Local Government Energy Audit Report

Science Park High School and Ball Field

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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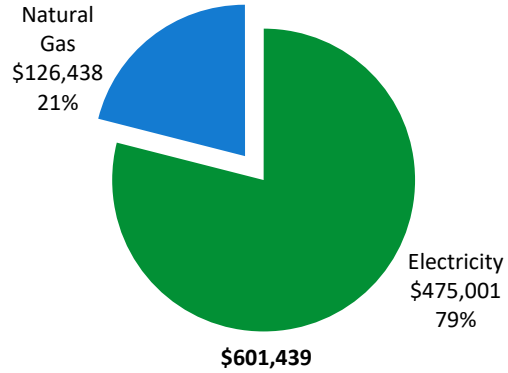
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Science Park High School and Ball Field. 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 the High School. 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: $601,439 Electricity: 4,116,509 kWh Natural Gas: 152,244 Therms	
ENERGY STAR® Benchmarking Score	37 *(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.

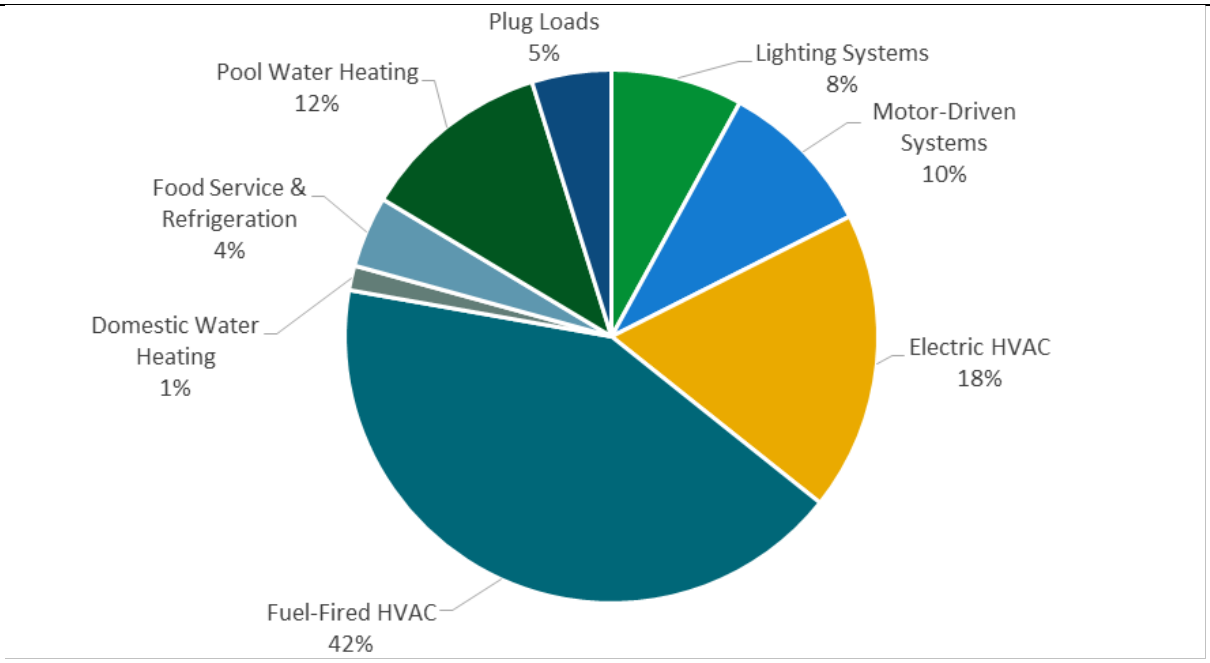


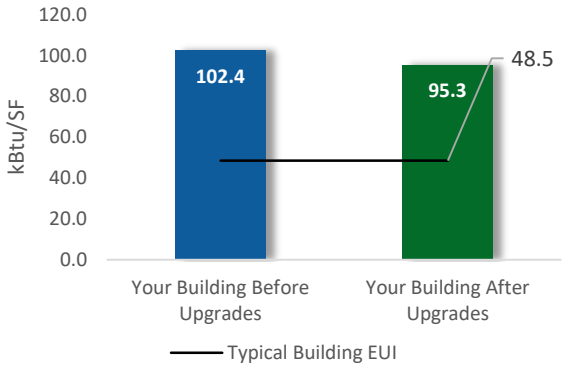
Figure 1 - Energy Use by System

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.

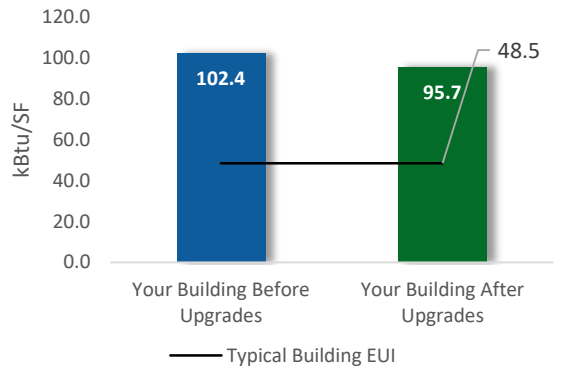
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$486,303
Potential Rebates & Incentives[1]	$46,661
Annual Cost Savings	$62,098
Annual Energy Savings	Electricity: 550,766 kWh Natural Gas: 1,138 Therms
Greenhouse Gas Emission Savings	286 Tons
Simple Payback	7.1 Years
Site Energy Savings (all utilities)	7%



Scenario 2: Cost Effective Package[2]

Installation Cost	$242,916
Potential Rebates & Incentives	$22,916
Annual Cost Savings	$58,186
Annual Energy Savings	Electricity: 517,953 kWh Natural Gas: 1,138 Therms
Greenhouse Gas Emission Savings	269 Tons
Simple Payback	4.2 Years
Site Energy Savings (all utilities)	7%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	High

[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 Static*	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		**272,214**	**45.6**	**-84**	**$30,712**	**$125,266**	**$19,176**	**$106,090**	**3.5**	**264,272**
ECM 1	Install LED Fixtures	57,716	9.8	-15	$6,539	$35,326	$6,320	$29,006	4.4	56,409
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	7,949	0.6	-3	$896	$1,819	$180	$1,639	1.8	7,703
ECM 3	Retrofit Fixtures with LED Lamps	206,549	35.1	-67	$23,278	$88,122	$12,676	$75,446	3.2	200,159
Lighting Control Measures		**54,319**	**6.6**	**-17**	**$6,126**	**$39,512**	**$2,315**	**$37,197**	**6.1**	**52,693**
ECM 4	Install Occupancy Sensor Lighting Controls	19,951	3.1	-6	$2,248	$19,312	$2,315	$16,997	7.6	19,334
ECM 5	Install High/Low Lighting Controls	34,368	3.6	-11	$3,877	$20,200	$0	$20,200	5.2	33,360
Electric Chiller Replacement		**20,445**	**13.9**	**0**	**$2,359**	**$198,792**	**$20,970**	**$177,822**	**75.4**	**20,588**
ECM 6	Install High Efficiency Chillers	20,445	13.9	0	$2,359	$198,792	$20,970	$177,822	75.4	20,588
Domestic Water Heating Upgrade		**22,500**	**2.7**	**-77**	**$1,958**	**$2,282**	**$1,075**	**$1,207**	**0.6**	**13,666**
ECM 7	Install Gas-Fired Booster Water Heater	22,500	2.7	-77	$1,958	$2,282	$1,075	$1,207	0.6	13,666
Food Service & Refrigeration Measures		**29,478**	**3.0**	**0**	**$3,401**	**$27,391**	**$3,125**	**$24,266**	**7.1**	**29,684**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,915	0.6	0	$567	$1,517	$0	$1,517	2.7	4,949
ECM 9	Refrigeration Controls	5,748	0.2	0	$663	$3,348	$150	$3,198	4.8	5,788
ECM 10	Replace Refrigeration Equipment	12,368	1.4	0	$1,427	$21,606	$2,775	$18,831	13.2	12,455
ECM 11	Vending Machine Control	6,447	0.7	0	$744	$920	$200	$720	1.0	6,492
Custom Measures		**151,810**	**0.0**	**292**	**$17,542**	**$93,060**	**$0**	**$93,060**	**5.3**	**187,041**
ECM 12	Computer Power Management Software	22,256	0.0	0	$2,568	$7,060	$0	$7,060	2.7	22,412
ECM 13	Retro-Commissioning Study & HVAC Improvements	129,554	0.0	292	$14,973	$86,000	$0	$86,000	5.7	164,629
TOTALS (COST EFFECTIVE MEASURES)		**517,953**	**56.5**	**114**	**$58,312**	**$265,905**	**$22,916**	**$242,989**	**4.2**	**534,901**
TOTALS (ALL MEASURES)		**550,766**	**71.8**	**114**	**$62,098**	**$486,303**	**$46,661**	**$439,642**	**7.1**	**567,943**

* - 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 Fluorescent Fixtures with LED Lamps and Drivers	x		x
ECM 3	Retrofit Fixtures with LED Lamps	x		x
ECM 4	Install Occupancy Sensor Lighting Controls	x		x
ECM 5	Install High/Low Lighting Controls			x
ECM 6	Install Gas-Fired Booster Water Heater	x		x
ECM 7	Refrigerator/Freezer Case Electrically Commutated Motors			x
ECM 8	Refrigeration Controls	x		x
ECM 9	Vending Machine Control	x		x
ECM 10	Computer Power Management Software			x
ECM 11	Retro-Commissioning Study & HVAC Improvements			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 Science Park High School and Ball Field. This report provides information on how the High School 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 December 12, 2018, TRC performed an energy audit at Science Park High School and Ball Field located in Newark, New Jersey. TRC met with George (Head Custodian) to review the High School operations and help focus our investigation on specific energy-using systems.

Science Park High School is a four-story, 285,743 square foot building built in 2006. The building has a small parking lot, as well as a ball field adjacent to the school. The school spaces include: classrooms, a gymnasium, a natatorium, an auditorium, offices, a media center, a cafeteria, a kitchen, corridors, stairwells, and mechanical spaces. The building is 100% heated and cooled. The south side of the High School is heated and cooled by water source heat pumps, which are connected to a geothermal loop, and ventilation is provided by energy recovery units (ERUs). The north side is conditioned by variable air volume (VAV) air handling units (AHUs) that are equipped with hot water and chilled water coils. The natatorium is conditioned by a dedicated AHU, and the indoor poor water is heated by the waste heat from the space AHU and by way of a heat exchanger off the main heating boiler loop. The domestic hot water is provided by custom-built storage tank water heaters.

In the last five years the High School has upgraded exterior light fixtures containing compact fluorescent plug in lamps by re-lamping with LED lamps.

Facility concerns include: inefficient lighting, domestic hot water heaters and pool water heating system configuration. The pool water and the preheating coil in the AHU serving the natatorium are served by the hydronic heating system, which requires the that the boilers and a hot water pump operate all summer.

2.2 Building Occupancy

The High School is occupied from September through June. Typical weekday occupancy is 106 staff and 811 students. The building is also open in the evening for sports activities, as well as on Saturdays. Summer occupancy includes continuing custodial and maintenance activities.

Occupancy	Weekday/Weekend	Operating Schedule
Normal School Day	Weekday	7:00AM - 3:30PM
	Weekend	7:00AM - 7:00PM
After Hours Cleaning	Weekday	3:30PM - 11:00PM
	Weekend	No Use
Summer School	Weekday	7:00AM - 3:30PM
	Weekend	7:00AM - 7:00PM

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete masonry units (CMU) over structural steel with a mixed material type facade. The façade is either concrete pane, brick, or glass curtain wall. The flat roof is supported with steel trusses and includes steel decking covered with a membrane. The roof is assumed to be properly insulated, given its young age, and is in good condition.

