949	$129,888	$30,026	$99,862	4.0	239,631

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources are proposed, we suggest converting all of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing exterior fixtures containing metal halide lamps with new LED light fixtures. Replace existing fixtures containing metal halide lamps in the lobby, main gym and auditorium with new LED light fixtures. This measure also includes the replacement of the compact fluorescent lamp high bay fixtures in the main gym and the halogen incandescent lamp fixtures in the auditorium with LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofit with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: lobby, main gym, auditorium, lobby, and exterior fixtures.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent (both linear and compact) lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected building areas: all areas with fluorescent fixtures with T8 tubes and compact fluorescent biax lamps.

4.2 Lighting Controls

#	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		**58,473**	**9.9**	**0**	**$6,131**	**$63,931**	**$6,435**	**$57,496**	**9.4**	**58,882**
ECM 3	Install Occupancy Sensor Lighting Controls	32,599	6.9	0	$3,418	$45,931	$6,435	$39,496	11.6	32,827
ECM 4	Install High/Low Lighting Controls	25,874	3.1	0	$2,713	$18,000	$0	$18,000	6.6	26,055

Lighting controls reduce energy use by turning off or lowering, lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, conference rooms, classrooms, cafeteria, gymnasiums, library/media center, restrooms, and storage rooms.

ECM 4: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected building areas: hallways.

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

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**505**	**0.2**	**0**	**$53**	**$3,256**	**$0**	**$3,256**	**61.5**	**508**
ECM 5	Premium Efficiency Motors	505	0.2	0	$53	$3,256	$0	$3,256	61.5	508

Replacing the motors with premium efficient motors has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units Central High School are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the motors are eventually replaced, consider purchasing premium efficient motors.

ECM 5: Premium Efficiency Motors

Replace standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor
Mechanical Room	Pool Filter Pumps	2	Process Pump	7.5
Mechanical Room	Pool HX Circulators	2	Process Pump	1.0

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**4,217**	**0.0**	**0**	**$442**	**$10,875**	**$0**	**$10,875**	**24.6**	**4,247**
ECM 6	Implement Demand Control Ventilation (DCV)	4,217	0.0	0	$442	$10,875	$0	$10,875	24.6	4,247

Upgrading controls has a long payback period and may not be justifiable based simply on energy considerations. However, the existing operational settings of these units would need to be further investigated and confirmed to determine cost effectiveness of this measure.

ECM 6: Implement Demand Control Ventilation (DCV)

Demand control ventilation (DCV) monitors the indoor air's carbon dioxide (CO_2) content to measure room occupancy. This data is used to regulate the amount of outdoor air provided to the space for ventilation.

Standard ventilation systems often provide outside air based on a space's estimated maximum occupancy but not actual occupancy. During low occupancy periods, the space may then be over ventilated. This wastes energy through excessive fan motor usage as well as heating and cooling the excess outside air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels. DCV is most suited for facilities where occupancy levels vary significantly from hour to hour and day to day.

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

Affected building areas: gymnasium, cafeteria, auditorium, and pool.

4.5 Domestic Water Heating

#	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**	**28**	**$309**	**$430**	**$0**	**$430**	**1.4**	**3,333**
ECM 7	Install Low-Flow DHW Devices	0	0.0	28	$309	$430	$0	$430	1.4	3,333

ECM 7: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following are low flow rates for devices. We are recommended to reduce hot water usage by replacing faucet aerators in restrooms.

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm

Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. Additional cost savings may result from reduced water usage.

4.6 Food Service & Refrigeration Measures

#	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 & Refrigeration Measures		**20,552**	**1.9**	**0**	**$2,155**	**$8,992**	**$500**	**$8,492**	**3.9**	**20,696**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,587	0.6	0	$481	$1,213	$0	$1,213	2.5	4,619
ECM 9	Refrigeration Controls	5,858	0.2	0	$614	$4,385	$250	$4,135	6.7	5,899
ECM 10	Replace Refrigeration Equipment	1,020	0.1	0	$107	$1,554	$0	$1,554	14.5	1,027
ECM 11	Vending Machine Control	9,087	1.0	0	$953	$1,840	$250	$1,590	1.7	9,150

ECM 8: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in the walk-in cooler and freezer. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 9: Refrigeration Controls

Install additional controls to optimize the operation of walk-in coolers and freezers. Many walk-in coolers and freezers have continuously operating electric heaters on the doors to prevent condensation formation. This measure adds a control system feature to shut off the door heaters when the humidity level is low enough that condensation will not occur if the heaters are off. This is done by measuring the ambient humidity and temperature of the store, comparing that to the dewpoint, and using pulse width modulation to control the anti-sweat door heaters.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, which reduces annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric defrost mechanism.

Many walk-in coolers and freezers have evaporator fans that run continuously. The measure adds a control system feature to automatically shut off evaporator fans when not needed.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

ECM 10: Replace Refrigeration Equipment

Replace the existing refrigerator chest with a new ENERGY STAR® rated piece of equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

ECM 11: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and, they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

4.7 Custom Measures

#	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		**203,562**	**42.0**	**-245**	**$18,688**	**$111,475**	**$287**	**$111,188**	**5.9**	**176,341**
ECM 12	Computer Power Management Software	23,110	0.0	0	$2,423	$9,475	$0	$9,475	3.9	23,271
ECM 13	Retro-Commissioning Study & HVAC Improvements	114,753	0.0	5	$12,080	$78,000	$0	$78,000	6.5	116,083
ECM 14	Pool Heating System Upgrades	65,700	42.0	-249	$4,185	$24,000	$287	$23,713	5.7	36,987

ECM 12: Computer Power Management Software

We evaluated the implementation of computer power management software at a high level. 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.

This measure in effort to increase the plug load management of the school district was of interest for facility personnel. Further analysis should be conducted for the feasibility of this measure. An entire baseline tracking of existing computing fleet energy use would need to be performed to optimize proposed software strategies. This would need to be implemented in conjunction with the IT department. This is not an investment grade analysis nor should be used as a basis for design and construction.

ECM 13: Retro-Commissioning Study & HVAC Improvements

Due to the complexity of today's HVAC systems and controls, it is likely for systems to be operating incorrectly or not as efficiently as they could be. Retro-commissioning studies reveal hidden deficiencies and highlights operational & maintenance (O&M) issues that could have been avoided as well as exposes 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 controlled and designed to operate. 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. The study includes functional system testing under various modes, such as heating or cooling loads, occupied and unoccupied modes, varying outside air temperature and space temperatures. 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) to be revisited every couple of 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, 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.

This measure in effort to increase the optimization of the EMS and operation of HVAC systems and equipment. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction. The results are based on industry standards.

ECM 14: Pool Heating System Upgrades

Replacement of the older electric boiler with a natural gas fired, high efficiency condensing hot water boiler was of interest to facility personnel. The pool water heating system upgrade was evaluated at a high level. Energy savings results from improved combustion efficiency and reduced standby losses at low loads. Further analysis should be conducted for the feasibility of this measure. For the purposes of this analysis, we evaluated the heating system upgrade based on the existing capacity of the pool water heating boiler. As noted, this does not include costs associated with gas supply upgrades.

The most notable efficiency improvement is an upgrade to condensing hydronic boilers, which can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, pool water heating systems are a great application for condensing hot water boilers. It is the recommended that reconfiguring the pool water heating system be further evaluated. This is not an investment grade analysis, nor should be used as a basis for design and construction.

