Local Government Energy Audit Report

D'Ippolito Elementary School

January 3, 2020

Prepared for:

Vineland Public Schools
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Vineland, NJ 08360

Prepared by:

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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 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. Cost estimates include material and labor pricing associated with installation of primary recommended equipment only. Cost estimates do not include demolition or removal of hazardous waste. We encourage the owner of the facility 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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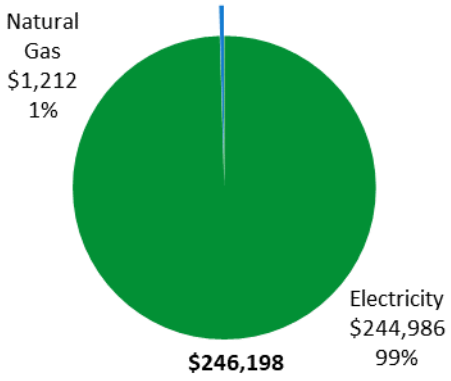
1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $246,198 Electricity: 1,522,543 kWh Natural Gas: 639 Therms	
ENERGY STAR® Benchmarking Score	6 *(1-100 scale)*	This building performs below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

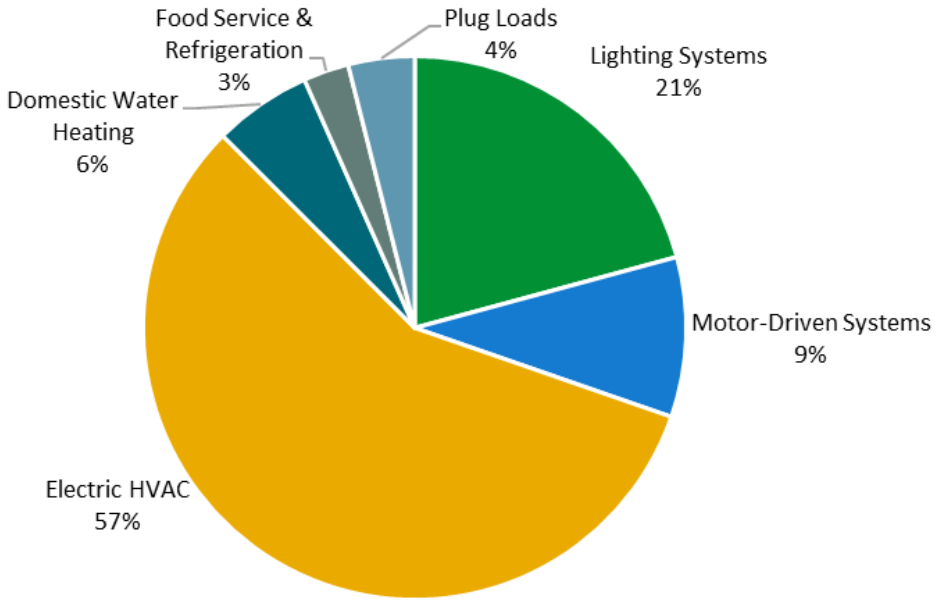


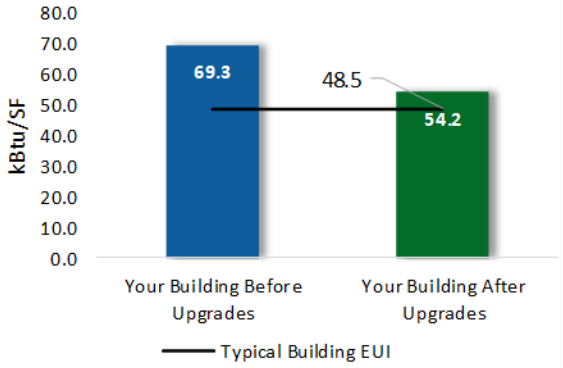
Figure 1 - Energy Use by System

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.

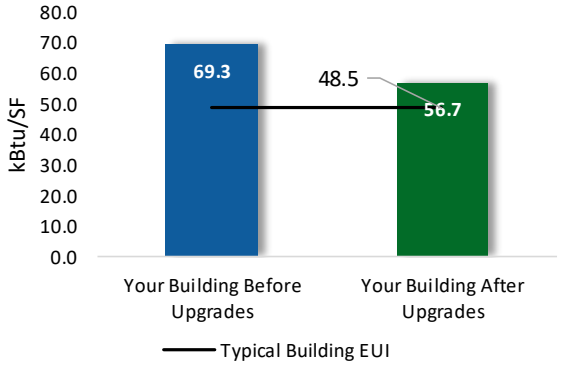
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$682,310
Potential Rebates & Incentives[1]	$92,145
Annual Cost Savings	$54,211
Annual Energy Savings	Electricity: 336,912 kWh
Greenhouse Gas Emission Savings	170 Tons
Simple Payback	10.9 Years
Site Energy Savings (all utilities)	22%



Scenario 2: Cost Effective Package[2]

Installation Cost	$210,719
Potential Rebates & Incentives	$59,399
Annual Cost Savings	$45,162
Annual Energy Savings	Electricity: 280,676 kWh
Greenhouse Gas Emission Savings	141 Tons
Simple Payback	3.4 Years
Site Energy Savings (all utilities)	18%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	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			**177,575**	**36.9**	**0**	**$28,573**	**$100,329**	**$0**	**$100,329**	**3.5**	**178,816**
ECM 1	Install LED Fixtures	Yes	41,477	3.6	0	$6,674	$47,632	$0	$47,632	7.1	41,767
ECM 2	Retrofit Fixtures with LED Lamps	Yes	128,664	32.7	0	$20,703	$50,814	$0	$50,814	2.5	129,563
ECM 3	Install LED Exit Signs	Yes	7,434	0.6	0	$1,196	$1,883	$0	$1,883	1.6	7,486
Lighting Control Measures			**37,582**	**9.5**	**0**	**$6,047**	**$45,150**	**$0**	**$45,150**	**7.5**	**37,845**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	35,415	9.0	0	$5,698	$42,000	$0	$42,000	7.4	35,662
ECM 5	Install High/Low Lighting Controls	Yes	2,168	0.5	0	$349	$3,150	$0	$3,150	9.0	2,183
Motor Upgrades			**9,157**	**2.1**	**0**	**$1,473**	**$37,440**	**$0**	**$37,440**	**25.4**	**9,221**
ECM 6	Premium Efficiency Motors	No	9,157	2.1	0	$1,473	$37,440	$0	$37,440	25.4	9,221
Variable Frequency Drive (VFD) Measures			**41,989**	**11.8**	**0**	**$6,756**	**$54,132**	**$0**	**$54,132**	**8.0**	**42,283**
ECM 7	Install VFD on Variable Air Volume (VAV) Fans	Yes	8,842	2.7	0	$1,423	$16,798	$0	$16,798	11.8	8,904
ECM 8	Install VFDs on Constant Volume (CV) Fans	Yes	33,148	9.1	0	$5,334	$37,333	$0	$37,333	7.0	33,379
Electric Unitary HVAC Measures			**47,079**	**21.2**	**0**	**$7,575**	**$434,151**	**$0**	**$434,151**	**57.3**	**47,409**
ECM 9	Install High Efficiency Air Conditioning Units	No	7,062	5.9	0	$1,136	$158,387	$0	$158,387	139.4	7,111
ECM 10	Install High Efficiency Heat Pumps	No	14,294	4.7	0	$2,300	$71,722	$0	$71,722	31.2	14,394
ECM 11	Install High Efficiency PTAC/PTHP	No	25,723	10.7	0	$4,139	$204,042	$0	$204,042	49.3	25,903
HVAC System Improvements			**12,738**	**0.0**	**0**	**$2,050**	**$5,556**	**$0**	**$5,556**	**2.7**	**12,827**
ECM 12	Implement Demand Control Ventilation (DCV)	Yes	9,536	0.0	0	$1,534	$5,438	$0	$5,438	3.5	9,602
ECM 13	Install Pipe Insulation	Yes	3,203	0.0	0	$515	$118	$0	$118	0.2	3,225
Domestic Water Heating Upgrade			**6,117**	**0.0**	**0**	**$984**	**$315**	**$0**	**$315**	**0.3**	**6,160**
ECM 14	Install Low-Flow DHW Devices	Yes	6,117	0.0	0	$984	$315	$0	$315	0.3	6,160
Food Service & Refrigeration Measures			**4,675**	**0.4**	**0**	**$752**	**$5,237**	**$0**	**$5,237**	**7.0**	**4,708**
ECM 15	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	786	0.1	0	$127	$910	$0	$910	7.2	792
ECM 16	Refrigeration Controls	Yes	1,934	0.0	0	$311	$3,867	$0	$3,867	12.4	1,948
ECM 17	Vending Machine Control	Yes	1,954	0.2	0	$314	$460	$0	$460	1.5	1,968
TOTALS (COST EFFECTIVE MEASURES)			**280,676**	**58.5**	**0**	**$45,162**	**$210,719**	**$0**	**$210,719**	**4.7**	**282,639**
TOTALS (ALL MEASURES)			**336,912**	**81.8**	**0**	**$54,211**	**$682,310**	**$0**	**$682,310**	**12.6**	**339,268**

* - 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

For more detail on each evaluated energy improvement and a break out of cost-effective improvements, see **Section 4: Energy Conservation Measures**.