Windows are fixed or operable with double panes and metal frames. Glass panes are thermally sealed, and windows are in good condition. Majority of exterior doors are metal with metal frames. Double door entrance doors are double-pane glass doors with metal frames. Exterior doors are in good condition with undamaged door seals. Once window and door seals degrade, this would increase drafts and outside air infiltration. At that time, the seal materials such as caulk and weather-stripping should be replaced.

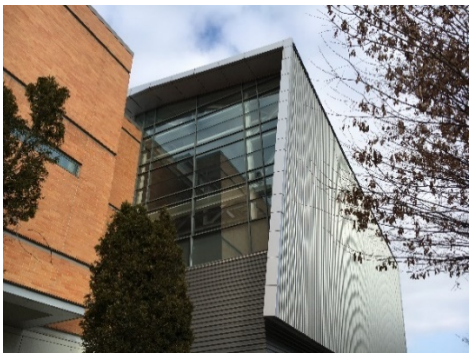
Building Facade

Building Facade

Building Facade

Building Facade

Building Facade



Building Facade

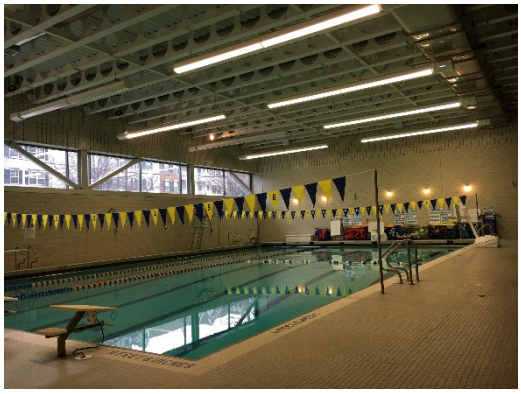
2.4 Lighting Systems

The primary interior lighting system uses 4-foot 32-Watt linear fluorescent T8 lamps and 42-Watt compact fluorescent lamps. There are also several linear fluorescent T12 lamp fixtures in display cases. The gymnasium is lit by 8-lamp compact fluorescent high bay fixtures. The natatorium and auditorium stage have metal halide lamp fixtures. The auditorium is lit by high output halogen incandescent lamp fixtures. Typically, T8 fluorescent lamps use electronic ballasts, and T12 lamps use less efficient magnetic ballasts. Fixtures throughout the building were in good condition and include wall-mounted and pendant-mounted up light fixtures, recessed troffer fixtures, and strip fixtures. All exit signs throughout the building are LED. All interior lighting levels were generally sufficient. The majority of interior light fixtures are controlled by occupancy based sensors, while some are manually controlled via wall switches. Restrooms and hallway area light fixtures are controlled by keyed switches.

Linear Fluorescent T12 lamps in Display Cases

Linear Fluorescent T8 Hallway Lighting

CFL High Bay Fixtures in Gym



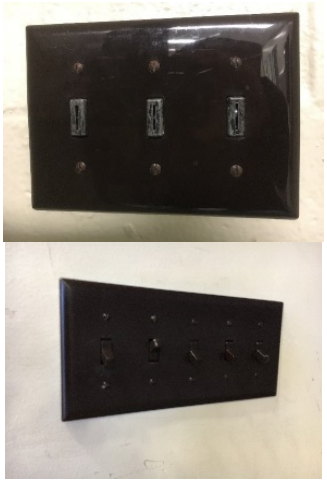
Linear Fluorescent T8 Natatorium Lighting

CFL Fixtures in Cafeteria

Linear Fluorescent T8 Recessed Troffer Fixture

CFL Recessed Can Lighting in Atrium

Linear Fluorescent T8 Direct/Indirect Fixtures



Key and Wall Switches

Occupancy Based Sensor

Exterior lighting is provided by under canopy, wall-mounted, and building-mounted fixtures with LED lamps. Exterior light fixtures are controlled by time clocks. There are pole-mounted walkways and parking lot fixtures with metal halide lamps and ballasts. The parking lot fixtures were on when ample amount of daylight was present. The ball field lighting is provided by stadium lighting pole-mounted fixtures with 1000-Watt metal halide lamps and ballasts and assumed to be manually controlled.

Wall-mounted Fixture with LED Lamps

Surface-mounted Fixture with LED Lamps

HID Pole-mounted Parking Lot Lighting

HID Pole-mounted Parking Lot Lighting

HID Pole-mounted Baseball Field Lighting

HID Pole-mounted Parking Lot Lighting

2.5 Air Handling Systems

Energy Recovery Units (ERUs)

Ventilation for the north side of the High School is provided by four energy recovery units (ERUs) located in a mechanical space. These ERUs are 100% outdoor air (OA) units and are each equipped with an enthalpy wheel, which recovers both sensible and latent heat from the exhaust air to pre-condition the incoming OA. All ERUs have motor driven supply and return fans that are each controlled by variable frequency drives (VFDs). Equipment is in good condition and controlled by the EMS.

Energy Recovery Unit (ERUs)

Energy Recovery Unit (ERUs)

Air Handling Units (AHUs)

Ventilation for the south side of the High School is provided by four air handling units (AHUs) located in mechanical space. These are variable air volume (VAV) units and include both hot water and chilled water coils. These serve the auditorium, music rooms, fitness rooms, and cafeteria. The basement is conditioned by three heating and ventilation units (HVs). All AHUs have motor driven supply and return fans, which are each controlled by VFDs. Equipment is in good condition and controlled by the EMS.

A 100% OA PoolPak® system provides ventilation and dehumidification for the natatorium. When this AHU is on, there is a 5 hp VFD Controlled pump that circulates water from the pool water heating system up to the AHU to preheat the incoming OA. The PoolPak® unit also contains hot water and chilled water coils to condition the natatorium. The natatorium space temperature is heated to about 82°F.

Air Handling Unit (AHU)

PoolPak Unit

General Building Exhaust

The remainder of the south side of the building, including restrooms, is exhausted by general exhaust fans. Some specialized classrooms have specialty exhaust and fume hood exhaust fans. The remainder of the building, including hallways and smaller rooms, is exhausted by general exhaust fans. The kitchen has an exhaust fan that serves all the kitchen hoods. The kitchen hood exhaust appeared to be operated by a VFD, which would indicate some control system is in place. Equipment is in good condition and controlled by the existing building energy management system (EMS).

2.6 Heat Pump System

The north side and south side of the High School are heated by two different systems. The north side of the building is conditioned by high-efficiency water source heat pumps connected to a geothermal loop. The bore fields for the geothermal system are located under the sports fields adjacent to the building. Condenser water is circulated throughout the system using two VDF controlled 75 hp inverter duty pumps, with one back up. Each classroom is conditioned by a heat pump located in the ceiling of the hallway. There are several types of water source heat pumps in the building. The average cooling capacity is 3.5 tons, and the average heating capacity is 50 Mbh. The heat pumps receive water from water-to-water heat pumps located in mechanical space. The twelve water to water heat pumps each have a 27-ton cooling capacity and a 333 Mbh heating capacity. All heat pumps on average have a cooling efficiency of 12.2 EER and the average heating efficiency is 2.3 COP. Equipment is in good condition and controlled by the existing building EMS.

Water Source Heat Pumps in Mechanical Room

Water Source Heat Pumps in Mechanical Room

2.7 Heating Hot Water System

Four gas-fired Aerco® model BMK2000 1700 Mbh high-efficiency condensing hot water boilers serve the building heating load on the south side of the building. These areas include the natatorium, gymnasium, auditorium, and a few work room/classrooms. The burners are fully-modulating with a nominal efficiency of 85%. They have a 20:1 burner turndown and can reach efficiencies up to 99% when return water is at 60°F. The boilers are configured in an automated control scheme. At least one boiler is required to operate year-round to heat pool water. The boilers were installed in 2006 and are in good condition. They are controlled by the EMS, which allows for outdoor air temperature reset controls. The exact set points are unknown and assumed to be optimized. The boilers serve a primary only distribution system with three VDF-controlled 20 hp heating hot water pumps operating in lead/lag/standby fashion. Hot water is distributed to hot water coils in the AHUs. The pipe insulation is in good condition.

Boilers

Hot Water Pumps and Motors

2.8 Chilled Water Systems

The south side of the building is cooled by a chilled water system. The chiller plant consists of a two 116.5-ton, York chillers with an efficiency of 10.1 EER with remote air-cooled condensers located on the roof of the building. The chillers were installed in 2006 and are in good condition. They are controlled by the EMS, which allows for outdoor air temperature reset controls. The exact set points are unknown and assumed to be optimized. The chillers are configured in a primary distribution loop with three VFD-controlled 15 hp chilled water pumps, operating in lead/lag/standby fashion. Chilled water is distributed by chilled water coils in AHUs. The pipe insulation is in good condition.

Chilled Water Pumps and Motors

Variable Frequency Drives (VFDs)

2.9 Building Energy Management Systems (EMS)

A Honeywell EMS provides direct digital controls (DDC) of the HVAC equipment, including the boilers, chillers, air handlers, energy recovery units, water source heat pumps, distribution pumps, and motors. The EMS provides equipment scheduling control, supply air temperatures, humidity, and water loop temperatures. There are temperature sensors located in each room to monitor space temperatures throughout the building. On average, the heating temperature set point is set between 70-72°F with a setback to 65°F. Heating mode is enabled when the outdoor air temperature (OAT) is below 45°F. Water source heat pump loop reversing valves are then set to the heating position and operate to maintain a supply water temperature of 120°F.

On average, the cooling temperature set point is set to about 74°F with a setback to 80°F. Cooling mode is enabled when the outdoor air temperature (OAT) is above 54°F. Water source heat pump loop reversing valves are set to the cooling position and operate to maintain a supply water temperature of 45°F.

The controls front end onsite was inaccessible at the time of the audit; however, facility staff reported concern of the EMS functionality. Limitations may include incorrect outdoor air temperature, no indication of economizer mode on AHUs and VFDs operating different than expected, or operating in bypass mode. In general, retro-commissioning of the HVAC controls system will address these types of issues and ensure the controls system continues to operate as intended.

2.10 Pool Water Heating System

Pool water is heated by a heat exchanger off the hydronic heating system served by the aforementioned boilers. Facility staff reported that boilers and hot water pumps must operate year-round to circulate heat through this heat exchanger for the pool. There is a VFD controlled 1.5 hp pool water pump that operates year-round. The pool water is heated to about to 80°F. The pool is open year-round and there is no pool cover to prevent evaporation while the natatorium is unoccupied.

Pool Water Filter Pumps

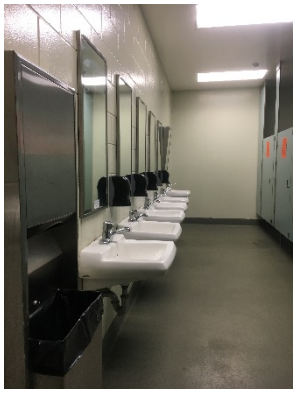
Circulation Pump and Motor

2.11 Domestic Hot Water

Hot water is produced by two 600-gallon 1260 Mbh gas storage water heaters with 80% efficiency. These hot water boiler burners operate between 650 Mbh and 1260 Mbh. They were installed in 2006 and are in fair condition; however, facility staff reported maintenance issues. Domestic hot water is provided to restrooms throughout the High School and the kitchen by several factional horsepower circulation pumps that operate continuously. The domestic hot water pipes are insulated, and the insulation is in fair condition. The kitchen dishwasher utilizes a 9-kW electric booster water heater. This appears to be in fair condition.