We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the pool water heating load. This is a fuel switching project. TRC recommends that the District review cost projections for natural gas and electricity, including an evaluation whether to pursue on-site generation as a means of controlling their cost of electricity.

4.8 Additional Measures for Further Consideration

There are additional opportunities for improvement which are beyond the scope of this energy audit through the LGEA program. We mention them here to give an idea of other potential upgrades that may be chosen to be included if the implementation approach or preferred incentive program is more comprehensive in nature. If the school district moves forward toward implementation of a large district wide project under the Energy Savings Improvement Program (ESIP), we would recommend considering the following measures to be evaluated. We recommend that you work with your ESCO and design team to select a comprehensive project that is inclusive of interactive affects.

ECM 15: Vestibule Revolving Doors

Revolving doors are a free standing vestibule that much more energy efficient than traditional doors. The installation of revolving doors create comfort, improve traffic flow and increase security. Based on conversations with facility staff, the double doors are left open during security checks at all four entrances. This allows for a significant amount of uncontrolled air exchange between the outside and inside of the building. The installation of revolving doors would greatly reduce this and thus reduce the load on the HVAC system which serves these lobby/corridor spaces. However, this is an architecturally intensive cost and would require much more evaluation to determine feasibility.

ECM 16: Automatic Pool Cover Installation

An automatic pool cover may be installed to save energy associated with conditioning the natatorium space as well as heating the pool water. This suggestion is considering the installation of a retractable pool cover which will reduce pool water evaporation during unoccupied periods of time. Evaporation occurs when the pool water is heated to a temperature above the temperature of the natatorium and because natatoriums have high ventilation loads to control humidity. The evaporation reduction would result in water savings, pool water heating energy and ventilation savings. Implementation of this measure would require installation of pool cover, reel system and control system. However, this measure was not evaluated, and it is the recommended that installing a pool cover be further evaluated.

ECM 17: Domestic Hot Water Heater Replacements

The existing domestic hot water heating system includes the use of three gas-fired custom storage tank water heaters which each have a 300 gallon storage capacity. Based on the locker room showers not being used and the dishwasher in the kitchen not being used, there may be an opportunity to upgrade the system to use smaller, high efficiency boilers. This would mitigate losses due to oversized storage and reduce energy consumption. However, this measure was not evaluated, and it is the recommended that reconfiguring the water heaters be further evaluated.

5 ENERGY EFFICIENT BEST PRACTICES

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions.[4] Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single pane windows and east or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

Motor Controls

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. Whenever possible, use automatic devices such as twist timers or occupancy sensors to turn off motors when they are not needed.

Motor Short Cycling Reduction

Frequent stopping and starting of motors places substantial stress on rotors and other parts. This leads to wear and tear, lower efficiency, and higher maintenance costs. Adjust the load on the motor to limit the amount of unnecessary stopping and starting to improve motor performance.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include 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.

Fans to Reduce Cooling Load

Install ceiling fans to supplement your cooling system. Thermostat settings can typically be increased by 4°F with no change in overall occupant comfort due to the wind chill effect of moving air.

Destratification Fans

For areas with high ceilings, destratification fans f air balance the air temperature from floor to ceiling. They help reduce the recovery time needed to warm the space after nightly temperature setbacks and will increase occupants' the comfort level.

Areas with high ceilings require the heating system to heat a larger volume of space than that which is occupied. As the warm air rises, the warmest space is at the ceiling level, rather than floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, which requires additional energy consumption by the heating equipment to compensate for this accelerated heat transfer.

Economizer Maintenance

Economizers can significantly reduce cooling system load. A malfunctioning economizer can increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air. Common economizer malfunctions include broken outdoor thermostat or enthalpy control, or dampers that are stuck or improperly adjusted.

Periodic inspection and maintenance will keep economizers working in sync with the heating and cooling system. This maintenance should be part of annual system maintenance, and it 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.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Duct Sealing

Duct leakage in commercial buildings can account for five to twenty-five percent of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building wasting conditioned air. Eliminating duct leaks can improve ventilation system performance and reduce heating and cooling system operation.

Boiler Maintenance

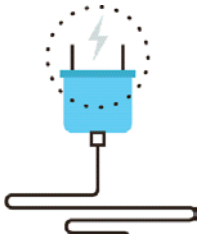
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the water side or fire side of the boiler.

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to 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. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- 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 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 more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[5]. Your local utility may offer incentives or rebates for this equipment.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense™ ratings for urinals is 0.5 gpf and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. 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.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices

[6] https://www.epa.gov/watersense

[7] https://www.epa.gov/watersense/watersense-work-0

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases reduction, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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 medium potential for installing a PV array. A PV array located in the parking lot may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

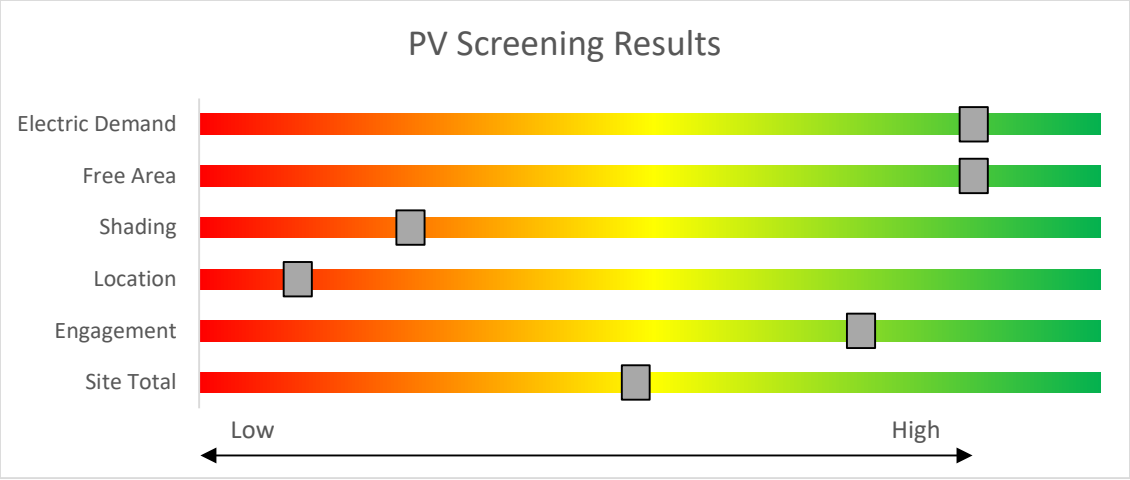


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in New Jersey**: www.njcleanenergy.com/whysolar
- **New Jersey Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the New Jersey Market**: 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) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need 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 no potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