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 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			
ECM 2	Retrofit Fixtures with LED Lamps			
ECM 3	Install LED Exit Signs			
ECM 4	Install Occupancy Sensor Lighting Controls			
ECM 5	Install High/Low Lighting Controls			
ECM 6	Premium Efficiency Motors			
ECM 7	Install VFD on Variable Air Volume (VAV) Fans			
ECM 8	Install VFDs on Constant Volume (CV) Fans			
ECM 9	Install High Efficiency Air Conditioning Units			
ECM 10	Install High Efficiency Heat Pumps			
ECM 11	Install High Efficiency PTAC/PTHP			
ECM 12	Implement Demand Control Ventilation (DCV)			
ECM 13	Install Pipe Insulation			
ECM 14	Install Low-Flow DHW Devices			
ECM 15	Refrigerator/Freezer Case Electrically Commutated Motors			
ECM 16	Refrigeration Controls			
ECM 17	Vending Machine Control			

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 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 D'Ippolito Elementary School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

2.1 Site Overview

On August 6, 2019, TRC performed an energy audit at D'Ippolito Elementary School located in Vineland, New Jersey. TRC met with Daniel Biggs to review the facility operations and help focus our investigation on specific energy-using systems.

D'Ippolito Elementary School is a 1-story, 75,860 square foot building built in 1968 with an addition in 1980. Spaces include: classrooms, gymnasium, multipurpose room, offices, cafeteria, corridors, restrooms, storage, library, kitchen, and electrical & mechanical space.

2.2 Building Occupancy

The facility is occupied ten months of the year. Typical weekday occupancy is 641 staff and students.

There are no summer or weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
D'Ippolito Elementary School	Weekday	8:00 AM to 4:00 PM
	Weekend	Closed

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block and brick masonry over structural steel. The roof is flat and covered with black membrane. It is in fair condition. Sections of walls are made of concrete masonry units (CMUs) with a painted CMU interior finish.

Most of the windows are single pane and have aluminum frames without a thermal break. The glass-to-frame seals are in poor condition. The operable window weather seals are in poor condition showing evidence of wear. Exterior doors have aluminum frames and some are in fair condition with undamaged door seals.

Flat Roof

Concrete Wall

CMUs Wall & Window

Entrance Door

Exit Door

2.4 Lighting Systems

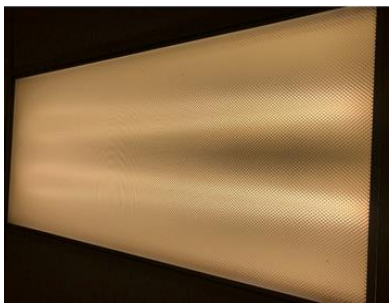
The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some high intensity discharge (HID), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 2- 3- or 4-lamp, 2- or 4-foot long recessed or surface mounted fixtures, and 2-foot fixtures with U-bend or linear tube lamps. Gymnasium fixtures have high bay HID lamps and are manually controlled. Most exit signs are incandescent however there are a few LED units.

Most fixtures are in good condition. Interior lighting levels were generally sufficient. Lighting fixtures are controlled by wall switches.

Exterior fixtures include wall packs and canopy lights with high intensity discharge (HID) or LED lamps. The pole mounted fixtures have HID or LED lamps.

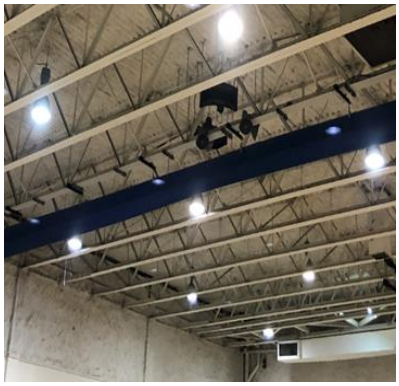
Exterior light fixtures are controlled by a time clock or photocell, depending on the fixture.



Linear Fluorescent T8

4-Foot LED Panel

Classroom T8 Fixtures

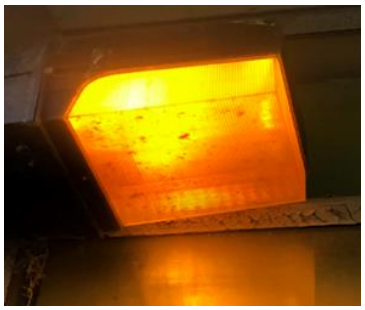


Gym HID Fixtures

LED Exit Sign

Incandescent Exit Sign

LED Wall Pack



HPS Canopy Light

LED Wall Pack

LED Pole Light

HID Pole Light

Time O'clock

2.5 Air Handling Systems

Unit Ventilators

Classroom McQuay unit ventilators have supply fan with capacitor motors, outside air dampers and valves that operate with a local control system. They provide direct expansion cooling and are equipped with electric resistance heaters. Most of the units are 17 years old and are in fair operating condition.

Typical Unit Ventilator

Capacitor Fan Motor

Unit Ventilator Nameplate

Packaged and Split-System Units

The library office is served with a packaged terminal heat pump (PTHP) unit controlled by room thermostat. The 11.2 EER unit has a heating capacity of 13.2 MBh and a 1.25-ton cooling capacity.

Most of the packaged and split system units at this school have passed their useful live and are in poor condition. The Trane packaged units are controlled by the Novar control system while the split system units are controlled with programmable thermostats. The RTUs are equipped with economizer that opens to draw-in outside air for cooling when the outside air temperature is cool and dry enough. This reduces the demand on the cooling system, lowering its usage hours and saving energy. Also, each RTUs has a 90 kW (307 MBh) electric resistance heater.

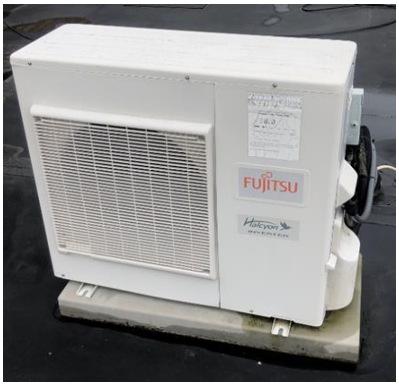
The school is served by multiple packaged roof top units, which are summarized on the next page.

Unit	Area Served	Size	Estimated Efficiency
Packaged Air-Source HP	Classrooms	7.50 tons cooling 88 MBh heating	9.7 EER 2.8 COP
Packaged Air-Source HP	Classrooms	7.50 tons cooling 88 MBh heating	9.7 EER 2.8 COP
Packaged Air-Source HP	Room A10	4.00 tons cooling 47 MBh heating	9.7 EER 2.8 COP
Packaged Air-Source HP	Main Office	4.00 tons cooling 47 MBh heating	9.7 EER 2.8 COP
Packaged Air-Source HP	Classroom	4.00 tons cooling 47 MBh heating	9.7 EER 2.8 COP
Split-System AC	Library	3.00 tons cooling	9.7 EER
Split-System AC	Library	3.00 tons cooling	9.7 EER
Ductless Mini-Split AC	Kitchen	2.00 tons cooling	9.7 EER
Ductless Mini-Split AC	Kitchen	2.00 tons cooling	9.7 EER
Ductless Mini-Split AC	Computer Room	3.00 tons cooling	9.7 EER
Packaged AC	Gym	27.50 tons cooling	9.7 EER
Packaged AC	Cafeteria	27.50 tons cooling	9.7 EER
Packaged AC	Classroom and Hallway	27.50 tons cooling	9.7 EER
Packaged Air-Source HP	Classroom	10.00 tons cooling 108 MBh heating	9.7 EER 2.8 COP

Refer to Appendix A for detailed information about each unit.