Domestic Water Heaters

Low Flow Aerator



Restroom Faucets

Electric Booster Water Heater in Kitchen

2.12 Food Service Equipment

The kitchen has mixed gas and electric equipment that is used to prepare meals for students. Most cooking is done using gas fired ovens, griddle, fryer, and steamer. Bulk prepared foods are held in several electric holding cabinets. Equipment is standard to high-efficiency and is in fair condition. The dishwasher is an ENERGY STAR® high-temperature, tank type unit with a 9 kW electric booster heater.

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

Cooking Equipment

Cooking Equipment

2.13 Refrigeration

The kitchen has several stand-up refrigerators and freezers with solid doors. All equipment is of standard efficiency and in good condition.

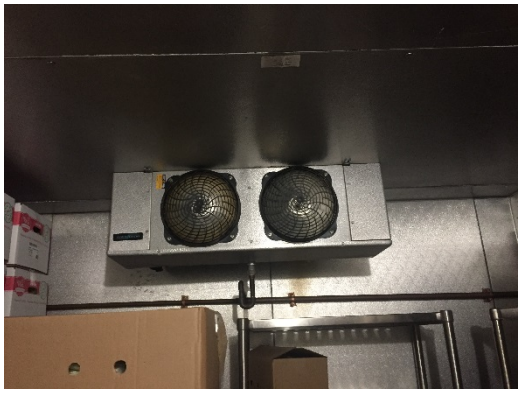
The walk-in refrigerator has an estimated 1-ton compressor and a 2-fan evaporator. The walk-in medium temperature freezer has an estimated 3-ton compressor and a 3-fan evaporator. This equipment appears to have electric defrost controls but no evaporator fan motor controls.

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

Stand up Refrigeration Equipment

Walk-in Refrigeration Equipment

Evaporator



Evaporator

2.14 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 5% 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 304 computer work stations throughout the High School and approximately 852 laptops in the building. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as Smart Boards, projectors, and fans. There are also typical office loads such as small printers, microwaves, and mini fridges. There are several residential-style refrigerators throughout the building which vary in condition and efficiency.

There are four refrigerated beverage vending machines and three non-refrigerated vending machines. Vending machines are not equipped with occupancy-based controls.

Vending Machine

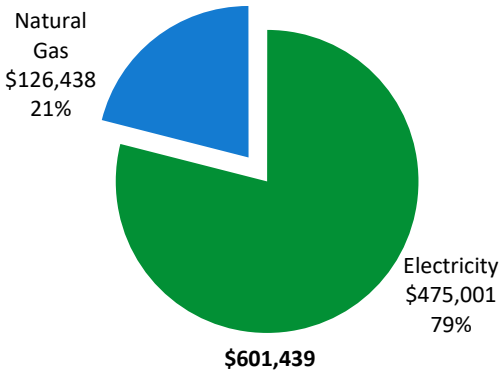
2.15 Water-Using Systems

There are restrooms with toilets, urinals, and sinks throughout the building. Faucet flow rates are low-flow rated for 0.5 gpm gallons per minute (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	4,116,509 kWh	$475,001
Natural Gas	152,244 Therms	$126,438
Total		**$601,439**



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.

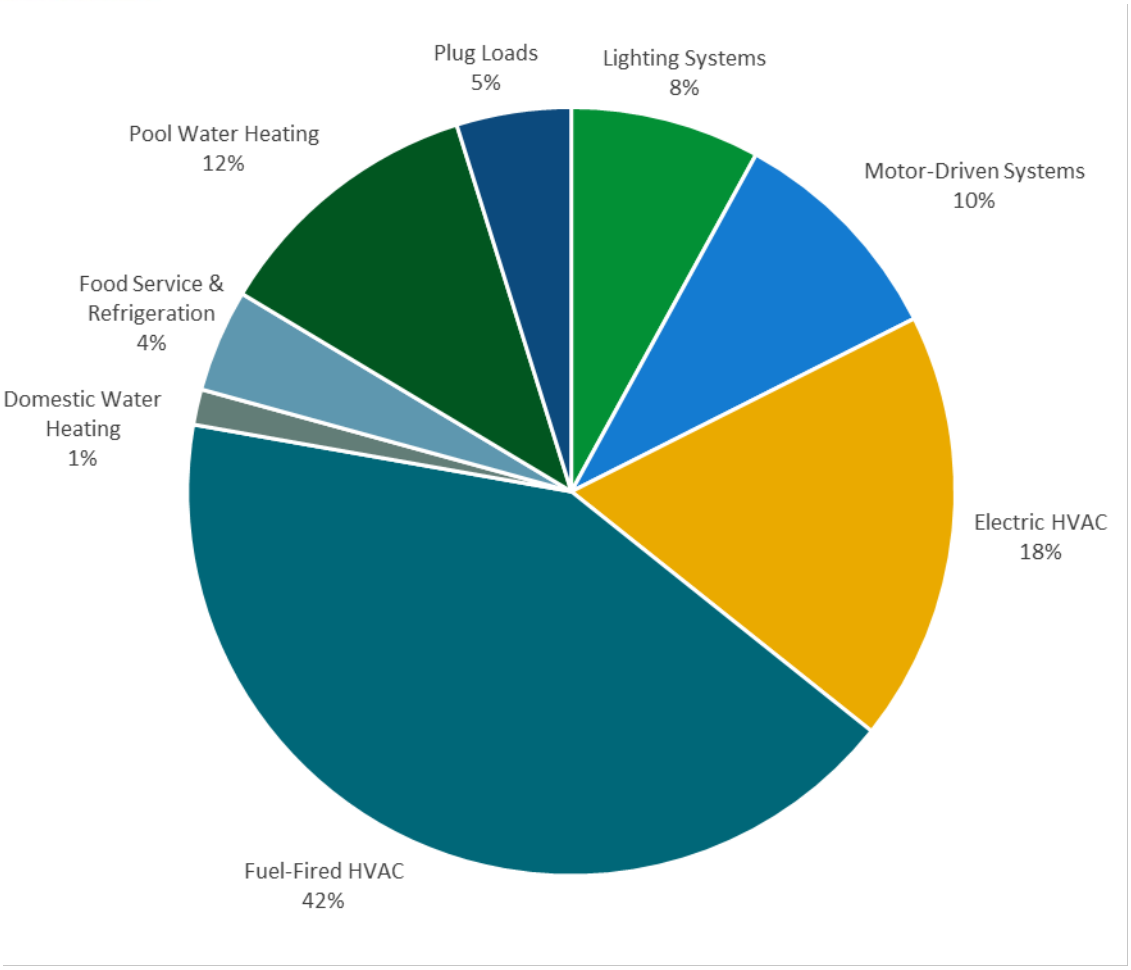
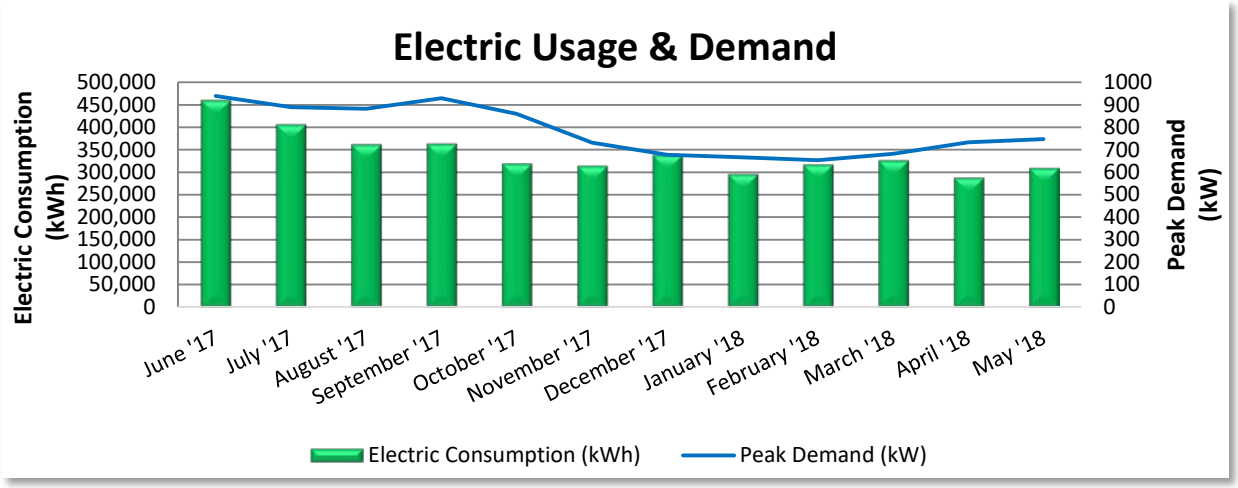


Figure 5 - Energy Balance

3.1 Electricity

PSE&G supplies and delivers electricity under rate class LPLS. There are two electric meters.



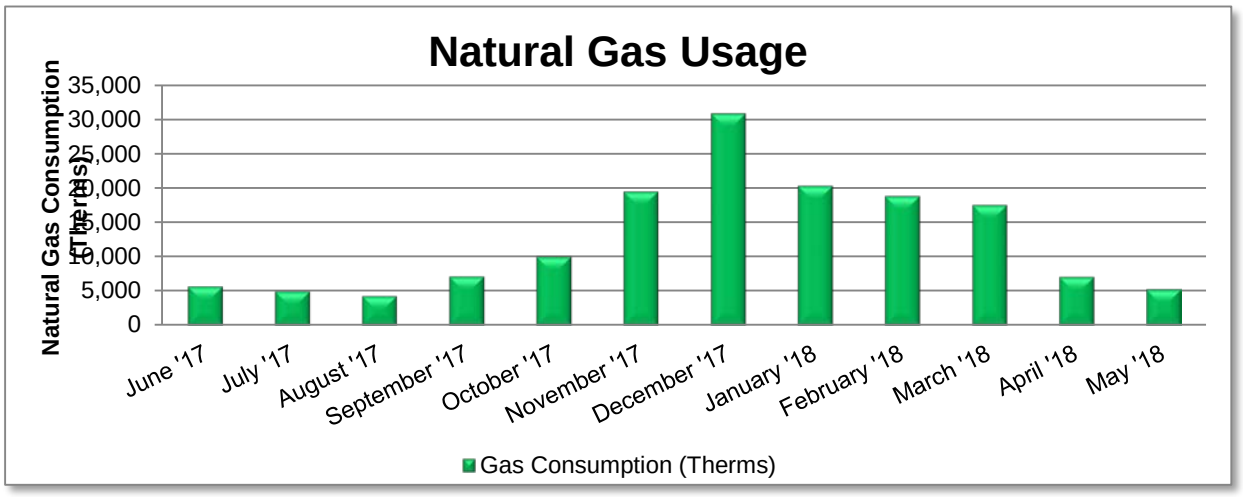
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/12/17	29	460,485	939	$0	$51,136
8/10/17	29	406,446	890	$0	$45,966
9/11/17	32	362,222	882	$0	$41,014
10/10/17	29	364,042	930	$0	$38,273
11/8/17	29	319,973	860	$0	$34,052
12/11/17	33	314,758	732	$0	$34,892
1/11/18	31	338,546	678	$0	$56,055
2/9/18	29	296,413	666	$0	$35,859
3/13/18	32	317,376	654	$0	$34,293
4/12/18	30	326,961	683	$0	$33,192
5/11/18	29	288,059	733	$0	$29,438
6/12/18	32	309,950	748	$0	$39,529
Totals	**364**	**4,105,231**	**939**	**$0**	**$473,699**
Annual	**365**	**4,116,509**	**939**	**$0**	**$475,001**

Notes:

- Peak demand of 939 kW occurred in July '17.
- The average electric cost over the past 12 months was $0.115/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 783 kW.
- The existing PV arrays located on the roof were never energized. They are not in operation and thus do not contribute to any electrical generation.