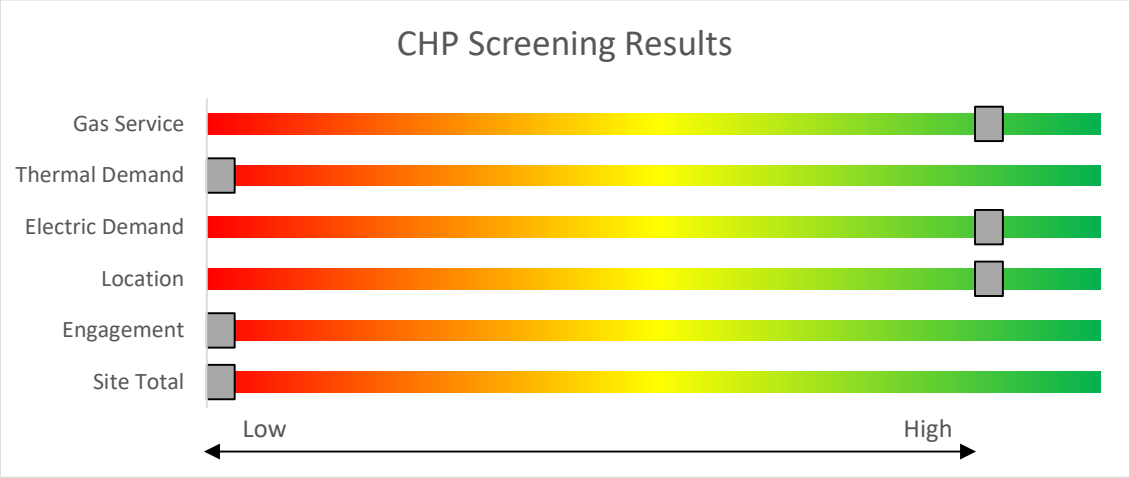


Figure 10 - Combined Heat and Power Screening

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey's Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available New Jersey's Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.
Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.			

7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely 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

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are 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

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and 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 to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

The scope of work presented in this audit report may not meet the requirements of the current P4P program. However, due to the size of the facility and existing conditions, should additional measures be identified at a later point in time, for example through further evaluation or the Energy Savings Improvement Program process, this facility could potentially meet the requirements necessary to participate in the P4P program.

Incentives

Incentives are 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

Contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

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

7.3 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. 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. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

7.4 SREC Registration Program

The SREC 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 prior to the start of construction 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 Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website[8].

8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website[9].

[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Exterior	6	Metal Halide: (1) 175W Lamp	Timeclock	S	215	4,380	1	Fixture Replacement	No	6	LED - Fixtures: Pole Mounted Acorn Walkway Lighting	Timeclock	60	4,380	0.5	4,073	0	$427	$2,178	$0	5.1
Exterior	18	Metal Halide: (1) 175W Lamp	Timeclock	S	215	4,380	1	Fixture Replacement	No	18	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	60	4,380	1.4	12,220	0	$1,281	$6,534	$1,800	3.7
Exterior	84	Metal Halide: (1) 175W Lamp	Timeclock	S	215	4,380	1	Fixture Replacement	No	84	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Timeclock	60	4,380	6.5	57,028	0	$5,979	$78,167	$4,200	12.4
Sports Field	16	Metal Halide: (1) 1000W Lamp	Other	S	1,080	50		None	No	16	Metal Halide: (1) 1000W Lamp	Other	1,080	50	0.0	0	0	$0	$0	$0	0.0
Pool	18	LED - Fixtures: Decorative: Other	Wall Switch	U	120	3,278		None	No	18	LED - Fixtures: Decorative: Other	Wall Switch	120	3,278	0.0	0	0	$0	$0	$0	0.0
Pool	10	LED - Fixtures: Decorative: Other	Wall Switch	U	120	3,278		None	No	10	LED - Fixtures: Decorative: Other	Wall Switch	120	3,278	0.0	0	0	$0	$0	$0	0.0
Pool	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,278	0.1	614	0	$64	$292	$80	3.3
Classroom 116	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 112	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 115	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.5	1,484	0	$156	$1,022	$280	4.8
Classroom 105	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Mechanical Room	19	Linear Fluorescent - T8: 4' T8 (32W) - 6L	Wall Switch	S	176	3,278	2	Relamp	No	19	LED - Linear Tubes: (6) 4' Lamps	Wall Switch	87	3,278	0.8	3,936	0	$413	$2,081	$570	3.7
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	6,000	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	4,140	0.0	281	0	$29	$190	$15	5.9
Restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	S	33	6,000	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	4,140	0.0	272	0	$28	$233	$18	7.5
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	6,000	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	4,140	0.0	281	0	$29	$190	$15	5.9
Restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	S	33	6,000	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	4,140	0.0	272	0	$28	$233	$18	7.5
Classroom 325	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Transition Spaces	85	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	85	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Lobby	36	Metal Halide: (1) 100W Lamp	Wall Switch	S	128	6,000	1, 4	Fixture Replacement	Yes	36	LED - Fixtures: Other	High/Low Control	38	4,140	1.8	15,567	0	$1,632	$8,354	$180	5.0
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2, 4	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	4,140	0.2	1,405	0	$147	$874	$75	5.4
Mechanical Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,621	0.1	258	0	$27	$292	$80	7.9
Hallway	26	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	26	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	0.8	6,453	0	$677	$1,847	$0	2.7
Classroom 16	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.3	928	0	$97	$708	$155	5.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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 14	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.4	1,546	0	$162	$1,000	$235	4.7
Classroom 012D	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	272	0	$29	$416	$75	11.9
Classroom 012E	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	272	0	$29	$416	$75	11.9
Classroom 012F	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	545	0	$57	$562	$115	7.8
Classroom 012B	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	272	0	$29	$416	$75	11.9
Hallway	2	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2	Relamp	No	2	LED - Linear Tubes: (2) Biax Lamps	Wall Switch	46	6,000	0.0	375	0	$39	$81	$0	2.0
Hallway	14	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	14	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	0.4	3,475	0	$364	$964	$0	2.6
Nurse's Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,621	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,621	0.0	57	0	$6	$55	$15	6.7
Classroom 004C	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,593	0.0	182	0	$19	$110	$30	4.2
Classroom 004G	1	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	2,593	2	Relamp	No	1	LED - Linear Tubes: (2) Biax Lamps	Wall Switch	46	2,593	0.0	81	0	$8	$40	$0	4.7
Classroom 004F	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.1	348	0	$36	$434	$80	9.7
Classroom 004D	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,593	0.0	182	0	$19	$110	$30	4.2
Classroom 3	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.3	1,159	0	$122	$818	$185	5.2
Classroom 003E	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.3	1,159	0	$122	$818	$185	5.2
Classroom 003H	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.1	464	0	$49	$489	$95	8.1
Classroom 003K	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.1	348	0	$36	$434	$80	9.7
Classroom 003L	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.1	232	0	$24	$226	$50	7.2
Classroom 003M	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,593	2	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,593	0.0	64	0	$7	$37	$10	3.9
Classroom 003N	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,593	2	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,593	0.0	64	0	$7	$37	$10	3.9
Classroom 003O	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.1	232	0	$24	$226	$50	7.2
Classroom 003P	1	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	2,593	2	Relamp	No	1	LED - Linear Tubes: (2) Biax Lamps	Wall Switch	46	2,593	0.0	81	0	$8	$40	$0	4.7
Classroom 3	2	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	2,593	2	Relamp	No	2	LED - Linear Tubes: (2) Biax Lamps	Wall Switch	46	2,593	0.0	162	0	$17	$81	$0	4.7
Classroom 003-toddler	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.2	580	0	$61	$544	$110	7.1
Classroom 2	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.3	1,044	0	$109	$763	$170	5.4
Classroom 009A	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.2	681	0	$71	$635	$135	7.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,080	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,080	0.1	172	0	$18	$292	$80	11.8
Classroom 13	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.5	1,855	0	$195	$1,416	$310	5.7
Classroom 15	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.6	2,087	0	$219	$1,526	$340	5.4
Restroom	4	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	993	0	$104	$431	$35	3.8
Restroom	4	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	993	0	$104	$431	$35	3.8
Classroom 33	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.6	2,319	0	$243	$1,365	$335	4.2
Restroom	4	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	993	0	$104	$431	$35	3.8
Restroom	4	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	993	0	$104	$431	$35	3.8
Classroom W014	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.2	696	0	$73	$599	$125	6.5
Hallway	26	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	26	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	0.8	6,453	0	$677	$1,847	$0	2.7
Classroom W013	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	46	1,789	0.2	564	0	$59	$544	$110	7.3
Classroom W013 A	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	46	1,789	0.1	226	0	$24	$226	$50	7.4
Classroom 29	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	46	1,789	0.2	677	0	$71	$599	$125	6.7
Stairwell	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2	Relamp	No	7	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	46	6,000	0.0	-417	0	-$44	$128	$35	-2.1
Classroom W007	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,593	2	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	46	2,593	0.0	-77	0	-$8	$55	$15	-4.9
Locker Room	32	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,278	2, 3	Relamp	Yes	32	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	46	2,262	0.0	19	0	$2	$1,124	$230	440.5
Locker Room	32	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,278	2, 3	Relamp	Yes	32	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	46	2,262	0.0	19	0	$2	$1,124	$230	440.5
Hallway	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,000	2, 4	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	46	4,140	0.5	3,867	0	$405	$2,095	$300	4.4
Stairwell	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	46	6,000	-0.1	-477	0	-$50	$146	$40	-2.1
Main Entrance	17	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	6,000	2, 4	Relamp	Yes	17	LED - Linear Tubes: Plug in Lamps	High/Low Control	46	4,140	0.1	1,178	0	$123	$1,171	$0	9.5
Main Entrance/Hallway	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2, 4	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	46	4,140	0.0	23	0	$2	$1,183	$105	442.2
Classroom Hallway	30	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2, 4	Relamp	Yes	30	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	46	4,140	0.0	33	0	$3	$1,548	$150	401.2
Classroom Hallway	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2, 4	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	46	4,140	0.0	13	0	$1	$619	$60	401.2
Classroom Hallway	13	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	0.4	3,226	0	$338	$923	$0	2.7
Classroom 122	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,593	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,593	0.3	1,093	0	$115	$657	$180	4.2