Large Trane Package (RTU)

Nameplate - Large RTU



Fujitsu Split AC

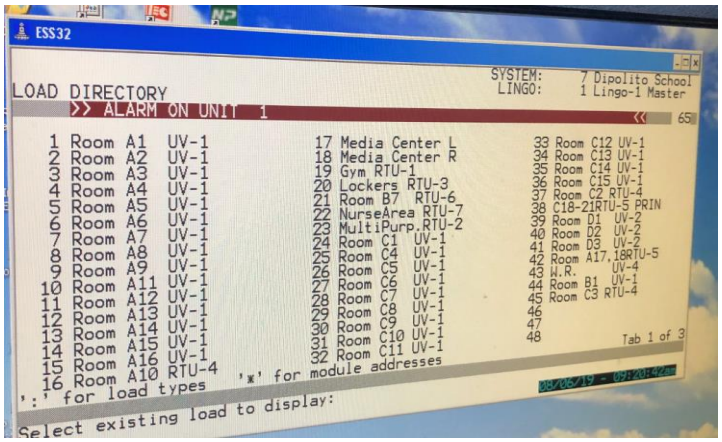
Trane Packaged Heat Pump

Novar Control System

Lennox Split AC

2.6 Building Energy Management Systems (EMS)

A limited Novar EMS controls unit ventilators and packaged units. The EMS provides equipment control and monitors and controls space temperatures. The staff expressed an interest in replacing and/or expanding the EMS.



EMS screenshot

2.7 Domestic Hot Water

Hot water is produced with one 200 gallon 120 kW and one 50 gallon 4.5 kW electric storage water heaters.

The domestic hot water pipes are partially insulated, and the insulation is in good condition.

Electric Domestic Hot Water & Uninsulated Pipes

2.8 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used to prepare meals for students and staff. Most cooking is done using a convection gas-fired oven. Bulk prepared foods are held in several electric holding cabinets. Equipment is high efficiency and is in good condition.

The dishwasher is a non- ENERGY STAR® high temperature, rack type unit. The dishwasher has a 30 kW booster heater.

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

Gas Convection Ovens & Range/Griddle

Dishwasher

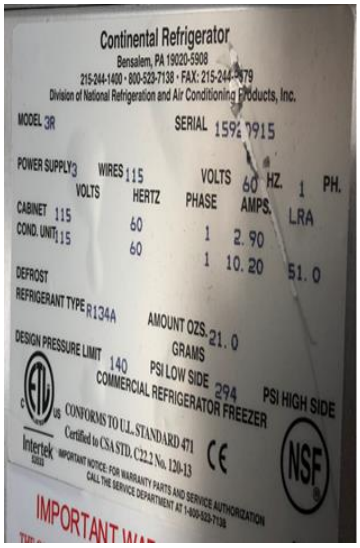
2.9 Refrigeration

The kitchen has several stand-up refrigerators with solid doors. There are also three milk cooler refrigerator chests. Most equipment is high efficiency and in good condition.

The walk-in refrigerator has an estimated 0.5-ton compressor located on top of the walk-in and a single fan evaporator. The walk-in low temperature freezer has a 0.5-ton compressor located on top of the walk-in and a two fan evaporator.

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

Commercial Standup Refrigerator



Refrigerator Nameplate

Walk-In Cooler

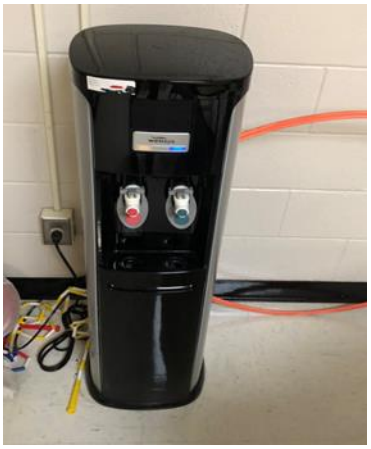
2.10 Plug Load & Vending Machines

The location is doing a great job managing their electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are approximately 45 computer work stations and 800 laptops throughout the facility. Plug loads throughout the building include general café and office equipment. There are typical loads such as printers, televisions, and microwaves.

There are several residential style refrigerators throughout the building that are used to store food and beverages. These vary in condition and efficiency.

There is a refrigerated beverage vending machine and a non-refrigerated vending machine. Vending machines are not equipped with occupancy-based controls.



Water Cooler

Vending Machines

2.11 Water-Using Systems

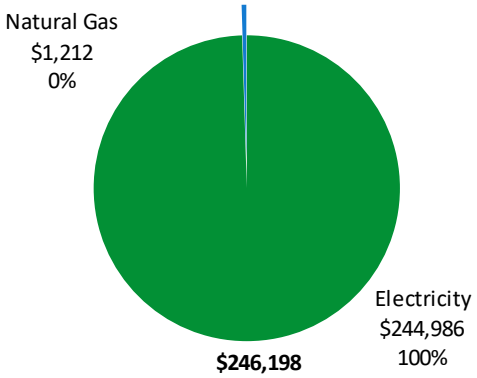
There are several restrooms with toilets, urinals, and sinks. Some faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf.

Lavatory Sinks & Urinals

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	1,522,543 kWh	$244,986
Natural Gas	639 Therms	$1,212
Total		**$246,198**



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.

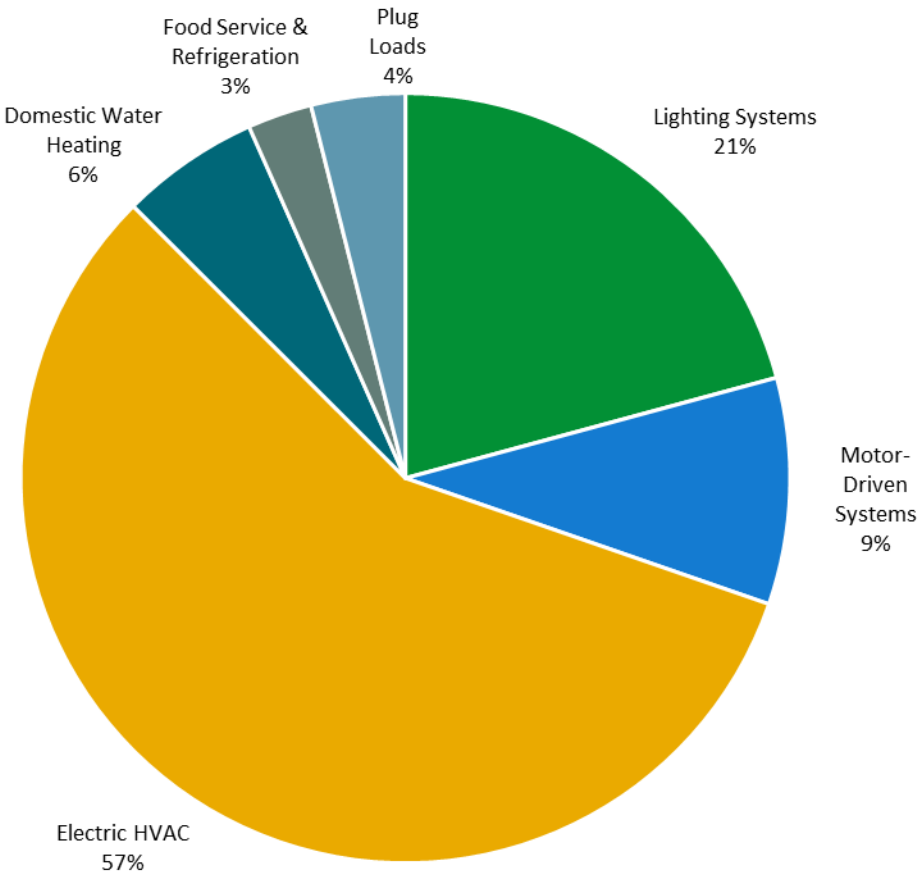
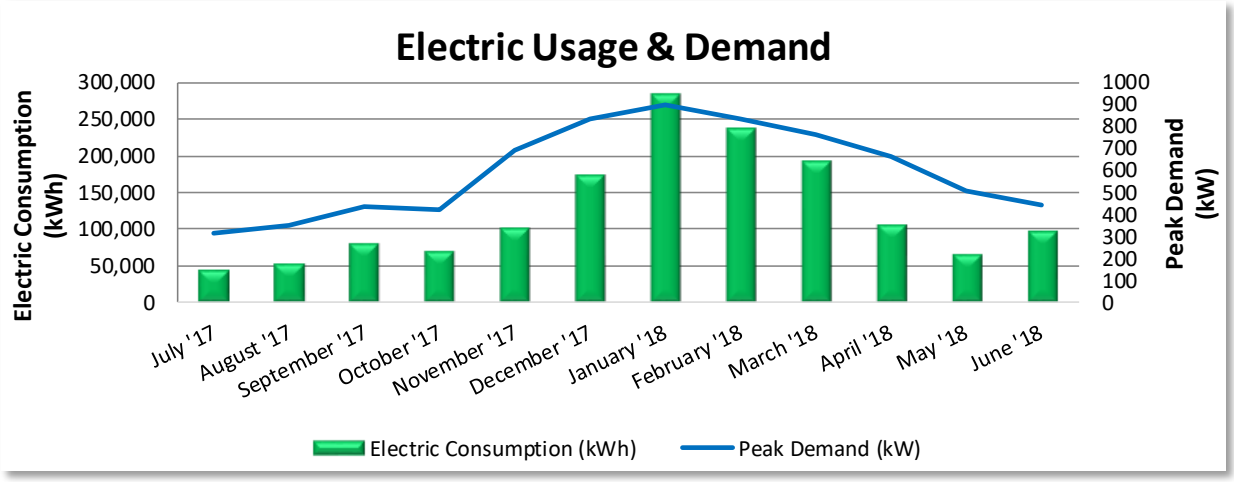