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**	**TRC Estimated Usage?**
7/12/17	29	5,710	$3,768	No
8/10/17	29	5,004	$3,278	Yes
9/11/17	32	4,299	$2,787	No
10/10/17	29	7,177	$6,699	Yes
11/8/17	29	10,056	$10,610	No
12/11/17	33	19,524	$17,605	No
1/11/18	31	30,895	$26,111	No
2/9/18	29	20,348	$19,140	No
3/13/18	32	18,869	$17,800	No
4/12/18	30	17,527	$10,529	No
5/11/18	29	7,134	$4,416	No
6/12/18	32	5,285	$3,349	No
Totals	**364**	**151,827**	**$126,091**	
Annual	**365**	**152,244**	**$126,438**	

Notes:

- The average gas cost for the past 12 months is $0.830/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	**37**

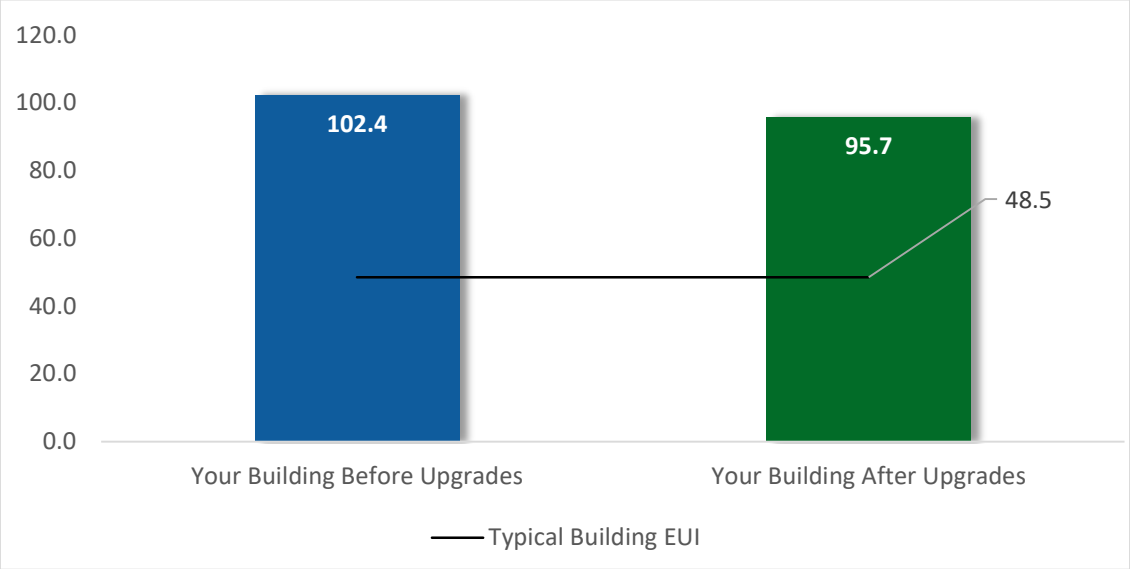


Figure 6 - Energy Use Intensity Comparison

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. Several 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 monthly 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 *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		**272,214**	**45.6**	**-84**	**$30,712**	**$125,266**	**$19,176**	**$106,090**	**3.5**	**264,272**
ECM 1	Install LED Fixtures	57,716	9.8	-15	$6,539	$35,326	$6,320	$29,006	4.4	56,409
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	7,949	0.6	-3	$896	$1,819	$180	$1,639	1.8	7,703
ECM 3	Retrofit Fixtures with LED Lamps	206,549	35.1	-67	$23,278	$88,122	$12,676	$75,446	3.2	200,159
Lighting Control Measures		**54,319**	**6.6**	**-17**	**$6,126**	**$39,512**	**$2,315**	**$37,197**	**6.1**	**52,693**
ECM 4	Install Occupancy Sensor Lighting Controls	19,951	3.1	-6	$2,248	$19,312	$2,315	$16,997	7.6	19,334
ECM 5	Install High/Low Lighting Controls	34,368	3.6	-11	$3,877	$20,200	$0	$20,200	5.2	33,360
Electric Chiller Replacement		**20,445**	**13.9**	**0**	**$2,359**	**$198,792**	**$20,970**	**$177,822**	**75.4**	**20,588**
ECM 6	Install High Efficiency Chillers	20,445	13.9	0	$2,359	$198,792	$20,970	$177,822	75.4	20,588
Domestic Water Heating Upgrade		**22,500**	**2.7**	**-77**	**$1,958**	**$2,282**	**$1,075**	**$1,207**	**0.6**	**13,666**
ECM 7	Install Gas-Fired Booster Water Heater	22,500	2.7	-77	$1,958	$2,282	$1,075	$1,207	0.6	13,666
Food Service & Refrigeration Measures		**29,478**	**3.0**	**0**	**$3,401**	**$27,391**	**$3,125**	**$24,266**	**7.1**	**29,684**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,915	0.6	0	$567	$1,517	$0	$1,517	2.7	4,949
ECM 9	Refrigeration Controls	5,748	0.2	0	$663	$3,348	$150	$3,198	4.8	5,788
ECM 10	Replace Refrigeration Equipment	12,368	1.4	0	$1,427	$21,606	$2,775	$18,831	13.2	12,455
ECM 11	Vending Machine Control	6,447	0.7	0	$744	$920	$200	$720	1.0	6,492
Custom Measures		**151,810**	**0.0**	**292**	**$17,542**	**$93,060**	**$0**	**$93,060**	**5.3**	**187,041**
ECM 12	Computer Power Management Software	22,256	0.0	0	$2,568	$7,060	$0	$7,060	2.7	22,412
ECM 13	Retro-Commissioning Study & HVAC Improvements	129,554	0.0	292	$14,973	$86,000	$0	$86,000	5.7	164,629
TOTALS		**550,766**	**71.8**	**114**	**$62,098**	**$486,303**	**$46,661**	**$439,642**	**7.1**	**567,943**

* - 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 Static*	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		**272,214**	**45.6**	**-84**	**$30,712**	**$125,266**	**$19,176**	**$106,090**	**3.5**	**264,272**
ECM 1	Install LED Fixtures	57,716	9.8	-15	$6,539	$35,326	$6,320	$29,006	4.4	56,409
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	7,949	0.6	-3	$896	$1,819	$180	$1,639	1.8	7,703
ECM 3	Retrofit Fixtures with LED Lamps	206,549	35.1	-67	$23,278	$88,122	$12,676	$75,446	3.2	200,159
Lighting Control Measures		**54,319**	**6.6**	**-17**	**$6,126**	**$39,512**	**$2,315**	**$37,197**	**6.1**	**52,693**
ECM 4	Install Occupancy Sensor Lighting Controls	19,951	3.1	-6	$2,248	$19,312	$2,315	$16,997	7.6	19,334
ECM 0	Install Daylight Dimming Controls	0	0.0	0	$0	$0	$0	$0	0.0	0
ECM 5	Install High/Low Lighting Controls	34,368	3.6	-11	$3,877	$20,200	$0	$20,200	5.2	33,360
Domestic Water Heating Upgrade		**22,500**	**2.7**	**-77**	**$1,958**	**$2,282**	**$1,075**	**$1,207**	**0.6**	**13,666**
ECM 7	Install Gas-Fired Booster Water Heater	22,500	2.7	-77	$1,958	$2,282	$1,075	$1,207	0.6	13,666
Food Service & Refrigeration Measures		**17,110**	**1.6**	**0**	**$1,974**	**$5,785**	**$350**	**$5,435**	**2.8**	**17,230**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,915	0.6	0	$567	$1,517	$0	$1,517	2.7	4,949
ECM 9	Refrigeration Controls	5,748	0.2	0	$663	$3,348	$150	$3,198	4.8	5,788
ECM 11	Vending Machine Control	6,447	0.7	0	$744	$920	$200	$720	1.0	6,492
Custom Measures		**151,810**	**0.0**	**292**	**$17,542**	**$93,060**	**$0**	**$93,060**	**5.3**	**187,041**
ECM 12	Computer Power Management Software	22,256	0.0	0	$2,568	$7,060	$0	$7,060	2.7	22,412
ECM 13	Retro-Commissioning Study & HVAC Improvements	129,554	0.0	292	$14,973	$86,000	$0	$86,000	5.7	164,629
TOTALS		**517,953**	**56.5**	**114**	**$58,312**	**$265,905**	**$22,916**	**$242,989**	**4.2**	**534,901**

* - 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		**272,214**	**45.6**	**-84**	**$30,712**	**$125,266**	**$19,176**	**$106,090**	**3.5**	**264,272**
ECM 1	Install LED Fixtures	57,716	9.8	-15	$6,539	$35,326	$6,320	$29,006	4.4	56,409
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	7,949	0.6	-3	$896	$1,819	$180	$1,639	1.8	7,703
ECM 3	Retrofit Fixtures with LED Lamps	206,549	35.1	-67	$23,278	$88,122	$12,676	$75,446	3.2	200,159

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 is proposed, we suggest converting all fixtures a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the High School, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing HID lamps and the 8-lamp CFL fixtures in the gymnasium with new 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 as LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: gymnasium, natatorium, auditorium stage, and exterior fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

The measure uses the existing fixture housing but replaces the electric components with more efficient lighting technology, which use less power than other lighting technologies but provides equivalent lighting output. Maintenance savings may also be achieved as LED tubes last longer than fluorescent tubes and therefore do not need to be replaced as often.

Affected building areas: display cases with fluorescent fixtures with T12 tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent T8, compact fluorescent, and halogen incandescent 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 direct replacements 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 CFL lamps as well as the auditorium.

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		**54,319**	**6.6**	**-17**	**$6,126**	**$39,512**	**$2,315**	**$37,197**	**6.1**	**52,693**
ECM 4	Install Occupancy Sensor Lighting Controls	19,951	3.1	-6	$2,248	$19,312	$2,315	$16,997	7.6	19,334
ECM 5	Install High/Low Lighting Controls	34,368	3.6	-11	$3,877	$20,200	$0	$20,200	5.2	33,360

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 4: 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, 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, work rooms, locker rooms, gymnasium, library, break rooms, and storage rooms.

ECM 5: 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. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

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

Affected building areas: hallways and parking lot

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 Electric Chillers

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Chiller Replacement		**20,445**	**13.9**	**0**	**$2,359**	**$198,792**	**$20,970**	**$177,822**	**75.4**	**20,588**
ECM 6	Install High Efficiency Chillers	20,445	13.9	0	$2,359	$198,792	$20,970	$177,822	75.4	20,588

Replacing the chillers has a long payback based on energy savings and may not be justifiable based solely on energy considerations. However, when the chillers are nearing the end of their normal useful life, the marginal cost of purchasing a high-efficiency chiller can typically be justified by the marginal savings from the improved efficiency. When the chillers are eventually replaced, consider purchasing equipment that exceed the minimum efficiency required by building codes.

ECM 6: Install High-Efficiency Chillers

Replace older inefficient electric chillers with new high-efficiency chillers. The type of chiller to be installed depends on the magnitude of the cooling load and variability of the cooling load profile, for example:

- Positive displacement chillers are usually under 600 tons of cooling capacity and centrifugal chillers generally start at 150 tons of cooling capacity.
- Constant speed chillers should be used to meet cooling loads with little or no variation while variable speed chillers are more efficient for variable cooling load profiles.
- Water cooled chillers are more efficient than air cooled chillers but require cooling towers and additional pumps to circulate the cooling water.
- In any given size range, variable speed chillers tend to have better partial load efficiency, but lower full load efficiency, than constant speed chillers.