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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 121	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,593	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,593	0.3	1,215	0	$127	$730	$200	4.2
Classroom 120	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,593	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,593	0.3	1,093	0	$115	$657	$180	4.2
Classroom 118	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,593	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,593	0.3	1,215	0	$127	$730	$200	4.2
Classroom 112	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,593	2	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,593	0.4	1,640	0	$172	$986	$270	4.2
Hallway	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	6,000	2, 4	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	4,140	0.1	1,124	0	$118	$619	$60	4.7
Classroom 108	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 106	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Office Room 104	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,278	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.1	689	0	$72	$408	$100	4.3
Office Room 104C	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,278	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,262	0.1	293	0	$31	$226	$50	5.7
Classroom 102	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 101	29	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	29	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.5	1,537	0	$161	$1,059	$290	4.8
Classroom 103	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 107	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	636	0	$67	$438	$120	4.8
Classroom 109	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	742	0	$78	$511	$140	4.8
Classroom 115	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 119	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	848	0	$89	$584	$160	4.8
Classroom 121	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Restroom	3	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	745	0	$78	$391	$35	4.6
Restroom	3	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	745	0	$78	$391	$35	4.6
Hallway	31	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	31	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	0.9	7,694	0	$807	$2,248	$0	2.8
Office 130A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.0	106	0	$11	$73	$20	4.8
Classroom 134	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 136	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 138	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 140	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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 142	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Office 144	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	545	0	$57	$562	$115	7.8
Office 144C	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	272	0	$29	$262	$60	7.1
Lounge Room 146	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.2	696	0	$73	$599	$125	6.5
Stairwell	5	Compact Fluorescent: Plug in Lamps (26W) - 2L	Wall Switch	S	50	6,000	2	Relamp	No	5	LED - Linear Tubes: Plug in Lamps	Wall Switch	24	6,000	0.1	554	0	$58	$406	$0	7.0
Main Office	16	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	1,621	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	1,118	0.5	1,073	0	$112	$914	$35	7.8
Conference Room 135	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	545	0	$57	$562	$115	7.8
Main Office Kitchenette	4	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	1,621	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	1,118	0.1	268	0	$28	$277	$20	9.1
Principal Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Hallway	50	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	50	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	1.5	12,409	0	$1,301	$3,613	$0	2.8
Classroom 221	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Hallway	54	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2, 4	Relamp	Yes	54	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	4,140	0.6	5,060	0	$530	$2,786	$270	4.7
Classroom 222	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 220	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 216	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 214	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 208	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 206	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Office Room 204	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.1	212	0	$22	$146	$40	4.8
Office Room 202B	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.1	309	0	$32	$416	$75	10.5
Greenhouse 202A	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,789	0.1	464	0	$49	$489	$95	8.1
Classroom 201	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 203	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.4	1,378	0	$144	$949	$260	4.8
Classroom 207	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.1	477	0	$50	$329	$90	4.8
Classroom 207	1	Compact Fluorescent: Biax Lamp (40W) - 2L	Occupancy Sensor	S	90	2,262	2	Relamp	No	1	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	2,262	0.0	71	0	$7	$40	$0	5.4