Figure 5 - Energy Balance

3.1 Electricity

City of Vineland delivers and produces electricity under rate class Commercial Service (GLP20).



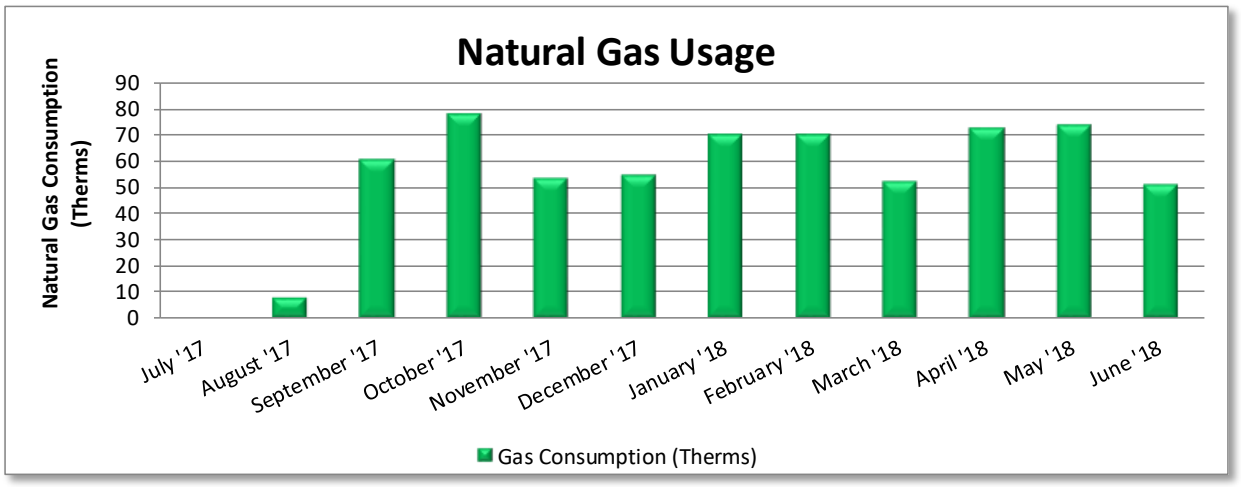
Electric Billing Data						
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**	**TRC Estimated Usage?**
7/31/17	31	44,200	318	$2,147	$7,418	No
8/31/17	31	53,800	354	$2,390	$8,803	No
9/29/17	29	79,800	434	$4,232	$13,576	No
10/31/17	32	71,000	422	$4,009	$12,045	No
11/30/17	30	102,200	690	$6,555	$18,082	No
12/29/17	29	174,400	834	$7,923	$27,529	No
1/31/18	33	285,200	896	$8,512	$40,517	No
2/28/18	28	239,200	831	$7,895	$33,981	Yes
3/29/18	29	193,200	766	$7,277	$29,953	No
4/30/18	32	106,600	662	$6,786	$20,404	No
5/24/18	24	66,000	510	$5,228	$13,694	No
6/28/18	35	98,600	440	$4,620	$17,641	No
Totals	**363**	**1,514,200**	**896**	**$67,571**	**$243,643**	
Annual	**365**	**1,522,543**	**896**	**$67,943**	**$244,986**	

Notes:

- Peak demand of 896 kW occurred in January '18.
- Average demand over the past 12 months was 596 kW.
- The average electric cost over the past 12 months was $0.161/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.
- Due to the electric heating, consumption and demand is greatest during the winter months and peaks in January.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service FT, with natural gas supply provided by South Jersey Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
8/3/17	28	0	$27
9/7/17	35	7	$42
10/4/17	27	60	$94
11/6/17	33	78	$121
12/5/17	29	53	$101
1/8/18	34	54	$123
2/5/18	28	70	$126
3/6/18	29	70	$128
4/5/18	30	52	$105
5/4/18	29	73	$128
6/6/18	33	73	$124
7/7/18	31	51	$95
Totals	**366**	**640**	**$1,215**
Annual	**365**	**639**	**$1,212**

Notes:

- The average gas cost for the past 12 months is $1.898/therm, which is the blended rate used throughout the analysis.
- Gas consumption occurs only during the school year and is associated with the food service equipment.

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.

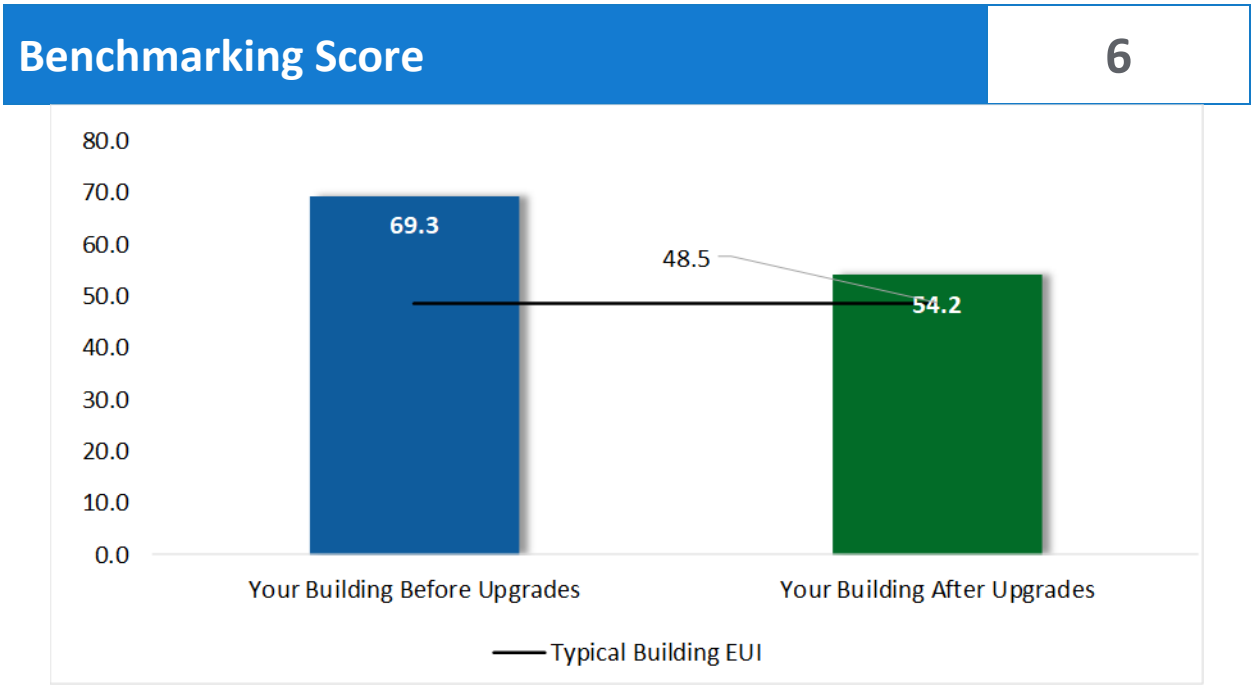


Figure 6 - Energy Use Intensity Comparison[3]

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

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause a 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.

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[4].