Energy savings result from the improvement in chiller efficiency and matching the right type of chiller to the cooling load. The energy savings are calculated based on the cooling capacity of the new chiller, the improvement in efficiency compared with the base case equipment, the cooling load profile, and the estimated annual operating hours of the chiller before and after the upgrade.

For the purposes of this analysis, we evaluated the replacement of chillers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your design team to select chillers that are sized appropriately for the cooling load at the High School. In some cases, the plant energy use can be reduced by selecting multiple chillers that match the facility load profile rather than one or two large chillers. This can also improve the chiller plant reliability through increased redundancy. Energy savings are maximized by proper selection of new equipment based on the cooling load profile.

4.4 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		**22,500**	**2.7**	**-77**	**$1,958**	**$2,282**	**$1,075**	**$1,207**	**0.6**	**13,666**
ECM 7	Install Gas-Fired Booster Water Heater	22,500	2.7	-77	$1,958	$2,282	$1,075	$1,207	0.6	13,666

ECM 7: Install Gas-Fired Booster Water Heater

Install a booster water heater to allow domestic water heater temperatures to be reduced. Many domestic hot water systems are maintained at a high temperature to meet the needs of a single end-use, such as dishwashing. Using a smaller booster water heater to provide the required water temperature for the critical end use allows the temperature at the primary water heater to be reduced.

Energy savings result from reducing the system hot water temperature, which reduces fuel used to heat the water and heat loss from the domestic hot water storage tank and distribution system.

4.5 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		**29,478**	**3.0**	**0**	**$3,401**	**$27,391**	**$3,125**	**$24,266**	**7.1**	**29,684**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	4,915	0.6	0	$567	$1,517	$0	$1,517	2.7	4,949
ECM 9	Refrigeration Controls	5,748	0.2	0	$663	$3,348	$150	$3,198	4.8	5,788
ECM 10	Replace Refrigeration Equipment	12,368	1.4	0	$1,427	$21,606	$2,775	$18,831	13.2	12,455
ECM 11	Vending Machine Control	6,447	0.7	0	$744	$920	$200	$720	1.0	6,492

ECM 8: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in cooler and freezers. 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 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 existing commercial refrigerators and freezers with new ENERGY STAR® rated 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 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.

4.6 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		**151,810**	**0.0**	**292**	**$17,542**	**$93,060**	**$0**	**$93,060**	**5.3**	**187,041**
ECM 12	Computer Power Management Software	22,256	0.0	0	$2,568	$7,060	$0	$7,060	2.7	22,412
ECM 13	Retro-Commissioning Study & HVAC Improvements	129,554	0.0	292	$14,973	$86,000	$0	$86,000	5.7	164,629

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 by using 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 in implementing computer power management software to better match the energy use to user needs.

This measure to increase the plug load management in the school district was of interest by facility personnel. Further analysis should be conducted for the feasibility of this measure. A baseline tracking of the existing computing fleet energy use would need to be performed to optimize proposed software strategies. This should be implemented in conjunction with the IT department and 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 below their potential efficiency. Retro-commissioning studies reveal hidden deficiencies and highlights operational and maintenance (O&M) issues that could have been avoided, as well as exposing 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, developing a cost-effective project delivery, and focusing 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 and 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 contacting an engineering firm who specializes in energy control systems and retro-commissioning for a detailed evaluation and implementation costs. Facility operations personnel would work with the engineers to develop goals and objectives. During on-site testing, the qualified personnel conducting the study would

immediately make any no/low-cost improvements as identified. Furthermore, for any suggested corrective actions that require the purchase of material, a contractor who specializes in that scope of work would be contacted to implement the remaining improvements.

This measure is an 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.

4.7 Additional Measures for Further Consideration

There are additional opportunities for improvement that 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.

Pool Heating System Upgrades

There are a few options to improve the pool water heating system.

1. Remove the heat exchanger and separate the pool water heating from the hydronic space heating loop. In its place, install a dedicated hot water boiler for heating pool water to limit the main boiler plant operation to the heating season. The boiler should be a high-efficiency, gas-fired condensing unit. The pool water heating is an ideal application for this technology. However, this would require significant upfront costs. The payback period is likely to be long due to the relatively new and efficient boilers that are currently in the boiler plant.
2. Apply isolating valves to modify the distribution loop piping to supply hot water only to the heat exchanger during the summer months. There may be an opportunity to adjust and improve the existing system to reduce the energy consumption associated with pumping. However, this is beyond the scope of this LGEA report, and it is recommended to consult a contractor who specializes in pool water heating systems.
3. Consider the installation of a Combined Heat and Power (CHP) system to serve the pool water heating needs at this building. A high level screening of this renewable technology is provided within this report, and the estimate is based on the pool water heating equipment. We recommend that the feasibility of a CHP be evaluated further.

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 air. Natatoriums have high ventilation loads to control humidity. The evaporation reduction would result in water savings, chemical treatment, 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.

Domestic Hot Water Heater Replacements

The existing domestic hot water heating system includes the use of two gas-fired custom storage tank water heaters, which each have a 600-gallon storage capacity. Based on the locker room showers not being used and if there are no plans to change the hot water demand of the building, 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 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.

Chiller Maintenance

Service chillers regularly to keep them operating properly. Chillers are responsible for a substantial portion of a commercial building's overall energy usage and when they do not work well, there is usually a noticeable increase in energy bills and increased occupant complaints. Regular diagnostics and service can save five to ten percent of the cost of operating your chiller. If you already have a maintenance contract in place, your existing service company should be able to provide these services.

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

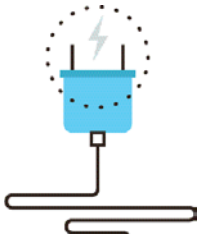
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is 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 High School 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 High School'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 the High School. 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 High School's electric demand, size and location of free area, and shading elements shows that the facility has a **high** potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the roof 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.

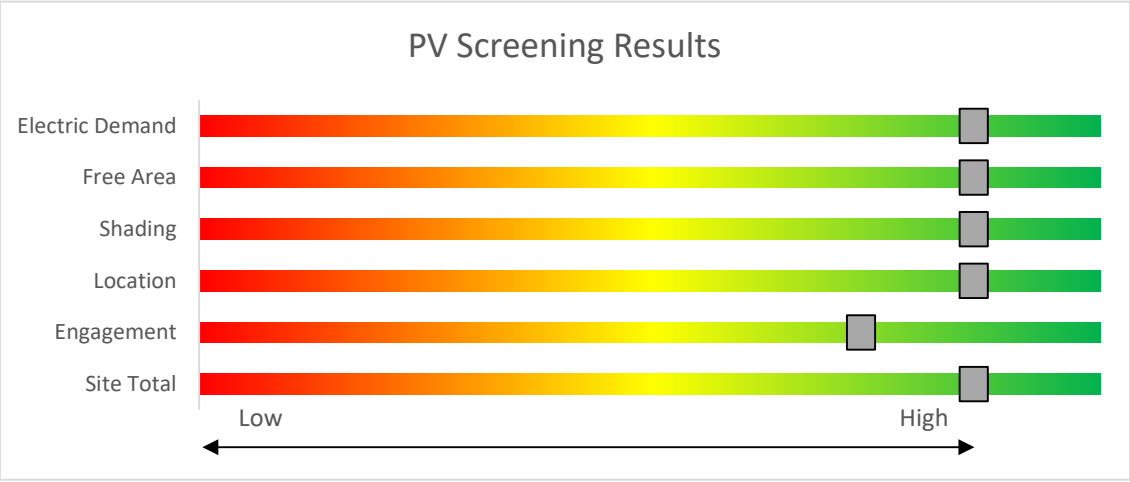


Figure 9 - Photovoltaic Screening

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 High School 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 High School has a **high** potential for installing a cost-effective CHP system. This would apply to the pool water heating system.

The magnitude, type, and duration of the thermal demand, the coincident electric load, and the ease of interconnection contribute to the potential for CHP at the site. Based on the amount of hot water used throughout the year and the concurrent electric demand a Microturbine may be feasible. If you are interested in pursuing combined heat and power, we recommend performing a detailed feasibility study, which will provide a thorough understanding of the costs and savings associated with this technology.

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.

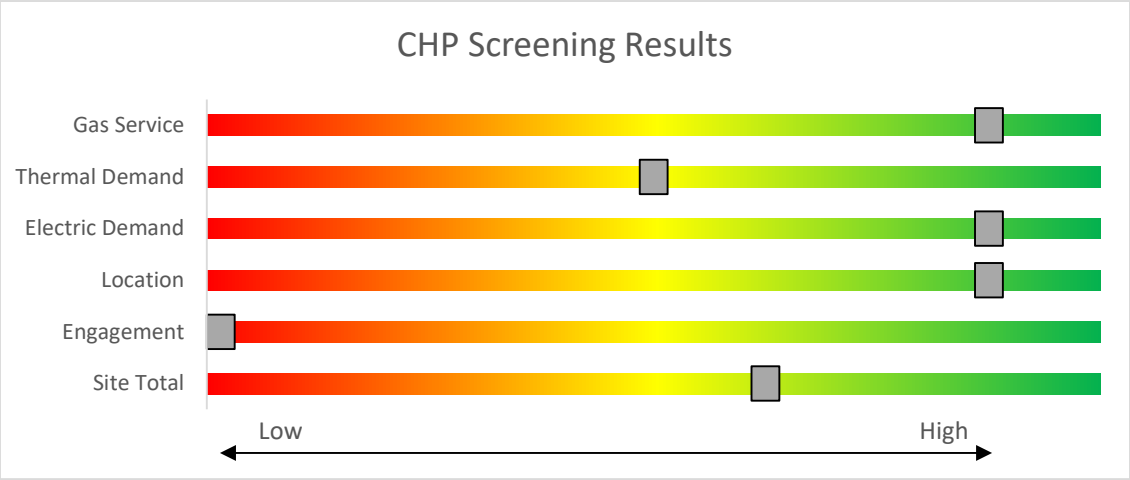


Figure 10 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/

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 the High School 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 most 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 does not quite 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, the High School 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 Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or

waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

Incentives

Eligible Technologies	Size (Installed Rated Capacity)[1]	Incentive ($/kW)	% of Total Cost Cap per Project[3]	$ Cap per Project[3]
Powered by non-renewable or renewable fuel source[4]	≤500 kW	$2,000	30-40%[2]	$2 million
Gas Internal Combustion Engine	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine	> 1 MW - 3 MW	$550	30%	$3 million
Microturbine Fuel Cells with Heat Recovery	>3 MW	$350		
Waste Heat to Power*	<1 MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

How to Participate

You work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at: www.njcleanenergy.com/CHP.

7.4 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.