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Classroom 209	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.4	1,272	0	$133	$876	$240	4.8
Classroom 215	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.5	1,484	0	$156	$1,022	$280	4.8
Classroom 214	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 216	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 217	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 219	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 220	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 222	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 221	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.4	1,272	0	$133	$876	$240	4.8
Classroom 224	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Mechanical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	38	0	$4	$37	$10	6.7
Office 230A	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	409	0	$43	$489	$95	9.2
Office 230B	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	409	0	$43	$489	$95	9.2
Office 230C	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	545	0	$57	$562	$115	7.8
Classroom 233	34	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,262	2	Relamp	No	34	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,262	0.8	2,703	0	$283	$1,862	$510	4.8
Classroom 234	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 236	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 235	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 237	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	40	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.7	2,120	0	$222	$1,461	$400	4.8
Classroom 238	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 240	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.4	1,272	0	$133	$876	$240	4.8
Classroom 239	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.1	318	0	$33	$219	$60	4.8
Classroom 241	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.5	1,696	0	$178	$1,168	$320	4.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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 242	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,060	0	$111	$730	$200	4.8
Classroom 243	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,007	0	$106	$694	$190	4.8
Classroom 244	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,262	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,262	0.0	159	0	$17	$110	$30	4.8
Classroom 244C	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,262	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.1	360	0	$38	$292	$80	5.6
Teacher's Lounge	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,118	0.2	435	0	$46	$445	$110	7.3
Classroom 245	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,007	0	$106	$694	$190	4.8
Auxiliary Gym	24	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	4,056	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	2,799	0.7	4,027	0	$422	$6,246	$840	12.8
Main Gym	36	Compact Fluorescent: 8L CFL PL High Bay Fixture PM	Wall Switch	S	376	4,056	1, 3	Fixture Replacement	Yes	36	LED - Fixtures: High-Bay	Occupancy Sensor	150	2,799	4.9	28,250	0	$2,962	$35,816	$6,660	9.8
Main Gym	24	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	4,056	1, 3	Fixture Replacement	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	89	2,799	2.8	16,168	0	$1,695	$23,877	$4,440	11.5
Upper Gym W012A	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,056	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,799	0.1	426	0	$45	$416	$75	7.6
Upper Gym W012B	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,056	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,799	0.1	426	0	$45	$416	$75	7.6
Pool Mech W001A	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,080	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,080	0.2	304	0	$32	$438	$120	10.0
Locker Room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	1,075	0	$113	$672	$145	4.7
Pool Office Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,118	0.0	97	0	$10	$189	$40	14.7
Locker Room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	1,075	0	$113	$672	$145	4.7
Pool Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,080	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,080	0.0	25	0	$3	$37	$10	10.0
Classroom 301	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	636	0	$67	$438	$120	4.8
Classroom 302	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 303	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	636	0	$67	$438	$120	4.8
Classroom 305	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	636	0	$67	$438	$120	4.8
Classroom 307	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	636	0	$67	$438	$120	4.8
Classroom 309	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Work Room 306	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,278	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.1	517	0	$54	$489	$95	7.3
Work Room 306C	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,278	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.1	517	0	$54	$489	$95	7.3
Classroom 308	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 310	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 309	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,262	2	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.2	719	0	$75	$584	$160	5.6
Classroom 314	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 315	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,262	2	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,262	0.4	1,192	0	$125	$822	$225	4.8
Classroom 316	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 317	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 319	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 320	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 321	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 322	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Restroom	3	Compact Fluorescent: Biax Lamp (40W) - 2L	None	S	90	3,278	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	2,262	0.1	407	0	$43	$321	$35	6.7
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	3,278	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,262	0.0	154	0	$16	$125	$15	6.8
Restroom	3	Compact Fluorescent: Biax Lamp (40W) - 2L	None	S	90	3,278	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	2,262	0.1	407	0	$43	$321	$35	6.7
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	3,278	2, 3	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,262	0.0	154	0	$16	$125	$15	6.8
Classroom 324	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 324	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	2,262	2	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,262	0.0	28	0	$3	$18	$5	4.5
Restroom	2	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	496	0	$52	$351	$35	6.1
Restroom	2	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) Biax Lamps	Occupancy Sensor	46	4,140	0.1	496	0	$52	$351	$35	6.1
Office 330A	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	409	0	$43	$489	$95	9.2
Office 330B	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	409	0	$43	$489	$95	9.2
Office 330C	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	409	0	$43	$489	$95	9.2
Classroom 332	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,262	2	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.1	270	0	$28	$219	$60	5.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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 335A & B	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 334	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 336	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 337	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 338	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 339	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.5	1,696	0	$178	$1,168	$320	4.8
Classroom 340	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 341	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	954	0	$100	$657	$180	4.8
Classroom 342	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,262	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.2	795	0	$83	$548	$150	4.8
Classroom 343	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,262	2	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,262	0.4	1,192	0	$125	$822	$225	4.8
Office 344	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	272	0	$29	$416	$75	11.9
Office 344C	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,593	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,789	0.1	272	0	$29	$416	$75	11.9
Classroom 345	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.4	1,391	0	$146	$927	$215	4.9
Lounge Room 346	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,593	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,789	0.2	696	0	$73	$599	$125	6.5
Hallway	50	Compact Fluorescent: Biax Lamp (40W) - 2L	Wall Switch	S	90	6,000	2, 4	Relamp	Yes	50	LED - Linear Tubes: (2) Biax Lamps	High/Low Control	46	4,140	1.5	12,409	0	$1,301	$3,613	$0	2.8
Hallway	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,000	2, 4	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	4,140	0.1	843	0	$88	$564	$45	5.9
Kitchen	24	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	3,278	2	Relamp	No	24	LED - Linear Tubes: Plug in Lamps	Wall Switch	18	3,278	0.4	1,676	0	$176	$806	$0	4.6
Kitchen	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,278	2, 3	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,262	0.7	3,099	0	$325	$1,585	$395	3.7
Storage UN-51	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,080	2	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,080	0.1	86	0	$9	$146	$40	11.8
Storage UN-53	1	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	1,080	2	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Wall Switch	18	1,080	0.0	23	0	$2	$34	$0	13.9
Storage UN-50	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,080	2	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,080	0.1	86	0	$9	$146	$40	11.8
Storage UN-47	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,080	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,080	0.0	51	0	$5	$73	$20	10.0
Storage UN-49	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,080	2	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,080	0.1	86	0	$9	$146	$40	11.8
Receiving 161	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,080	2	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,080	0.1	177	0	$19	$256	$70	10.0
Storage UN-55	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,080	2	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,080	0.0	43	0	$5	$73	$20	11.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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 UN-57	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,080	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,080	0.0	51	0	$5	$73	$20	10.0
Cafeteria	74	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,380	2, 3	Relamp	Yes	74	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,022	1.6	9,663	0	$1,013	$4,052	$915	3.1
Cafeteria	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,380	2, 3	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,022	0.4	2,612	0	$274	$1,000	$235	2.8
Cafeteria	20	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	4,380	2, 3	Relamp	Yes	20	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	3,022	0.4	2,213	0	$232	$942	$35	3.9
Pantry 149	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	4,380	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,022	0.1	783	0	$82	$489	$95	4.8
Office 151	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,380	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,022	0.0	261	0	$27	$208	$20	6.9
Atrium (first floor)	40	LED - Fixtures: Decorative Pendant	Wall Switch	S	30	6,000	3	None	Yes	40	LED - Fixtures: Decorative Pendant	Occupancy Sensor	30	4,140	0.2	1,585	0	$166	$810	$0	4.9
Entrance	43	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,000	2, 4	Relamp	Yes	43	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,140	0.9	7,692	0	$806	$2,970	$430	3.1
Atrium	31	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	6,000	2, 4	Relamp	Yes	31	LED - Linear Tubes: Plug in Lamps	High/Low Control	18	4,140	0.6	4,699	0	$493	$2,042	$0	4.1
Atrium	8	Exit Signs: LED - 2 W Lamp	Wall Switch	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	0.0	0	0	$0	$0	$0	0.0
Atrium (second floor)	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2, 4	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,262	0.5	2,345	0	$246	$1,676	$240	5.8
Atrium (balconys)	32	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	3,278	2	Relamp	No	32	LED - Linear Tubes: Plug in Lamps	Wall Switch	18	3,278	0.5	2,234	0	$234	$1,075	$0	4.6
Auditorium	8	Compact Fluorescent: Plug in Lamps (36W) - 3L	Wall Switch	S	112	3,278	2	Relamp	No	8	LED - Linear Tubes: Plug in Lamps	Wall Switch	42	3,278	0.3	1,303	0	$137	$627	$0	4.6
Auditorium	17	Metal Halide: (1) 175W Lamp	Wall Switch	S	215	3,278	1	Fixture Replacement	No	17	LED - Fixtures: Decorative: Other	Wall Switch	65	3,278	1.3	5,955	0	$624	$5,630	$85	8.9
Auditorium	24	Halogen Incandescent: High Output Lamp	Wall Switch	S	500	3,278	1	Fixture Replacement	No	24	LED - Fixtures: Decorative: Other	Wall Switch	75	3,278	5.1	23,739	0	$2,489	$7,948	$120	3.1
Auditorium	38	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	3,278	2	Relamp	No	38	LED - Linear Tubes: Plug in Lamps	Wall Switch	18	3,278	0.6	2,653	0	$278	$1,277	$0	4.6
W202 Conference	14	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	1,621	2, 3	Relamp	Yes	14	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	1,118	0.2	573	0	$60	$586	$20	9.4
W202 Conference	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	340	0	$36	$408	$100	8.6
Office Room W203	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.3	766	0	$80	$773	$200	7.1
Office Room W203A	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Office Room W203D	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Office Room W203C	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Library	246	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2, 3	Relamp	Yes	246	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	5.2	24,041	0	$2,521	$12,223	$2,880	3.7
Office Room W204B	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,621	2	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,621	0.1	129	0	$14	$146	$40	7.9
Office Room W204A	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,621	2	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,621	0.2	387	0	$41	$438	$120	7.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Restrooms	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W204C	2	Compact Fluorescent: Plug in Lamps (42W) - 1L	Occupancy Sensor	S	48	1,621	2	Relamp	No	2	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	1,621	0.0	69	0	$7	$67	$0	9.3
Office Room W204D	2	Compact Fluorescent: Plug in Lamps (42W) - 1L	Occupancy Sensor	S	48	1,621	2	Relamp	No	2	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	1,621	0.0	69	0	$7	$67	$0	9.3
School Store W209	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	340	0	$36	$408	$100	8.6
Office Room W208	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	340	0	$36	$408	$100	8.6
Office Room W207	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Office Room W205	12	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	1,621	2, 3	Relamp	Yes	12	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	1,118	0.2	491	0	$52	$519	$20	9.7
Library Entrance	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.3	1,564	0	$164	$854	$195	4.0
Library Entrance	12	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	3,278	2, 3	Relamp	Yes	12	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	2,262	0.2	994	0	$104	$673	$35	6.1
Library Stacks	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,278	2, 3	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,262	0.8	3,518	0	$369	$1,855	$430	3.9
Office Room W210	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	340	0	$36	$408	$100	8.6
Office Room W212	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Office Room W213	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,621	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,118	0.1	170	0	$18	$262	$60	11.3
Office Room W214	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W215	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W216	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W204E	14	Compact Fluorescent: Plug in Lamps (42W) - 1L	Wall Switch	S	48	1,621	2, 3	Relamp	Yes	14	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	18	1,118	0.2	573	0	$60	$586	$20	9.4
Office Room W204E	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,118	0.1	145	0	$15	$226	$50	11.6
Office Room W204F	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,118	0.1	193	0	$20	$262	$60	10.0
Office Room W204G	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W204H	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W204I	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Office Room W204J	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,621	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,621	0.0	76	0	$8	$73	$20	6.7
Restroom	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	3,278	2, 3	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,262	0.1	307	0	$32	$380	$65	9.8
Restroom	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	3,278	2, 3	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,262	0.1	307	0	$32	$380	$65	9.8