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

4 Energy Conservation Measures

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

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

For a detailed list of the locations and recommended energy conservation measures for all inventoried equipment, see **Appendix A: Equipment Inventory & Recommendations**

#	Energy Conservation Measure	Cost Effective?	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			**177,575**	**36.9**	**0**	**$28,573**	**$100,329**	**$0**	**$100,329**	**3.5**	**178,816**
ECM 1	Install LED Fixtures	Yes	41,477	3.6	0	$6,674	$47,632	$0	$47,632	7.1	41,767
ECM 2	Retrofit Fixtures with LED Lamps	Yes	128,664	32.7	0	$20,703	$50,814	$0	$50,814	2.5	129,563
ECM 3	Install LED Exit Signs	Yes	7,434	0.6	0	$1,196	$1,883	$0	$1,883	1.6	7,486
Lighting Control Measures			**37,582**	**9.5**	**0**	**$6,047**	**$45,150**	**$0**	**$45,150**	**7.5**	**37,845**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	35,415	9.0	0	$5,698	$42,000	$0	$42,000	7.4	35,662
ECM 5	Install High/Low Lighting Controls	Yes	2,168	0.5	0	$349	$3,150	$0	$3,150	9.0	2,183
Motor Upgrades			**9,157**	**2.1**	**0**	**$1,473**	**$37,440**	**$0**	**$37,440**	**25.4**	**9,221**
ECM 6	Premium Efficiency Motors	No	9,157	2.1	0	$1,473	$37,440	$0	$37,440	25.4	9,221
Variable Frequency Drive (VFD) Measures			**41,989**	**11.8**	**0**	**$6,756**	**$54,132**	**$0**	**$54,132**	**8.0**	**42,283**
ECM 7	Install VFD on Variable Air Volume (VAV) Fans	Yes	8,842	2.7	0	$1,423	$16,798	$0	$16,798	11.8	8,904
ECM 8	Install VFDs on Constant Volume (CV) Fans	Yes	33,148	9.1	0	$5,334	$37,333	$0	$37,333	7.0	33,379
Electric Unitary HVAC Measures			**47,079**	**21.2**	**0**	**$7,575**	**$434,151**	**$0**	**$434,151**	**57.3**	**47,409**
ECM 9	Install High Efficiency Air Conditioning Units	No	7,062	5.9	0	$1,136	$158,387	$0	$158,387	139.4	7,111
ECM 10	Install High Efficiency Heat Pumps	No	14,294	4.7	0	$2,300	$71,722	$0	$71,722	31.2	14,394
ECM 11	Install High Efficiency PTAC/PTHP	No	25,723	10.7	0	$4,139	$204,042	$0	$204,042	49.3	25,903
HVAC System Improvements			**12,738**	**0.0**	**0**	**$2,050**	**$5,556**	**$0**	**$5,556**	**2.7**	**12,827**
ECM 12	Implement Demand Control Ventilation (DCV)	Yes	9,536	0.0	0	$1,534	$5,438	$0	$5,438	3.5	9,602
ECM 13	Install Pipe Insulation	Yes	3,203	0.0	0	$515	$118	$0	$118	0.2	3,225
Domestic Water Heating Upgrade			**6,117**	**0.0**	**0**	**$984**	**$315**	**$0**	**$315**	**0.3**	**6,160**
ECM 14	Install Low-Flow DHW Devices	Yes	6,117	0.0	0	$984	$315	$0	$315	0.3	6,160
Food Service & Refrigeration Measures			**4,675**	**0.4**	**0**	**$752**	**$5,237**	**$0**	**$5,237**	**7.0**	**4,708**
ECM 15	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	786	0.1	0	$127	$910	$0	$910	7.2	792
ECM 16	Refrigeration Controls	Yes	1,934	0.0	0	$311	$3,867	$0	$3,867	12.4	1,948
ECM 17	Vending Machine Control	Yes	1,954	0.2	0	$314	$460	$0	$460	1.5	1,968
TOTALS			**336,912**	**81.8**	**0**	**$54,211**	**$682,310**	**$0**	**$682,310**	**12.6**	**339,268**

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

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

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**177,575**	**36.9**	**0**	**$28,573**	**$100,329**	**$0**	**$100,329**	**3.5**	**178,816**
ECM 1	Install LED Fixtures	41,477	3.6	0	$6,674	$47,632	$0	$47,632	7.1	41,767
ECM 2	Retrofit Fixtures with LED Lamps	128,664	32.7	0	$20,703	$50,814	$0	$50,814	2.5	129,563
ECM 3	Install LED Exit Signs	7,434	0.6	0	$1,196	$1,883	$0	$1,883	1.6	7,486
Lighting Control Measures		**37,582**	**9.5**	**0**	**$6,047**	**$45,150**	**$0**	**$45,150**	**7.5**	**37,845**
ECM 4	Install Occupancy Sensor Lighting Controls	35,415	9.0	0	$5,698	$42,000	$0	$42,000	7.4	35,662
ECM 5	Install High/Low Lighting Controls	2,168	0.5	0	$349	$3,150	$0	$3,150	9.0	2,183
Variable Frequency Drive (VFD) Measures		**41,989**	**11.8**	**0**	**$6,756**	**$54,132**	**$0**	**$54,132**	**8.0**	**42,283**
ECM 7	Install VFD on Variable Air Volume (VAV) Fans	8,842	2.7	0	$1,423	$16,798	$0	$16,798	11.8	8,904
ECM 8	Install VFDs on Constant Volume (CV) Fans	33,148	9.1	0	$5,334	$37,333	$0	$37,333	7.0	33,379
HVAC System Improvements		**12,738**	**0.0**	**0**	**$2,050**	**$5,556**	**$0**	**$5,556**	**2.7**	**12,827**
ECM 12	Implement Demand Control Ventilation (DCV)	9,536	0.0	0	$1,534	$5,438	$0	$5,438	3.5	9,602
ECM 13	Install Pipe Insulation	3,203	0.0	0	$515	$118	$0	$118	0.2	3,225
Domestic Water Heating Upgrade		**6,117**	**0.0**	**0**	**$984**	**$315**	**$0**	**$315**	**0.3**	**6,160**
ECM 14	Install Low-Flow DHW Devices	6,117	0.0	0	$984	$315	$0	$315	0.3	6,160
Food Service & Refrigeration Measures		**4,675**	**0.4**	**0**	**$752**	**$5,237**	**$0**	**$5,237**	**7.0**	**4,708**
ECM 15	Refrigerator/Freezer Case Electrically Commutated Motors	786	0.1	0	$127	$910	$0	$910	7.2	792
ECM 16	Refrigeration Controls	1,934	0.0	0	$311	$3,867	$0	$3,867	12.4	1,948
ECM 17	Vending Machine Control	1,954	0.2	0	$314	$460	$0	$460	1.5	1,968
TOTALS		**280,676**	**58.5**	**0**	**$45,162**	**$210,719**	**$0**	**$210,719**	**4.7**	**282,639**

* - 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		**177,575**	**36.9**	**0**	**$28,573**	**$100,329**	**$0**	**$100,329**	**3.5**	**178,816**
ECM 1	Install LED Fixtures	41,477	3.6	0	$6,674	$47,632	$0	$47,632	7.1	41,767
ECM 2	Retrofit Fixtures with LED Lamps	128,664	32.7	0	$20,703	$50,814	$0	$50,814	2.5	129,563
ECM 3	Install LED Exit Signs	7,434	0.6	0	$1,196	$1,883	$0	$1,883	1.6	7,486

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

ECM 1: Install LED Fixtures

Replace existing fixtures containing HID lamps 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 fixtures.

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

Affected building areas: gymnasium and exterior fixtures.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent and 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 a direct replacement for most other lighting technologies.

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

Affected building areas: all areas with fluorescent fixtures with T8 tubes; incandescent lamps in restrooms, electric rooms, faculty lounge, and closets.

ECM 3: Install LED Exit Signs

Replace incandescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output. Maintenance savings and improved reliability may also be achieved, as the longer-lasting LED lamps will not need to be replaced as often as the existing lamps.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**37,582**	**9.5**	**0**	**$6,047**	**$45,150**	**$0**	**$45,150**	**7.5**	**37,845**
ECM 4	Install Occupancy Sensor Lighting Controls	35,415	9.0	0	$5,698	$42,000	$0	$42,000	7.4	35,662
ECM 5	Install High/Low Lighting Controls	2,168	0.5	0	$349	$3,150	$0	$3,150	9.0	2,183

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 that lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

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

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

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

Affected building areas: offices, kitchen, classrooms, gymnasium, library, multipurpose room, restrooms, 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 code requirements for egress. 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.