7.5 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
Ball Field	26	Metal Halide: (1) 1000W Lamp	Other	S	1,080	50		None	No	26	Metal Halide: (1) 1000W Lamp	Other	1,080	50	0.0	0	0	$0	$0	$0	0.0
Parking Lot	6	Metal Halide: (1) 250W Lamp	None	S	295	8,760	1, 5	Fixture Replacement	Yes	6	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	High/Low Control	89	6,044	0.7	12,277	0	$1,417	$5,783	$600	3.7
Building Mounted	11	LED - Linear Tubes: Plug in Lamp Fixture	Timeclock	S	18	4,380		None	No	11	LED - Linear Tubes: Plug in Lamp Fixture	Timeclock	18	4,380	0.0	0	0	$0	$0	$0	0.0
Under Canopy	73	LED - Linear Tubes: Plug in Lamp Fixture	Timeclock	S	18	4,380		None	No	73	LED - Linear Tubes: Plug in Lamp Fixture	Timeclock	18	4,380	0.0	0	0	$0	$0	$0	0.0
Main Entrance	2	LED - Linear Tubes: Plug in Lamp Fixture	Timeclock	S	18	8,760		None	No	2	LED - Linear Tubes: Plug in Lamp Fixture	Timeclock	18	8,760	0.0	0	0	$0	$0	$0	0.0
Pole Mounted	2	Metal Halide: (1) 250W Lamp	Timeclock	S	295	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	89	4,380	0.2	1,805	0	$208	$1,861	$200	8.0
Natatorium	60	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Breaker Panel	S	114	2,398	3	Relamp	No	60	LED - Linear Tubes: (4) 4' Lamps	Breaker Panel	58	2,398	1.7	5,721	-2	$645	$4,382	$1,200	4.9
Natatorium	11	Compact Fluorescent: Plug in Lamp Fixture	Breaker Panel	S	42	2,398	3	Relamp	No	11	LED - Linear Tubes: Plug in Lamps	Breaker Panel	29	2,398	0.1	243	0	$27	$462	$0	16.8
Natatorium	9	Compact Fluorescent: Plug in Lamp Fixture	Breaker Panel	S	42	2,398	3	Relamp	No	9	LED - Linear Tubes: Plug in Lamps	Breaker Panel	29	2,398	0.1	199	0	$22	$378	$0	16.8
Natatorium	18	Compact Fluorescent: Plug in Lamp Fixture	Breaker Panel	S	42	2,398	3	Relamp	No	18	LED - Linear Tubes: Plug in Lamps	Breaker Panel	29	2,398	0.1	398	0	$45	$756	$0	16.8
Natatorium	14	Metal Halide: (1) 70W Lamp	Breaker Panel	S	95	2,398	1	Fixture Replacement	No	14	LED - Fixtures: Other	Breaker Panel	29	2,398	0.5	1,573	-1	$177	$2,782	$70	15.3
Basement Corridor	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3, 5	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,655	0.5	1,787	-1	$201	$1,713	$250	7.3
B19 Custodian Break Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,398	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	429	0	$48	$489	$95	8.2
Basement Corridor #2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.0	112	0	$13	$73	$20	4.2
B20 Custodian Shop	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	8,760	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	8,760	0.1	1,231	0	$139	$219	$60	1.1
B18 Admin Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Breaker Panel	S	62	1,199	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Breaker Panel	29	1,199	0.0	56	0	$6	$73	$20	8.4
B17 Water Service	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Breaker Panel	S	62	1,199	3	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Breaker Panel	29	1,199	0.2	309	0	$35	$402	$110	8.4
B13 Storage	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,199	3	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,199	0.2	365	0	$41	$475	$130	8.4
B12 Heating Plant	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.2	843	0	$95	$548	$150	4.2
B14 Mens Locker Room	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,398	0.0	99	0	$11	$145	$20	11.2
B14 Mens Locker Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,398	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,398	0.0	84	0	$9	$55	$15	4.2
B14 Entrance Corridor	1	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	2,398	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	2,398	0.0	32	0	$4	$42	$0	11.5
B15 Womens Locker Room	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	1,655	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,655	0.0	68	0	$8	$145	$20	16.3
B15 Womens Locker Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Breaker Panel	S	93	2,398	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Breaker Panel	44	2,398	0.0	84	0	$9	$55	$15	4.2
B15 Entrance Corridor	1	Compact Fluorescent: Triple Tube Plug in Lamp	Breaker Panel	S	48	2,398	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Breaker Panel	29	2,398	0.0	32	0	$4	$42	$0	11.5

	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
B16 Custodians Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,398	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	429	0	$48	$489	$95	8.2
Basement Corridor	7	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Elevator #1	8	Compact Fluorescent: Screw in Lamp	Wall Switch	S	23	8,760	3	Relamp	No	8	LED Screw-In Lamps: Screw in Lamps	Wall Switch	15	8,760	0.0	398	0	$45	$138	$8	2.9
B11 Mechanical Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.1	393	0	$44	$256	$70	4.2
B10 Electric Service Room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.2	618	0	$70	$402	$110	4.2
B10 Side Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,241	0.1	215	0	$24	$416	$75	14.1
B09	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3, 4	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	827	0.5	894	0	$101	$1,453	$320	11.2
B05 Storage	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,199	3	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,199	0.2	281	0	$32	$365	$100	8.4
B05 Storage	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
B05 Security	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,398	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	429	0	$48	$489	$95	8.2
B05 Rear Secure Equipment	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.1	225	0	$25	$146	$40	4.2
B03	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,199	3	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,199	0.2	337	0	$38	$438	$120	8.4
B02 IT Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,199	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,199	0.1	169	0	$19	$219	$60	8.4
B01 Generator	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,799	3	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,799	0.1	337	0	$38	$292	$80	5.6
B01 Generator Intake Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,799	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,799	0.1	169	0	$19	$146	$40	5.6
North Stairs (3x)	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Breaker Panel	S	62	8,760	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Breaker Panel	29	8,760	0.0	616	0	$69	$110	$30	1.1
North Stairs (3x)	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Breaker Panel	S	62	8,760	3	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Breaker Panel	29	8,760	0.5	6,157	-2	$694	$1,095	$300	1.1
120A Electric	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.0	112	0	$13	$73	$20	4.2
Cafeteria	140	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	3,597	3, 5	Relamp	Yes	140	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	2,482	2.0	10,008	-3	$1,128	$8,680	$0	7.7
Cafeteria	60	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	3,597	3, 5	Relamp	Yes	60	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	2,482	0.8	4,289	-1	$483	$3,720	$0	7.7
Cafeteria	20	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	3,597	3, 5	Relamp	Yes	20	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	2,482	0.3	1,430	0	$161	$1,240	$0	7.7
Kitchen Serving Area	11	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	3,597	3, 5	Relamp	Yes	11	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	2,482	0.2	786	0	$89	$862	$0	9.7
Kitchen Serving Area	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,597	3	Relamp	No	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,597	0.2	885	0	$100	$383	$105	2.8
Chair Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,199	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	827	0.1	107	0	$12	$380	$30	28.9
Kitchen	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,597	3	Relamp	No	20	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,597	0.5	2,528	-1	$285	$1,095	$300	2.8

	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
Kitchen Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,760	0.0	308	0	$35	$55	$15	1.1
Kitchen Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,199	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,199	0.0	42	0	$5	$55	$15	8.4
Loading Dock	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,597	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,597	0.0	169	0	$19	$73	$20	2.8
115 Common Suite Corridor	13	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	13	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.2	2,263	-1	$255	$946	$0	3.7
115 Common Suite Corridor	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
115 Common Suite Corridor	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.3	3,134	-1	$353	$838	$120	2.0
Development Center	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.3	1,628	-1	$184	$767	$210	3.0
Common Suite	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.3	1,396	0	$157	$657	$180	3.0
107 Conference Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	349	0	$39	$329	$90	6.1
108 Conference Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	349	0	$39	$329	$90	6.1
112 Debate Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
109	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
110	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
111	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
104 Media Center	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.3	1,628	-1	$184	$767	$210	3.0
Tech Center (in Lib)	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.1	698	0	$79	$329	$90	3.0
Conference Room (in Lib)	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.1	698	0	$79	$329	$90	3.0
Library	30	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 4	Relamp	Yes	30	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	6,044	0.4	5,223	-2	$589	$1,660	$70	2.7
Library	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library	58	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 4	Relamp	Yes	58	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	6,044	0.8	10,097	-3	$1,138	$3,036	$105	2.6
Library Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
Library Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.2	2,350	-1	$265	$599	$125	1.8
Library Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,398	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.3	858	0	$97	$708	$155	5.7
Library Rear Hall	5	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	5	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.1	870	0	$98	$410	$0	4.2
Library Rear Hall	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	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
105 Electrical Media Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
Server Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	233	0	$26	$219	$60	6.1
105 Tech Workroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,398	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	429	0	$48	$489	$95	8.2
105A Electrical	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.0	56	0	$6	$37	$10	4.2
Front Lobby Mens Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.0	233	0	$26	$110	$30	3.0
Front Lobby Womens Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,309	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,309	0.0	233	0	$26	$110	$30	3.0
117 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.0	56	0	$6	$37	$10	4.2
118 Storage	1	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	2,398	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	2,398	0.0	32	0	$4	$42	$0	11.5
122 Security	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.0	112	0	$13	$73	$20	4.2
121 Admin Lobby	17	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	17	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.2	2,959	-1	$334	$1,114	$0	3.3
123 Files	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
Mail Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	8,760	0.0	118	0	$13	$42	$0	3.2
124	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
126	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
127	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
128	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
129 Principal	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	233	0	$26	$219	$60	6.1
130 Int Staff	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	349	0	$39	$329	$90	6.1
130 Rear Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
Copy Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
Main Office Open Area	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	349	0	$39	$329	$90	6.1
133 Conference	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	349	0	$39	$329	$90	6.1
121 Lobby	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Office Mens Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	8,760	0.0	118	0	$13	$42	$0	3.2
Main Office Womens Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	8,760	0.0	118	0	$13	$42	$0	3.2