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?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Heat Pump Loop Pumps	3	Water-Source Heat Pump Circulation Pump	50.0	94.1%	No	W	2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Heat Pump Loop Pumps	2	Water-Source Heat Pump Circulation Pump	5.0	89.5%	No	W	1,373		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Pool Filter Pumps	2	Process Pump	7.5	89.5%	No	W	1,696	NR	Yes	91.7%	No		0.2	381	0	$40	$2,308	$0	57.7
Mechanical Room	Pool HX Circulators	2	Process Pump	1.0	80.0%	No	W	1,373	NR	Yes	85.5%	No		0.1	123	0	$13	$948	$0	73.2
Mechanical Room	Pool Water Circulators	4	Process Pump	0.8	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Sump Pumps	2	Other	1.5	78.5%	No	W	1,373		No	78.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	DHW Burners	3	Other	0.3	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	DHW Circulators	3	Water Supply Pump	0.2	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Cooling Tower	Fan Motors	2	Cooling Tower Fan	40.0	96.0%	No	W	2,034		No	96.0%	No		0.0	0	0	$0	$0	$0	0.0
Cooling Tower	Fan Motors	2	Cooling Tower Fan	10.0	91.0%	No	W	2,034		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Cooling Tower	Spray Pumps	2	Other	3.0	84.0%	No	W	2,034		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-11	Supply Side	1	Supply Fan	25.0	93.6%	No	W	2,034		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
RTU-11	Exhaust Side	1	Exhaust Fan	15.0	92.4%	No	W	2,034		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-11	Enthalpy Wheel	1	Other	0.5	74.0%	No	W	1,696		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-12	Supply Side	1	Supply Fan	15.0	92.4%	No	W	1,373		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-12	Exhaust Side	1	Exhaust Fan	10.0	91.7%	No	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
RTU-12	Enthalpy Wheel	1	Other	0.3	74.0%	No	W	1,696		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-13	Supply Side	1	Supply Fan	15.0	92.4%	No	W	1,373		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-13	Exhaust Side	1	Exhaust Fan	7.5	91.7%	No	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
RTU-13	Enthalpy Wheel	1	Other	1.0	85.5%	No	W	1,696		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
MUA-1	Fan Motor	1	Supply Fan	2.0	86.5%	No	W	1,373		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
MUA-2	Fan Motor	1	Supply Fan	0.8	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-15	Fan Motor	1	Supply Fan	5.0	89.5%	No	W	2,034		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-10	Supply Side	1	Supply Fan	15.0	92.4%	No	W	1,373		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-10	Exhaust Side	1	Exhaust Fan	15.0	92.4%	No	W	1,696		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-10	Enthalpy Wheel	1	Other	0.5	74.0%	No	W	1,696		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-9	Supply Side	1	Supply Fan	3.0	89.5%	No	W	2,034		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-9	Exhaust Side	1	Exhaust Fan	1.5	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-9	Enthalpy Wheel	1	Other	0.3	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-8	Supply Side	1	Supply Fan	5.0	89.5%	No	W	2,034		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-8	Exhaust Side	1	Exhaust Fan	5.0	89.5%	No	W	2,034		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-8	Enthalpy Wheel	1	Other	0.3	85.5%	No	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-8A	Supply Side	1	Supply Fan	20.0	93.0%	No	W	1,373		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-8A	Exhaust Side	1	Exhaust Fan	15.0	92.4%	No	W	1,696		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-7	Supply Side	1	Supply Fan	5.0	89.5%	No	W	2,034		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-7	Exhaust Side	1	Exhaust Fan	2.0	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-7	Enthalpy Wheel	1	Other	0.3	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-5	Supply Side	1	Supply Fan	20.0	93.0%	No	W	1,373		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-5	Exhaust Side	1	Exhaust Fan	20.0	93.0%	No	W	1,696		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-5	Enthalpy Wheel	1	Other	0.5	85.5%	No	W	1,696		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
RTU-4	Supply Side	1	Supply Fan	1.5	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-4	Exhaust Side	1	Exhaust Fan	1.5	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-4	Enthalpy Wheel	1	Other	0.3	74.0%	No	W	1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-3A	Supply Side	1	Supply Fan	5.0	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-3A	Exhaust Side	1	Exhaust Fan	5.0	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-3B & 3C	Supply Side	2	Supply Fan	5.0	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-3B & 3C	Exhaust Side	2	Exhaust Fan	2.0	86.5%	No	W	2,034		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
RTU-2	Supply Side	1	Supply Fan	20.0	93.0%	No	W	1,373		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
RTU-2	Exhaust Side	1	Exhaust Fan	10.0	91.7%	No	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
RTU-1	Supply Side	1	Supply Fan	15.0	92.4%	No	W	1,696		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
RTU-1	Exhaust Side	1	Exhaust Fan	7.5	91.7%	No	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	6	Exhaust Fan	0.3	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	4	Exhaust Fan	0.1	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	2	Exhaust Fan	0.3	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	1	Exhaust Fan	0.8	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	2	Exhaust Fan	0.1	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	1	Exhaust Fan	1.0	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	1	Exhaust Fan	1.5	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fans	1	Exhaust Fan	2.0	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Various	Heat Pumps	160	Supply Fan	0.3	74.0%	No	W	2,745		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0