The controller lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be taken into account when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

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

Affected building areas: hallways and main lobby.

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

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**9,157**	**2.1**	**0**	**$1,473**	**$37,440**	**$0**	**$37,440**	**25.4**	**9,221**
ECM 6	Premium Efficiency Motors	9,157	2.1	0	$1,473	$37,440	$0	$37,440	25.4	9,221

ECM 6: Premium Efficiency Motors

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

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Classrooms	Unit Ventilators	32	Supply Fan	0.3	McQuay UV units
Classrooms	Unit Ventilators	32	Return Fan	0.3	McQuay UV units

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

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**41,989**	**11.8**	**0**	**$6,756**	**$54,132**	**$0**	**$54,132**	**8.0**	**42,283**
ECM 7	Install VFD on Variable Air Volume (VAV) Fans	8,842	2.7	0	$1,423	$16,798	$0	$16,798	11.8	8,904
ECM 8	Install VFDs on Constant Volume (CV) Fans	33,148	9.1	0	$5,334	$37,333	$0	$37,333	7.0	33,379

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new inverter duty rated motor to conservatively account for the cost of an inverter duty rated motor.

ECM 7: Install VFD on Variable Air Volume (VAV) Fans

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally requires less maintenance than mechanical air volume control devices.

Affected air handlers: Trane WSC048 and WSC090 units.

ECM 8: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume fan motor speeds. This converts a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one.

Zone thermostats signal the VFD to adjust fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

Affected air handlers: Trane TED330 and WSC120 units.

4.5 Electric Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**47,079**	**21.2**	**0**	**$7,575**	**$434,151**	**$0**	**$434,151**	**57.3**	**47,409**
ECM 9	Install High Efficiency Air Conditioning Units	7,062	5.9	0	$1,136	$158,387	$0	$158,387	139.4	7,111
ECM 10	Install High Efficiency Heat Pumps	14,294	4.7	0	$2,300	$71,722	$0	$71,722	31.2	14,394
ECM 11	Install High Efficiency PTAC/PTHP	25,723	10.7	0	$4,139	$204,042	$0	$204,042	49.3	25,903

Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the packaged and split-system units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

Affected units: packaged units serving the gym, cafeteria, and hallway; ductless mini-split units serving the server room, and kitchen.

ECM 10: Install High Efficiency Heat Pumps

We evaluate replacing standard efficiency heat pumps with high efficiency heat pumps. A higher EER or SEER rating indicates a more efficient cooling system and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours.

Affected units: Trane WSC units.

ECM 11: Install High Efficiency PTAC/PTHP

We evaluated repacing packaged terminal air conditioners and heat pumps (PTAC and PTHP) with high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours.

Affected units: classrooms.

4.6 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**12,738**	**0.0**	**0**	**$2,050**	**$5,556**	**$72**	**$5,484**	**2.7**	**12,827**
ECM 12	Implement Demand Control Ventilation (DCV)	9,536	0.0	0	$1,534	$5,438	$0	$5,438	3.5	9,602
ECM 13	Install Pipe Insulation	3,203	0.0	0	$515	$118	$72	$46	0.1	3,225

ECM 12: Implement Demand Control Ventilation (DCV)

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

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

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

Affected building areas: gymnasium, cafeteria

ECM 13: Install Pipe Insulation

Install insulation on domestic hot water system piping. Distribution system losses are dependent on water system temperature, the size of the distribution system, and the level of insulation of the piping. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is exposed to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

4.7 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		**6,117**	**0.0**	**0**	**$984**	**$315**	**$0**	**$315**	**0.3**	**6,160**
ECM 14	Install Low-Flow DHW Devices	6,117	0.0	0	$984	$315	$0	$315	0.3	6,160

ECM 14: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing.

Additional cost savings may result from reduced water usage.

4.8 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		**4,675**	**0.4**	**0**	**$752**	**$5,237**	**$0**	**$5,237**	**7.0**	**4,708**
ECM 15	Refrigerator/Freezer Case Electrically Commutated Motors	786	0.1	0	$127	$910	$0	$910	7.2	792
ECM 16	Refrigeration Controls	1,934	0.0	0	$311	$3,867	$0	$3,867	12.4	1,948
ECM 17	Vending Machine Control	1,954	0.2	0	$314	$460	$0	$460	1.5	1,968

ECM 15: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in coolers 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 16: Refrigeration Controls

Install additional controls to optimize the operation of walk-in coolers and freezers.

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

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

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

ECM 17: Vending Machine Control

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

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[5] . Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

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.

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.

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,

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

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.

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.

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 gallons per flush (gpf) and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

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

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. Any reduction in water use does however ultimately reduce grid-level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users.

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

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

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

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

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.

6 On-site Generation

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

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

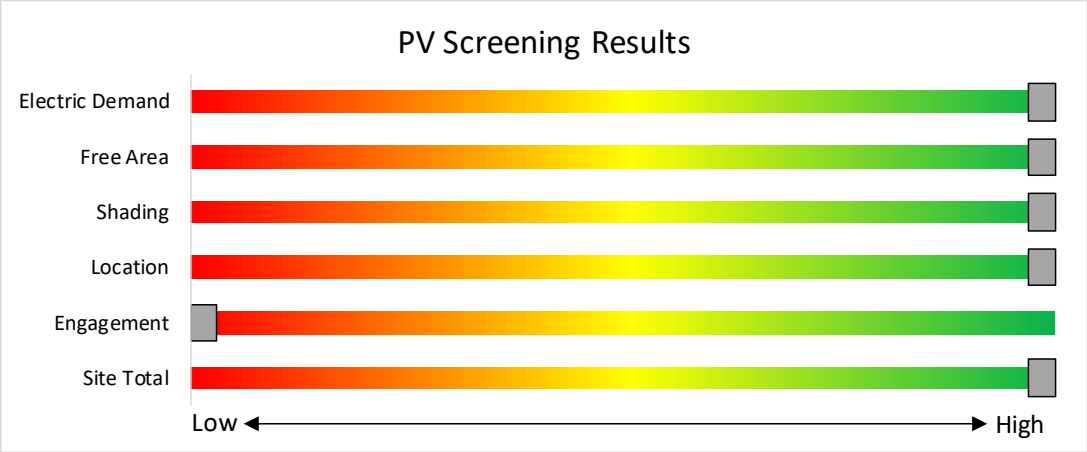
6.1 Solar Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has **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.



Potential	High	
System Potential	600	kW DC STC
Electric Generation	714,822	kWh/yr
Displaced Cost	$115,020	/yr
Installed Cost	$1,560,000	

Figure 5 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

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

6.2 Combined Heat and Power

Combined heat and power (CHP) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

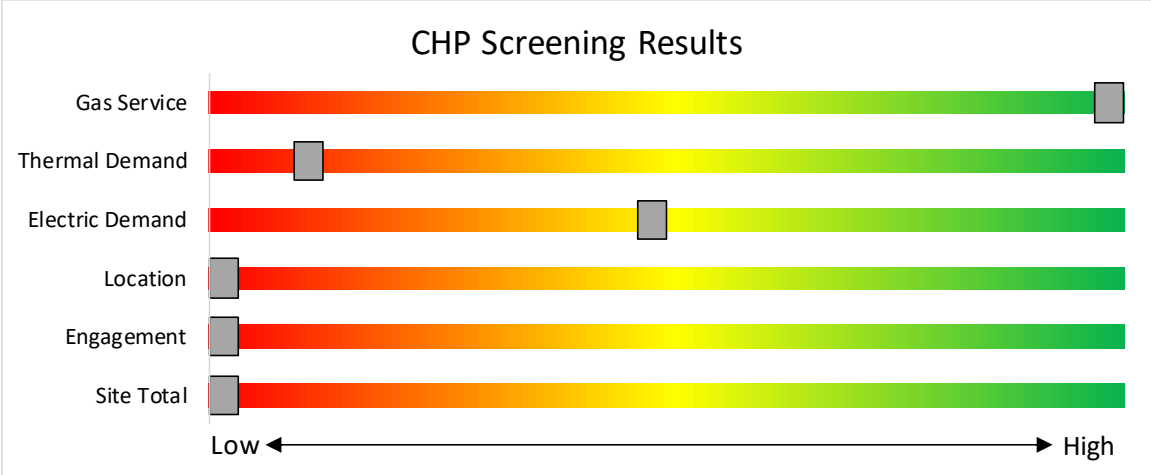
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has **no potential** for installing a cost-effective CHP system.