	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
Guidance Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.1	1,828	-1	$206	$456	$70	1.9
Guidance Hallway	16	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	16	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.2	2,785	-1	$314	$1,072	$0	3.4
Guidance Office Open	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.3	698	0	$79	$657	$180	6.1
Guidance Office Open	10	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	1,655	3	Relamp	No	10	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	1,655	0.1	223	0	$25	$420	$0	16.7
Guidance Office Open	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Guidance Mens Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,760	0.0	205	0	$23	$37	$10	1.1
Guidance Womens Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,760	0.0	205	0	$23	$37	$10	1.1
Guidance Office #1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #2	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #3	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #4	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #5	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #6	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #7	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #8	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Guidance Office #9	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
Conference Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	233	0	$26	$219	$60	6.1
135 Nurse Open Area	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,760	0.0	616	0	$69	$110	$30	1.1
Nurse Mens Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,760	0.0	205	0	$23	$37	$10	1.1
Nurse Womens Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,760	0.0	205	0	$23	$37	$10	1.1
Nurse Exam Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,760	0.0	616	0	$69	$110	$30	1.1
Nurse Resting Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,175	0	$132	$280	$65	1.6
Nurses Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,760	0.0	616	0	$69	$110	$30	1.1
Nurses Office Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,760	0.0	205	0	$23	$37	$10	1.1
Controls Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	42	0	$5	$37	$10	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
Elevator Machine Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	84	0	$10	$73	$20	5.6
Stair #5 Lobby	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Breaker Panel	S	62	8,760	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,089	-1	$235	$492	$80	1.8
Stair #5 Lobby	2	Compact Fluorescent: Triple Tube Plug in Lamp	Breaker Panel	S	48	8,760	3	Relamp	No	2	LED - Linear Tubes: Plug in Lamps	Breaker Panel	29	8,760	0.0	236	0	$27	$84	$0	3.2
139 Faculty Dining	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.2	465	0	$52	$438	$120	6.1
Side Entrance	84	Compact Fluorescent: Triple Tube Plug in Lamp	Breaker Panel	S	48	8,760	3, 5	Relamp	Yes	84	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	1.2	14,623	-5	$1,648	$6,328	$0	3.8
Side Entrance	8	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Side Entrance	20	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Breaker Panel	S	22	8,760	3, 5	Relamp	Yes	20	LED - Linear Tubes: (1) 2' Lamp	High/Low Control	9	6,044	0.2	2,007	-1	$226	$725	$60	2.9
153 Auditorium Hallway	2	Halogen Incandescent: PAR 38 Screw in Lamp	Wall Switch	S	100	2,878	3, 5	Relamp	Yes	2	LED Screw-In Lamps: Screw in Lamps	High/Low Control	15	1,986	0.1	366	0	$41	$260	$2	6.3
153 Auditorium Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,878	3, 5	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,986	0.1	257	0	$29	$310	$30	9.6
153 Auditorium	60	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,878	3	Relamp	No	60	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,878	0.4	1,655	-1	$187	$975	$180	4.3
153 Auditorium	56	Halogen Incandescent: PAR 38 Screw in Lamp	Wall Switch	S	100	2,878	3	Relamp	No	56	LED Screw-In Lamps: Screw in Lamps	Wall Switch	15	2,878	2.4	9,726	-3	$1,096	$1,692	$56	1.5
153 Auditorium	60	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,878	3	Relamp	No	60	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,878	0.4	1,655	-1	$187	$975	$180	4.3
153 Auditorium	90	Halogen Incandescent: PAR 38 Screw in Lamp	Wall Switch	S	100	2,878	3	Relamp	No	90	LED Screw-In Lamps: Screw in Lamps	Wall Switch	15	2,878	3.8	15,632	-5	$1,762	$2,719	$90	1.5
153 Auditorium	10	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	10	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Auditorium Stage	4	Metal Halide: (1) 70W Lamp	Wall Switch	S	95	2,878	1	Fixture Replacement	No	4	LED - Fixtures: Wall Pack Fixture	Wall Switch	29	2,878	0.1	539	0	$61	$432	$0	7.1
Auditorium Stage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,878	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,878	0.0	202	0	$23	$110	$30	3.5
Auditorium Stage	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Auditorium Stage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,878	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,878	0.0	135	0	$15	$73	$20	3.5
149 Rear Corridor Storage	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3, 4	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,655	0.3	1,072	0	$121	$818	$150	5.5
150 Mens Dress Room	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	1,655	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,655	0.0	34	0	$4	$72	$10	16.3
150 Mens Dress Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	58	0	$7	$55	$15	6.1
150 Mens Dress Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	1,655	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	1,655	0.0	22	0	$3	$42	$0	16.7
150 Womens Dress Room	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,159	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,159	0.0	44	0	$5	$72	$10	12.5
150 Womens Dress Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,159	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,159	0.0	76	0	$9	$55	$15	4.7
150 Womens Dress Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	2,159	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	2,159	0.0	29	0	$3	$42	$0	12.8

	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
Rear Entrance	16	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	16	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.2	2,785	-1	$314	$1,072	$0	3.4
Rear Entrance	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.4	5,223	-2	$589	$1,130	$200	1.6
Auditorium Rear Hall	18	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	18	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.3	3,134	-1	$353	$1,156	$0	3.3
148 Music Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,279	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,279	0.0	107	0	$12	$73	$20	4.4
Music Ensemble	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,573	0.1	306	0	$34	$434	$80	10.3
Production class 1C	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,279	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,573	0.3	815	0	$92	$708	$155	6.0
Instructional Music 1B	16	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	2,279	3, 5	Relamp	Yes	16	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	1,573	0.2	725	0	$82	$1,072	$0	13.1
Music Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,199	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	827	0.1	161	0	$18	$280	$45	13.0
Instructional Music 1B	3	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Music Practice Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,573	0.1	204	0	$23	$380	$30	15.2
Music Practice Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,573	0.1	204	0	$23	$380	$30	15.2
Gown Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,199	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	827	0.1	161	0	$18	$280	$45	13.0
Music Vocals 1A	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,279	3	Relamp	No	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,279	0.5	1,602	-1	$181	$1,095	$300	4.4
Music Vocals 1A	3	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
146 Electric Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	84	0	$10	$73	$20	5.6
145 Gym Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,199	0.0	28	0	$3	$37	$10	8.4
154 Data Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	84	0	$10	$73	$20	5.6
141 Gym	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,597	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,597	0.0	169	0	$19	$73	$20	2.8
Mens Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	233	0	$26	$219	$60	6.1
Mens Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	1,655	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	1,655	0.0	22	0	$3	$42	$0	16.7
Womens Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.1	233	0	$26	$219	$60	6.1
Womens Room	1	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	1,655	3	Relamp	No	1	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	1,655	0.0	22	0	$3	$42	$0	16.7
143 Custodial Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,199	0.0	28	0	$3	$37	$10	8.4
Natatorium	10	Metal Halide: (1) 1500W Lamp	Wall Switch	S	1,610	3,597	1	Fixture Replacement	No	10	LED - Fixtures: Other	Wall Switch	483	3,597	5.6	28,782	-9	$3,244	$1,987	$50	0.6
Natatorium	70	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	3,597	3	Relamp	No	70	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	3,597	0.7	3,397	-1	$383	$2,940	$0	7.7

	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
Natatorium	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,597	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,597	0.0	253	0	$28	$110	$30	2.8
Natatorium	10	Metal Halide: (1) 70W Lamp	Wall Switch	S	95	3,597	1	Fixture Replacement	No	10	LED - Fixtures: Wall Pack Fixture	Wall Switch	29	3,597	0.3	1,686	-1	$190	$1,080	$0	5.7
Natatorium	9	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	9	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
B26 PE Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	6,044	0.1	976	0	$110	$490	$40	4.1
B27 Natatorium Laundry	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,760	0.0	410	0	$46	$73	$20	1.1
B28 Mens Locker Room	10	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	2,159	3, 5	Relamp	Yes	10	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	1,490	0.1	429	0	$48	$620	$0	12.8
B28 Mens Locker Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,159	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,490	0.1	290	0	$33	$434	$80	10.9
B29 Womens Locker Room	10	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	2,159	3, 5	Relamp	Yes	10	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	1,490	0.1	429	0	$48	$620	$0	12.8
B29 Womens Locker Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,159	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,490	0.1	290	0	$33	$434	$80	10.9
B25 Elevator Equipment Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	84	0	$10	$73	$20	5.6
Service Elevator	9	LED - Fixtures: Emergency Lights	Breaker Panel	S	5	8,760		None	No	9	LED - Fixtures: Emergency Lights	Breaker Panel	5	8,760	0.0	0	0	$0	$0	$0	0.0
254 AV Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,199	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	827	0.1	161	0	$18	$280	$45	13.0
2nd Floor Lobby	90	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	90	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	1.3	15,668	-5	$1,766	$5,580	$0	3.2
2nd Floor Lobby	45	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	8,760	3, 5	Relamp	Yes	45	LED - Linear Tubes: (1) 2' Lamp	High/Low Control	9	6,044	0.4	4,516	-1	$509	$1,732	$135	3.1
2nd Floor Lobby	8	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Floor Lobby	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.1	1,567	-1	$177	$419	$60	2.0
2nd Floor Lobby Display Cases	24	Linear Fluorescent - T12: 3' T12 (30W) - 1L	Wall Switch	S	46	8,760	2	Relamp & Reballast	No	24	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	8,760	0.4	5,299	-2	$597	$1,212	$120	1.8
2nd Floor Lobby Mens Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
2nd Floor Lobby Womens Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,655	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,655	0.0	116	0	$13	$110	$30	6.1
255 Gym Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	827	0.1	107	0	$12	$380	$30	28.9
255 Gym Storage	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Floor Front Hall South	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,873	-1	$324	$802	$110	2.1
258 Athletic Directors Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	1,567	-1	$177	$335	$80	1.4
257 Training	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.3	4,309	-1	$486	$872	$200	1.4
256 Athletic Equipment	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	827	0.1	143	0	$16	$416	$75	21.2

	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
2nd Floor South Corr	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.3	3,134	-1	$353	$838	$120	2.0
266 Health Class	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3, 4	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,573	0.4	1,427	0	$161	$1,037	$245	4.9
265 Fitness Center	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,279	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,279	0.3	961	0	$108	$657	$180	4.4
264 Mens Locker Room	10	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	2,159	3	Relamp	No	10	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	2,159	0.1	291	0	$33	$420	$0	12.8
264 Mens Locker Room	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,159	3	Relamp	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,159	0.4	1,214	0	$137	$876	$240	4.7
262 Womens Locker Room	10	Compact Fluorescent: Triple Tube Plug in Lamp	Occupancy Sensor	S	48	2,159	3	Relamp	No	10	LED - Linear Tubes: Plug in Lamps	Occupancy Sensor	29	2,159	0.1	291	0	$33	$420	$0	12.8
262 Womens Locker Room	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,159	3	Relamp	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,159	0.4	1,214	0	$137	$876	$240	4.7
263 Custodial	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,199	0.0	28	0	$3	$37	$10	8.4
261 Electrical	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	42	0	$5	$37	$10	5.6
260 PE Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
260 PE Office Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$65	3.6
259 PE Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$30	4.0
259 PE Office Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,760	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,044	0.1	783	0	$88	$380	$65	3.6
Gym	36	Compact Fluorescent: CFL High Bay Fixture (42W)- 8L	Wall Switch	S	376	3,597	1, 4	Fixture Replacement	Yes	36	LED - Fixtures: High-Bay	Occupancy Sensor	240	2,482	3.8	19,344	-6	$2,180	$28,800	$6,660	10.2
360 IT Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	42	0	$5	$37	$10	5.6
359 Mech Room 3	40	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	40	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.7	2,247	-1	$253	$1,461	$400	4.2
359 Mech Room 3	3	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
357 Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,199	0.0	28	0	$3	$37	$10	8.4
3rd Floor South Hall	4	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	4	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	0.1	696	0	$78	$368	$0	4.7
3rd Floor South Hall	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.3	4,179	-1	$471	$984	$160	1.8
3rd Floor South Hall	6	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
356 Greenhouse	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,279	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,279	0.1	320	0	$36	$219	$60	4.4
356 Greenhouse	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,279	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,279	0.0	107	0	$12	$73	$20	4.4
355 Art Class	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,279	3	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,279	0.3	961	0	$108	$657	$180	4.4
355 Art Class Stor	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,199	0.0	56	0	$6	$73	$20	8.4

	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
355 Art Class Stor	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,199	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	827	0.1	143	0	$16	$416	$75	21.2
355 Art Class Kiln Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,279	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,279	0.0	107	0	$12	$73	$20	4.4
355 Art Class Darkroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,279	0.1	240	0	$27	$164	$45	4.4
354 Video Edit	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,573	0.1	306	0	$34	$280	$65	6.2
3rd Floor Corridor Display	12	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	S	46	8,760	2	Relamp & Reballast	No	12	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	8,760	0.2	2,351	-1	$265	$606	$60	2.1
353 Cad Class	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,279	3, 4	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,573	0.6	2,038	-1	$230	$1,365	$335	4.5
352 IT Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	42	0	$5	$37	$10	5.6
351 IT Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	42	0	$5	$37	$10	5.6
354 IT Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,799	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,799	0.0	42	0	$5	$37	$10	5.6
North Electrical Rooms (8x)	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.1	449	0	$51	$292	$80	4.2
North Custodial Rooms (4x)	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.1	225	0	$25	$146	$40	4.2
North IT Closets (4x)	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,398	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,398	0.1	225	0	$25	$146	$40	4.2
North Chemical Storage Rooms	2	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	2,398	3	Relamp	No	2	LED - Linear Tubes: Plug in Lamps	Wall Switch	29	2,398	0.0	65	0	$7	$84	$0	11.5
Main Entrance First Floor	98	Compact Fluorescent: Triple Tube Plug in Lamp	Wall Switch	S	48	8,760	3, 5	Relamp	Yes	98	LED - Linear Tubes: Plug in Lamps	High/Low Control	29	6,044	1.4	17,060	-6	$1,923	$6,116	$0	3.2
Main Entrance First Floor	10	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	10	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