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 (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	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	RTU-1	1	Packaged Air-Source HP	37.92	570.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2	1	Packaged Air-Source HP	92.25	1,196.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3a	1	Packaged Air-Source HP	27.17	301.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3b	1	Packaged Air-Source HP	19.08	197.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3c	1	Packaged Air-Source HP	19.08	197.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-8a	1	Packaged Air-Source HP	50.00	510.50	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-13	1	Packaged Air-Source HP	27.00	324.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-15	1	Packaged Air-Source HP	24.00	388.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various	Water Source Heat Pumps serving 1st, 2nd & 3rd Floor Classrooms (Approximately 155 Zones)	155	Water Source HP	3.00	558.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-9	1	Packaged AC	7.50		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-11	1	Packaged AC	30.00		W		No							0.0	0	0	$0	$0	$0	0.0
Vestibules/Stairwells	Electric Heating Cabinets	5	Electric Resistance Heat		27.20	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Spaces	Electric Unit Heaters	5	Electric Resistance Heat		27.20	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-14	1	Packaged AC	15.00		W		No							0.0	0	0	$0	$0	$0	0.0
Various	Ductless AC Systems	2	Split-System AC	2.00		W		No							0.0	0	0	$0	$0	$0	0.0
Various	Ductless AC Systems	1	Split-System AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-9	1	Electric Resistance Heat		51.20	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-11	1	Electric Resistance Heat		273.04	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-14	1	Electric Resistance Heat		153.59	W		No							0.0	0	0	$0	$0	$0	0.0

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)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	MUA-1	1	Furnace	40.01	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	MUA-2	1	Furnace	40.01	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-15	1	Furnace	20.00	W		No						0.0	0	0	$0	$0	$0	0.0

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
RTU-2	Auditorium	NR	2.00	92.25	510.50		0.0	2,234	0	$234	$2,719	$0	11.6
RTU-13	Cafeteria	NR	2.00	27.00	324.00		0.0	751	0	$79	$2,719	$0	34.5
RTU-11	Main Gym	NR	2.00	30.00	558.00		0.0	825	0	$87	$2,719	$0	31.4
RTU-14	Pool	NR	2.00	15.00	51.20		0.0	407	0	$43	$2,719	$0	63.7

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	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	Domestic Hot Water	3	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	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	5	54	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	26	$278	$387	$0	1.4
Restrooms	5	6	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	3	$31	$43	$0	1.4

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	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)	6, 7	Yes	Yes	Yes	0.4	6,015	0	$631	$2,799	$125	4.2
Kitchen	1	Cooler (35F to 55F)	6, 7	Yes	Yes	Yes	0.3	4,430	0	$464	$2,799	$125	5.8

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Freezer, Solid Door (>50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Office Area	1	Refrigerator Chest	No	NR	Yes	0.1	1,020	0	$107	$1,554	$0	14.5

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Remote Condensing Unit (<1,000 lbs/day), Batch	Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Fryer	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Griddle (3 Feet Width)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Convection Oven (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
School	465	Computers	120.0	
School	845	Laptops	90.0	
School	1	Fan	100.0	
School	2	TV	150.0	
School	72	Smart Board / Projector	300.0	
School	166	Small Office Printers	50.0	
School	1	Large Xerox- Type Printers	515.0	
School	2	Coffee Maker	400.0	
School	4	Microwave	900.0	
School	3	Residential Refrigerator	690.0	
School	1	Medium Sized Refrigerator	450.0	
School	2	Mini Fridge	260.0	
School	1	Water Dispenser	300.0	
School	3	Large Speakers	500.0	
School	1	Misc. Sound Equipment	3,500.0	
School	1	Misc. IT Equipment	4,500.0	
School	1	Misc Kitchen Equipment	5,500.0	
Home Economics	4	Electric Stove	1,500.0	
Home Economics	4	Undercounter Dishwashers	1,400.0	
Home Economics	4	Microwave/Toasters	1,100.0	
Home Economics	2	Washers & Dryers	4,000.0	

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	4	Refrigerated	8	Yes	0.7	6,447	0	$676	$920	$200	1.1
Cafeteria	3	Non-Refrigerated	8	Yes	0.1	1,028	0	$108	$690	$0	6.4
Lounge	1	Refrigerated	8	Yes	0.2	1,612	0	$169	$230	$50	1.1

Custom Recommendations (High Level Screening)

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
465	*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	40%	10%	5%	120	28	20%	10%	5%	80	19	40%	80%	90%	5	121
Proposed Conditions	40%	5%	0%	120	22	10%	5%	0%	80	8	50%	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)
44	241	75%	23,110	$2,423	$15.00	$2,500	$9,475	3.9
44	191							

Note: Diversity Factor is a conservative estimate of how many devices will operate with power management software and will not be manually overridden by users

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 / Heating Savings	Assumed % Gas Boiler Savings	Assumed % HVAC 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)
1,125,132	112.6	0.0	719,869	7%	4%	5%	114,753	5	0	$12,080	$78,000	6.5

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

This should include the following; Check Valve and Damper Operation, Economizer Controls, Temperature and Humidity Sensors, CO2 Sensors, etc.

Pool Heating System Upgrades

Replace Electric Boilers with High Efficiency Gas Boilers

Olympic-size swimming pool are approximately 50 m or 164 feet in length, 25 m or 82 feet in width, and 2 m or 6 feet in depth. These measurements create a surface area of 13,454.72 square feet and a volume of 88,263 cubic feet. The pool has 660,253.09 gallons of water.

Existing Conditions					Proposed Conditions					Energy Impact & Financial Analysis					
Annual Electric HVAC Demand (kW)	*Average Heating Efficiency*	*Estimated Heating EFLH*	*Annual Electric HVAC Energy Use (kWh)*	*Annual Electric HVAC Energy Costs ($)*	Average Heating Efficiency	Estimated Heating Capacity Total (MBH)	Estimated Heating EFLH	Annual Gas HVAC Energy Use (mmBtu)	Annual Gas HVAC Energy Costs ($)	Total Annual kWh Savings	Total Annual Gas mmBtu Savings	Total Annual Energy Cost Savings	Estimated Installation Cost	Estimated Incentive	Simple Payback Period (Years)
60	100%	1,095.0	65,700	$6,888	90%	204.8	1,095.0	249	$2,703	65,700	-249	$4,185	$24,000	$287	5.7

Equations: (Based on Industry Standards)

Estimated Costs based on RS Means and includes material and labor ($46.7/MBH) plus $4000 for extension of gas supply lines

Estimated Costs include an increase of 40% engineering services and 25% contingency above what is stated above

Estimated Costs DO NOT INCLUDE costs for asbestos abatement or natural gas supply service installations

Estimated Incentive is based on SS program and evaluated at $1.40/MBH

Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis or should be used as a basis for design and construction.