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

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



Potential	None	
System Type	None	
System Potential	0	kW
Electric Generation	0	kWh/yr
Thermal Generation	0	MBtu/yr
Displaced Cost	$0	/yr
Installed Cost	$0	

Figure 6 - 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 this facility are identified in the Executive Summary. This section provides an overview of currently available in 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 efficient 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 Direct Install

Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives, and controls.

Incentives

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program, which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings. P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

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.

7.4 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.

7.5 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.

7.6 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects 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
Wall Pack	8	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	57	4,380	0.0	4,660	0	$750	$7,728	$0	10.3
Wall Pack	4	Metal Halide: (1) 175W Lamp	Photocell		215	4,380	1	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	65	4,380	0.0	2,637	0	$424	$3,864	$0	9.1
Pole	14	Metal Halide: (1) 250W Lamp	Timeclock		295	5,110	1	Fixture Replacement	No	14	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	89	5,110	0.0	14,773	0	$2,377	$13,028	$0	5.5
Recesed	7	Metal Halide: (1) 70W Lamp	Timeclock		95	5,110	1	Fixture Replacement	No	7	LED - Fixtures: Downlight Recessed	Timeclock	29	5,110	0.0	2,379	0	$383	$1,062	$0	2.8
Wall Pack	3	High-Pressure Sodium: (1) 70W Lamp	Timeclock		95	5,110	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	29	5,110	0.0	1,019	0	$164	$2,898	$0	17.7
Pole	7	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		120	4,380		None	No	7	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	120	4,380	0.0	0	0	$0	$0	$0	0.0
Front Recessed	2	High-Pressure Sodium: (1) 150W Lamp	Photocell		188	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Downlight Recessed	Photocell	56	4,380	0.0	1,153	0	$185	$304	$0	1.6
Front Recessed	1	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Downlight Recessed	Photocell	57	4,380	0.0	583	0	$94	$152	$0	1.6
Wall Pack	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		11	4,380		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	11	4,380	0.0	0	0	$0	$0	$0	0.0
Main Hallway	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 5	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,070	0.5	2,056	0	$331	$1,296	$0	3.9
Main Hallway	1	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	s	50	3,000	5	None	Yes	1	LED - Fixtures: Ambient - 4' - Direct Fixture	High/Low Control	50	2,070	0.0	45	0	$7	$0	$0	0.0
Main Hallway	3	Exit Signs: LED - 2 W Lamp	None		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
Main Hallway	4	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,144	0	$184	$290	$0	1.6
Room C15	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.6	2,540	0	$409	$1,307	$0	3.2
Room C4	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C4 Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Room C5	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C5 Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Nurse Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.2	726	0	$117	$489	$0	4.2
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,070	0.0	61	0	$10	$303	$0	30.7
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,070	0.0	61	0	$10	$33	$0	3.3
Restroom	1	Incandescent: One lamp screw-in	Wall Switch	s	65	3,000	2, 4	Relamp	Yes	1	LED Lamps: One lamp screw-in	Occupancy Sensor	10	2,070	0.0	168	0	$27	$17	$0	0.6
Room C6	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C6 Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Storage Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.2	363	0	$58	$489	$0	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
Room C7	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C7 Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Room C8	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C9	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C10	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Boys Restroom	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.3	1,088	0	$175	$599	$0	3.4
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	48	0	$8	$37	$0	4.8
Girls Restroom	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.3	1,088	0	$175	$599	$0	3.4
Room C11	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C13	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C14	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C17	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	242	0	$39	$343	$0	8.8
Room C16	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.2	967	0	$156	$562	$0	3.6
Room C1	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C2	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room C3	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
D wing Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,070	0.2	967	0	$156	$742	$0	4.8
D wing Hallway	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
D wing Hallway	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	286	0	$46	$72	$0	1.6
Room D3	34	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	34	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	1.0	4,112	0	$662	$1,782	$0	2.7
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Room D1	34	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	34	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	1.0	4,112	0	$662	$1,782	$0	2.7

	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
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Room D2	34	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	34	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	1.0	4,112	0	$662	$1,782	$0	2.7
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
B wing Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 5	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,070	0.4	1,693	0	$272	$1,186	$0	4.4
B wing Hallway	4	Exit Signs: LED - 2 W Lamp	None		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
B wing Hallway	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	572	0	$92	$145	$0	1.6
Room B3	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	s	93	3,000	2, 4	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.8	3,084	0	$496	$1,201	$0	2.4
Maintenance Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	363	0	$58	$380	$0	6.5
Room B4	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.1	426	0	$69	$416	$0	6.1
Room B3	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	286	0	$46	$72	$0	1.6
Room B5	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.1	426	0	$69	$416	$0	6.1
Room B7	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.1	426	0	$69	$416	$0	6.1
Electric Room	2	Incandescent: One lamp screw-in	Wall Switch	s	65	1,500	2	Relamp	No	2	LED Lamps: One lamp screw-in	Wall Switch	10	1,500	0.1	159	0	$26	$34	$0	1.3
Room B6	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.1	426	0	$69	$416	$0	6.1
Room B7	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.1	426	0	$69	$146	$0	2.1
Room B8	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	s	93	3,000	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	726	0	$117	$489	$0	4.2
Room B9	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	s	93	3,000	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	726	0	$117	$489	$0	4.2
Room B12	34	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	s	93	3,000	2, 4	Relamp	Yes	34	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	1.5	6,167	0	$992	$2,402	$0	2.4
Room B12	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	363	0	$58	$380	$0	6.5
Room B12	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	286	0	$46	$72	$0	1.6
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	48	0	$8	$37	$0	4.8
B wing Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 5	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,070	0.1	213	0	$34	$73	$0	2.1
Room B10/11	22	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	s	93	3,000	2, 4	Relamp	Yes	22	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	1.0	3,991	0	$642	$1,745	$0	2.7

	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
Room B10/11	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.0	121	0	$19	$37	$0	1.9
Room B10/11	2	Exit Signs: LED - 2 W Lamp	None		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
Girls Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	242	0	$39	$343	$0	8.8
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	242	0	$39	$343	$0	8.8
Locker Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.4	1,572	0	$253	$745	$0	2.9
Locker Room	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	286	0	$46	$72	$0	1.6
Locker Room 2	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.4	1,572	0	$253	$745	$0	2.9
Locker Room 2	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	286	0	$46	$72	$0	1.6
Office 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	363	0	$58	$380	$0	6.5
Office 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	363	0	$58	$380	$0	6.5
Storage Room 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	181	0	$29	$380	$0	13.0
Storage Room 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	181	0	$29	$380	$0	13.0
Gym	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	242	0	$39	$343	$0	8.8
Gym	4	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,144	0	$184	$290	$0	1.6
Gym	24	Metal Halide: (1) 250W Lamp	Wall Switch	s	295	3,000	1, 4	Fixture Replacement	Yes	24	LED - Fixtures: High-Bay	Occupancy Sensor	89	2,070	4.0	16,170	0	$2,602	$23,877	$0	9.2
Multipurpose Room	198	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	198	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	6.0	23,944	0	$3,853	$10,470	$0	2.7
Multipurpose Room	4	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,144	0	$184	$290	$0	1.6
Stage	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.3	1,278	0	$206	$708	$0	3.4
Stage	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	572	0	$92	$145	$0	1.6
Stage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	363	0	$58	$110	$0	1.9
Storage Room 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Storage Room 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Kitchen	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.9	3,628	0	$584	$1,635	$0	2.8
Library	34	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	s	32	3,000	2, 4	Relamp	Yes	34	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,070	0.5	2,154	0	$347	$1,161	$0	3.3
Library	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	572	0	$92	$145	$0	1.6

	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
Library	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	s	50	3,000	4	None	Yes	12	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	50	2,070	0.1	536	0	$86	$270	$0	3.1
Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.2	726	0	$117	$489	$0	4.2
Main Hallway	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 5	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,070	0.8	3,023	0	$486	$1,813	$0	3.7
Main Hallway	3	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	858	0	$138	$217	$0	1.6
Room A16	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.6	2,540	0	$409	$1,307	$0	3.2
Room A15	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A11	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Main Hallway	4	Exit Signs: LED - 2 W Lamp	None		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
Room A13	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A14	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Storage Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.2	363	0	$58	$489	$0	8.4
Faculty Lounge	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	452	0	$73	$560	$0	7.7
Womens Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Mens Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	s	33	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,000	0.0	46	0	$7	$33	$0	4.4
Faculty Lounge	1	Incandescent: One lamp screw-in	Wall Switch	s	65	3,000	2, 4	Relamp	Yes	1	LED Lamps: One lamp screw-in	Occupancy Sensor	10	2,070	0.0	168	0	$27	$17	$0	0.6
Room A10	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A9	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A8	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A18	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.2	967	0	$156	$562	$0	3.6
Room A17	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	242	0	$39	$343	$0	8.8
Room A7	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A6	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A5	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A4	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4