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	Water-Source Heat Pump Circulation Pump	3	Water-Source Heat Pump Circulation Pump	75.0	95.0%	Yes	W	2,665		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Hot Water Heating System	3	Heating Hot Water Pump	20.0	93.0%	Yes	W	1,696		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Pool Water Heater	1	Process Pump	5.0	89.5%	Yes	W	1,373		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Heat Exchanger Pump	1	Process Pump	1.5	86.5%	Yes	W	8,760		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Chilled Water System	3	Chilled Water Pump	15.0	93.0%	Yes	W	1,696		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Water Source Heat Pumps	6	Other	10.0	91.7%	Yes	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Machine Rooms	Elevators	3	Other	75.0	95.0%	No	W	146		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Machine Rooms	Elevators	1	Other	50.0	95.0%	No	W	146		No	95.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Pool Pumps	2	Other	7.5	91.7%	No		1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Various	Heat Pumps	180	Supply Fan	0.8	74.0%	No		1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Various	Heat Pumps	1	Supply Fan	7.5	74.0%	No		1,696		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Various	Heat Pumps	2	Supply Fan	5.0	74.0%	No		1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Domestic Hot Water	2	Supply Fan	0.3	74.0%	No		1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Boiler Burner	8	Combustion Air Fan	0.3	74.0%	No		1,373		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Energy Recovery Units	Supply Fans	4	Supply Fan	40.0	94.1%	Yes		2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Energy Recovery Units	Return Fans	4	Return Fan	25.0	93.6%	Yes		2,034		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
AHU-3-1	Supply Fan	1	Supply Fan	40.0	94.1%	Yes		2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
AHU-3-2	Supply Fan	1	Supply Fan	15.0	93.0%	Yes		1,696		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
AHU-3-3	Supply Fan	1	Supply Fan	25.0	93.6%	Yes		2,034		No	93.6%	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
AHU-3-4	Supply Fan	1	Supply Fan	30.0	94.1%	Yes		2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
AHU-PH-1	Supply Fan	1	Supply Fan	30.0	94.1%	Yes		2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Kitchen Hood	Exhaust	1	Exhaust Fan	7.5	74.0%	No		1,696		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
Mechanical Room	Water to Water Heat Pump	12	Water Source HP	26.98	332.90	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-1	25	Water Source HP	2.86	35.20	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-2	25	Water Source HP	3.33	42.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-3	25	Water Source HP	3.96	50.70	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-4	25	Water Source HP	4.23	57.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-5	25	Water Source HP	4.79	68.80	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-6	25	Water Source HP	5.50	71.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various	HP-7	30	Water Source HP	0.65	7.20	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Electric Unit Heaters	5	Electric Resistance Heat		17.06	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Electric Unit Heaters	5	Electric Resistance Heat		34.12	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Electric Unit Heaters	5	Electric Resistance Heat		51.18	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Electric Unit Heaters	5	Electric Resistance Heat		68.24	W		No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Chilled Water Cooling Chiller CH-1 & Remote Air Cooled Condenser ACC-PH-1	1	Air-Cooled Screw Chiller	116.50	W	NR	Yes	1	Air-Cooled Centrifugal Chiller	Variable	116.50	1.24	0.74	6.9	10,222	0	$1,180	$99,396	$10,485	75.4
Mechanical Room	Chilled Water Cooling Chiller CH-2 & Remote Air Cooled Condenser ACC-PH-2	1	Air-Cooled Screw Chiller	116.50	W	NR	Yes	1	Air-Cooled Centrifugal Chiller	Variable	116.50	1.24	0.74	6.9	10,222	0	$1,180	$99,396	$10,485	75.4

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
Boiler Room	Hot Water Heating B-1	1	Condensing Hot Water Boiler	1,700.00	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Heating B-2	1	Condensing Hot Water Boiler	1,700.00	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Heating B-3	1	Condensing Hot Water Boiler	1,700.00	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Heating B-4	1	Condensing Hot Water Boiler	1,700.00	W		No						0.0	0	0	$0	$0	$0	0.0

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 DHW-1	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Domestic Hot Water DHW-2	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Kitchen	1	Booster Water Heater	W	6	Yes	1	Booster Water Heater	Natural Gas	85.00%	Et	2.7	22,500	-77	$1,958	$2,282	$1,075	0.6

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)	7, 8	Yes	No	Yes	0.5	6,608	0	$762	$2,584	$75	3.3
Kitchen	1	Cooler (35F to 55F)	7, 8	Yes	No	Yes	0.3	4,055	0	$468	$2,281	$75	4.7

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	3	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.2	1,937	0	$224	$4,896	$375	20.2
Kitchen	2	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.2	1,899	0	$219	$3,954	$600	15.3
Kitchen	3	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	No	NR	Yes	0.3	2,961	0	$342	$6,912	$600	18.5
Kitchen	2	Stand-Up Freezer, Solid Door (>50 cu. ft.)	No	NR	Yes	0.6	5,571	0	$643	$5,844	$1,200	7.2

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	4	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Rack Oven (Double)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Griddle (≥6 Feet Width)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Combination Oven/Steam Cooker (>28 Pans)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Fryer	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Steamer	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	8	Insulated Food Holding Cabinet (1/2 Size)	No		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	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	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Natural Gas	N/A	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	304	Computers	120.0	
School	852	Laptops	90.0	
School	24	Fan	100.0	
School	24	TV	150.0	
School	17	Smart Board / Projector	300.0	
School	47	Small Office Printers	50.0	
School	3	Large Xerox- Type Printers	515.0	
School	24	Coffee Maker	400.0	
School	24	Microwave	1,100.0	
School	4	Residential Refrigerator	690.0	
School	4	Medium Sized Refrigerator	450.0	
School	12	Mini Fridge	260.0	
School	12	Water Dispenser	300.0	
School	4	Large Floor Fans	185.0	
School	2	Kiln	11,000.0	
School	8	Speakers	100.0	
School	8	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	
School	4	Electric Stove	1,500.0	

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	2	Refrigerated	9	Yes	0.4	3,224	0	$372	$460	$100	1.0
Main Office	1	Refrigerated	9	Yes	0.2	1,612	0	$186	$230	$50	1.0
Gym	1	Refrigerated	9	Yes	0.2	1,612	0	$186	$230	$50	1.0
Various	3	Non-Refrigerated	N/A	No	0.0	0	0	$0	$0	$0	0.0

Custom Recommendations (High Level Screening)

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
304	*Mon - Fri 8AM-5PM*	*Mon - Fri 5PM-8AM*	*Weekends & Holidays*	Energy Rate (W)*	Weekly Run Hours	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	*Weekends & Holidays*	*Energy Rate (W)**	*Weekly Run Hours*	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	Weekends & Holidays	Energy Rate (W)*	*Weekly Run Hours*
Existing Conditions	50%	15%	5%	120	36	10%	10%	5%	80	14	40%	75%	90%	5	117
Proposed Conditions	50%	5%	0%	120	26	0%	0%	0%	80	0	50%	95%	100%	5	142

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	267	75%	22,256	$2,568	$15.00	$2,500.0	$7,060	2.7
44	194							

Retro-Commissioning Study & HVAC Improvements

Existing Conditions				Proposed Conditions			Energy Impact & Financial Analysis					
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Gas Use (mmBtu)*	*Annual Heating Oil Use (mmBtu)*	*Annual Motor HVAC Energy Use (kWh)*	Assumed % Cooling Savings	Assumed % Heating Savings	Assumed % Motor Savings	Total Annual kWh Savings	Total Annual Gas mmBtu Savings	Total Annual Fuel mmBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Simple Payback Period (Years)
1,695,577	9,727.5	0.0	895,508	5%	3%	5%	129,554	292	0	$14,973	$86,000	5.7

Equations: (Based on Industry Standards)

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

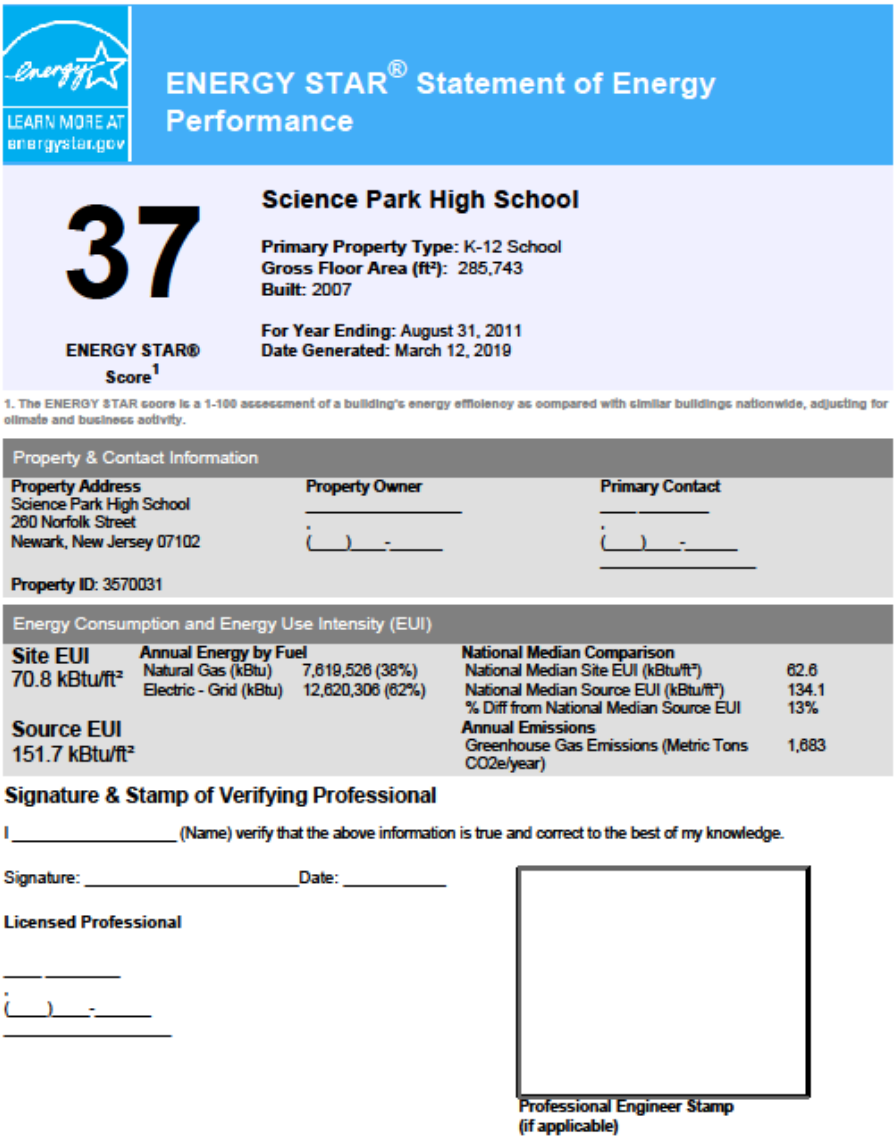
Energy savings range between 5% and 20% with a typical payback of two years or less

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.

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.



LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Science Park High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 285,743
Built: 2007

For Year Ending: August 31, 2011
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
Science Park High School 260 Norfolk Street Newark, New Jersey 07102	_____ . (___)___-_____	____ _____ . (___)___-_____ _____

Property ID: 3570031

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
70.8 kBtu/ft²

Source EUI
151.7 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	7,619,526 (38%)
Electric - Grid (kBtu)	12,620,306 (62%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	62.6
National Median Source EUI (kBtu/ft²)	134.1
% Diff from National Median Source EUI	13%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,683

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.