Existing Electric Savings is equal to the estimated electric use for the pool heating boiler as estimated above and based on the blended average rate for electric

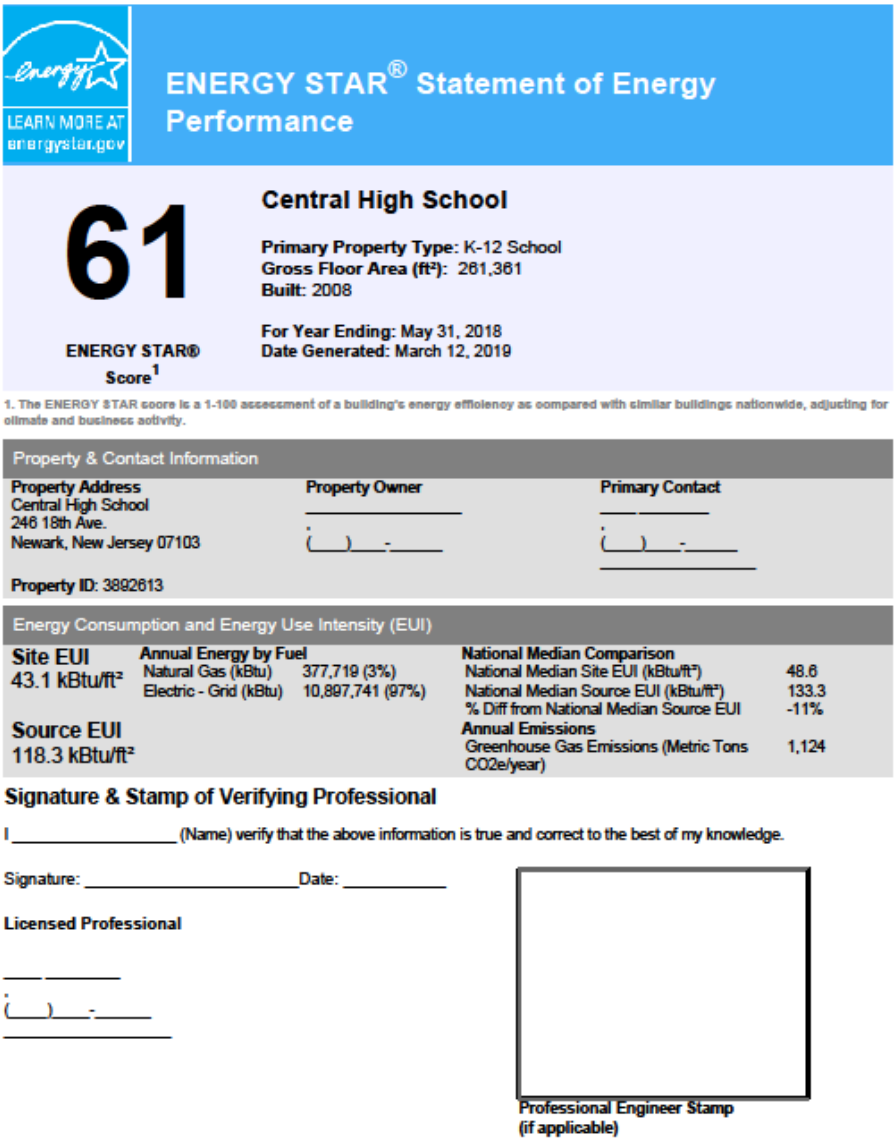
Proposed Gas Consumption is based on the same estimated annual full load run hours in the existing case multipled by the estimated heating load for pool water

Proposed boilers are natural gas fired, high efficiency condensing hot water boilers

Proposed gas costs are based on an average rate for the building

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

EUI is presented in terms of *site energy* and *source energy*. Site energy is the amount of fuel 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.



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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Central High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 261,361
Built: 2008

For Year Ending: May 31, 2018
Date Generated: March 12, 2019

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
Central High School 246 18th Ave. Newark, New Jersey 07103	_____ (___)___-_____	_____ (___)___-_____ _____

Property ID: 3892613

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
43.1 kBtu/ft²

Source EUI
118.3 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	377,719 (3%)
Electric - Grid (kBtu)	10,897,741 (97%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	48.6
National Median Source EUI (kBtu/ft²)	133.3
% Diff from National Median Source EUI	-11%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,124

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

_____
(___)___-_____
_____

Professional Engineer Stamp (if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
Btu	*British thermal unit*: a unit of energy equal to the amount of heat required to increase the temperature of one pound of water by one-degree Fahrenheit.
CHP	*Combined heat and power*. Also referred to as cogeneration.
COP	*Coefficient of performance*: a measure of efficiency in terms of useful energy delivered divided by total energy input.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
DCV	*Demand control ventilation*: a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need.
US DOE	*United States Department of Energy*
EC Motor	*Electronically commutated motor*
ECM	*Energy conservation measure*
EER	*Energy efficiency ratio*: a measure of efficiency in terms of cooling energy provided divided by electric input.
EUI	*Energy Use Intensity:* measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing the operation of energy use systems. Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service.
ENERGY STAR®	ENERGY STAR® is the government-backed symbol for energy efficiency. The ENERGY STAR® program is managed by the EPA.
EPA	*United States Environmental Protection Agency*
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
GHG	*Greenhouse gas:* gases that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface.
gpf	*Gallons per flush*

gpm	*Gallon per minute*
HID	*High intensity discharge:* high-output lighting lamps such as high-pressure sodium, metal halide, and mercury vapor.
hp	*Horsepower*
HPS	*High-pressure sodium*: a type of HID lamp.
HSPF	*Heating seasonal performance factor:* a measure of efficiency typically applied to heat pumps. Heating energy provided divided by seasonal energy input.
HVAC	*Heating, ventilating, and air conditioning*
IHP 2014	US DOE Integral Horsepower rule. The current ruling regarding required electric motor efficiency.
IPLV	*Integrated part load value:* a measure of the part load efficiency usually applied to chillers.
kBtu	One thousand British thermal units
kW	*Kilowatt*: equal to 1,000 Watts.
kWh	*Kilowatt-hour*: 1,000 Watts of power expended over one hour.
LED	*Light emitting diode*: a high-efficiency source of light with a long lamp life.
LGEA	*Local Government Energy Audit*
Load	The total power a building or system is using at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MH	*Metal halide*: a type of HID lamp.
MBh	*Thousand Btu per hour*
MBtu	*One thousand British thermal units*
MMBtu	*One million British thermal units*
MV	*Mercury Vapor:* a type of HID lamp.
NJBPU	*New Jersey Board of Public Utilities*
NJCEP	*New Jersey's Clean Energy Program:* NJCEP is a statewide program that offers financial incentives, programs and services for New Jersey residents, business owners and local governments to help them save energy, money, and the environment.
psig	Pounds per square inch gauge
Plug Load	Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug.
PV	*Photovoltaic:* refers to an electronic device capable of converting incident light directly into electricity (direct current).

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR® Portfolio Manager®.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
T5, T8, T12	A reference to a linear lamp diameter. The number represents increments of 1/8th of an inch.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
therm	100,000 Btu. Typically used as a measure of natural gas consumption.
tons	A unit of cooling capacity equal to 12,000 Btu/hr.
Turnkey	Provision of a complete product or service that is ready for immediate use
VAV	*Variable air volume*
VFD	*Variable frequency drive*: a controller used to vary the speed of an electric motor.
WaterSense™	The symbol for water efficiency. The WaterSense program is managed by the EPA.
Watt (W)	Unit of power commonly used to measure electricity use.