	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
Girls Restroom	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.3	1,088	0	$175	$599	$0	3.4
Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	48	0	$8	$37	$0	4.8
Room A3	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	121	0	$19	$343	$0	17.6
Boys Restroom	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.3	1,088	0	$175	$599	$0	3.4
Room A2	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Room A1	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.5	2,177	0	$350	$1,197	$0	3.4
Kitchen Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	242	0	$39	$343	$0	8.8
Closet	1	Incandescent: One lamp screw-in	Wall Switch	s	65	1,500	2	Relamp	No	1	LED Lamps: One lamp screw-in	Wall Switch	10	1,500	0.0	80	0	$13	$17	$0	1.3
Womens Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,000	0.0	95	0	$15	$37	$0	2.4
Mens Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,000	0.0	95	0	$15	$37	$0	2.4
Main Lobby	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 5	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,070	0.4	1,704	0	$274	$1,034	$0	3.8
Main Lobby	2	Exit Signs: LED - 2 W Lamp	None		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
Main Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.4	1,451	0	$234	$708	$0	3.0
Copy Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.1	426	0	$69	$416	$0	6.1
Principal Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.2	852	0	$137	$562	$0	4.1
Assistant Principal Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	3,000	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.2	605	0	$97	$453	$0	4.7
Room B1	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.5	1,918	0	$309	$927	$0	3.0
Room B2	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	s	114	3,000	2, 4	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,070	0.6	2,344	0	$377	$1,073	$0	2.8
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	s	62	1,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	48	0	$8	$37	$0	4.8

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Trane WSC090 units	2	Supply Fan	3.0	86.5%	No	b	3,250	7	No	89.5%	Yes	2	1.8	5,795	0	$933	$7,768	$0	8.3
Roof	Trane TED330 units	3	Supply Fan	7.5	88.5%	No	b	3,250	8	No	91.0%	Yes	3	6.7	24,258	0	$3,903	$14,215	$0	3.6
Roof	Trane TED330 units	6	Exhaust Fan	1.0	82.5%	No	b	3,250	8	No	82.5%	Yes	6	1.8	6,612	0	$1,064	$19,858	$0	18.7
Roof	Trane WSC048 units	3	Supply Fan	1.0	82.5%	No	b	3,250	7	No	85.5%	Yes	3	0.9	3,046	0	$490	$9,030	$0	18.4
Roof	Trane WSC120 unit	1	Supply Fan	2.0	84.0%	No	b	3,250	8	No	86.5%	Yes	1	0.6	2,277	0	$366	$3,261	$0	8.9
Roof	Multiple areas	18	Exhaust Fan	0.3	60.0%	No	w	3,250		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Classrooms	Unit Ventilators	32	Supply Fan	0.3	60.0%	No	b	3,250	6	Yes	73.4%	No		1.3	5,843	0	$940	$18,904	$0	20.1
Classrooms	Unit Ventilators	32	Return Fan	0.3	60.0%	No	b	3,250	6	Yes	69.5%	No		0.8	3,314	0	$533	$18,536	$0	34.8

Electric HVAC Inventory & Recommendations

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Classrooms	2	Packaged Air-Source HP	7.50	88.00	b	10	Yes	2	Packaged Air-Source HP	7.50	88.00	11.50	3.60	1.5	5,120	0	$824	$26,697	$0	32.4
Roof	Room A10, Main Office, Classroom	3	Packaged Air-Source HP	4.00	47.00	b	10	Yes	3	Packaged Air-Source HP	4.00	47.00	14.00	3.80	2.3	5,940	0	$956	$27,228	$0	28.5
Roof	WSC units	5	Electric Resistance Heat		61.42	b		No							0.0	0	0	$0	$0	$0	0.0
Roof	Library	2	Split-System AC	3.00		w		No							0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen	2	Ductless Mini-Split AC	2.00		b	9	Yes	2	Ductless Mini-Split AC	2.00		18.00		1.1	1,369	0	$220	$10,958	$0	49.7
Roof	Computer Room	1	Ductless Mini-Split AC	3.00		b	9	Yes	1	Ductless Mini-Split AC	3.00		18.00		0.9	1,027	0	$165	$8,218	$0	49.7
Roof	Gym, Cafeteria, Calssroom and Hallway	3	Packaged AC	27.50		b	9	Yes	3	Packaged AC	27.50		10.50		3.9	4,666	0	$751	$139,210	$0	185.4
Roof	TED units	3	Electric Resistance Heat		307.08	b		No							0.0	0	0	$0	$0	$0	0.0
Roof	Classroom	1	Packaged Air-Source HP	10.00	108.00	b	10	Yes	1	Packaged Air-Source HP	10.00	108.00	11.50	3.60	1.0	3,234	0	$520	$17,798	$0	34.2
Roof	WSC120 unit	1	Electric Resistance Heat		184.25	b		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	Classrooms	32	Packaged Terminal HP	3.33	40.00	b	11	Yes	32	Packaged Terminal HP	3.33	40.00	12.00	3.30	10.7	25,723	0	$4,139	$204,042	$0	49.3
Classrooms	Classrooms	32	Electric Resistance Heat		31.32	b		No							0.0	0	0	$0	$0	$0	0.0
Library Office	Library Office	1	Packaged Terminal HP	1.25	13.20	w		No							0.0	0	0	$0	$0	$0	0.0

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Gym	12	2.00	27.50	307.08		0.0	4,768	0	$767	$2,719	$0	3.5
Roof	Cafeteria	12	2.00	27.50	307.08		0.0	4,768	0	$767	$2,719	$0	3.5

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	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
Maintenance Room	DHW Heaters	13	10	2.50	0.0	2,354	0	$379	$72	$40	0.1
Storage Room	DHW Heaters	13	8	1.00	0.0	848	0	$137	$46	$32	0.1

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
Storage Room	D wing	1	Storage Tank Water Heater (≤ 50 Gal)	n		No						0.0	0	0	$0	$0	$0	0.0
Maintenance Room	Entire Facility	1	Storage Tank Water Heater (> 50 Gal)	b		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Multiple Locations	14	44	Faucet Aerator (Lavatory)	2.20	0.50	0.0	6,117	0	$984	$315	$0	0.3

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	Low Temp Freezer (-35F to -5F)	15, 16	Yes	Yes	Yes	0.1	2,051	0	$330	$2,799	$0	8.5
Kitchen	1	Cooler (35F to 55F)	15, 16	Yes	No	Yes	0.0	669	0	$108	$1,977	$0	18.4

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	3	Refrigerator Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

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

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)	Electric	Electric	No		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?
Multiple Locations	13	Microwaves	1,000.0	
Multiple Locations	5	Refrigerators	600.0	
Multiple Locations	9	Minifridges	30.0	
Multiple Locations	13	Wall TVs	120.0	
Multiple Locations	8	Dehumidifiers	1,500.0	
Multiple Locations	1	Washing Machine	900.0	
Multiple Locations	3	Cofee Machines	400.0	
Multiple Locations	2	Water Coolers	500.0	
Multiple Locations	45	Desktops	75.0	
Multiple Locations	25	Printers	20.0	
Multiple Locations	800	Laptops	40.0	

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
Faculty Lounge	1	Refrigerated	17	Yes	0.2	1,612	0	$259	$230	$0	0.9
Faculty Lounge	1	Non-Refrigerated	17	Yes	0.0	343	0	$55	$230	$0	4.2

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

EUI is presented in terms of *site energy* and *source energy*. Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

D'Ippolito Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 75,860
Built: 1968

For Year Ending: June 30, 2018
Date Generated: September 30, 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
D'Ippolito Elementary School 1578 N Valley Ave Vineland, New Jersey 08360	Vineland Public Schools 61 W. Landis Avenue Vineland, NJ 08360 856-794-6700, ext 2226	Gene Mercoli 61 W. Landis Avenue Vineland, NJ 08360 856-794-6700, ext. 2226 jrosado@trcsolutions.com

Property ID: 7566437

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
69.1 kBtu/ft²

Source EUI
192 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	5,178,691 (99%)
Natural Gas (kBtu)	63,551 (1%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	39.7
National Median Source EUI (kBtu/ft²)	110.4
% Diff from National Median Source EUI	74%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	528

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.