Local Government Energy Audit Report

Ravine Drive Elementary School

November 4, 2020

Prepared for:

Matawan Aberdeen Regional School District
170 Ravine Drive
Matawan, NJ 07747

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 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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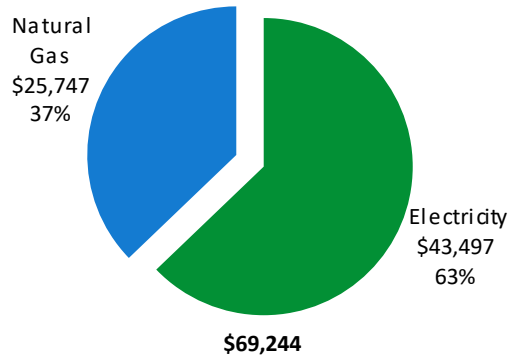
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Ravine Drive 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: $69,244 Electricity: 363,484 kWh Natural Gas: 22,704 Therms	
ENERGY STAR® Benchmarking Score	53 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

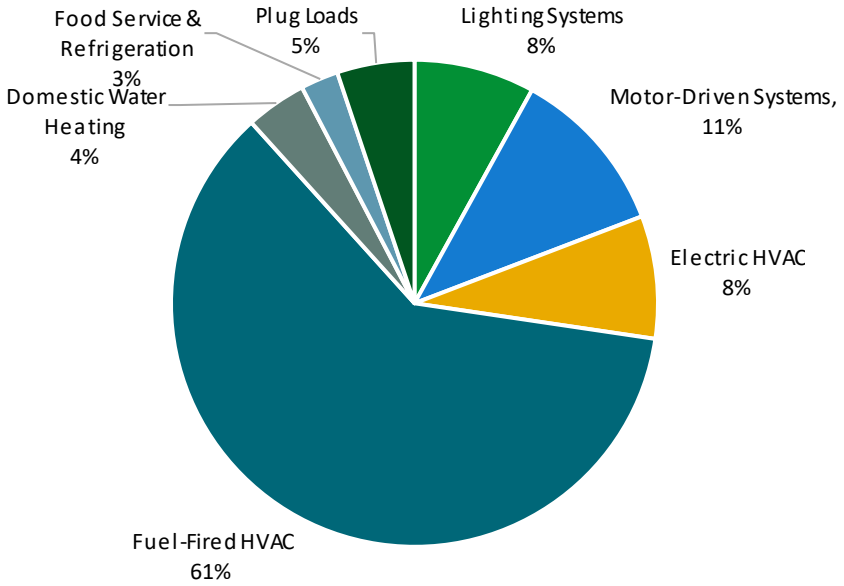


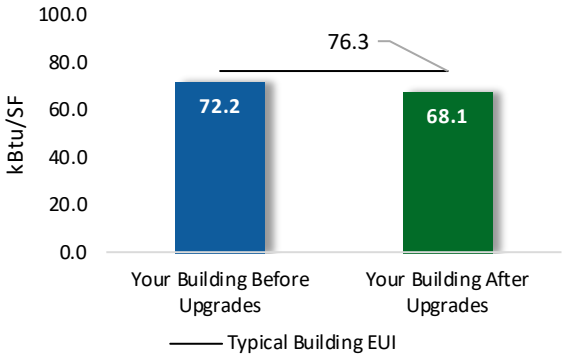
Figure 1 - Energy Use by System

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.

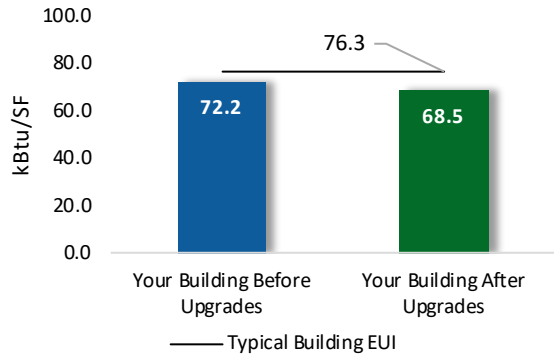
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$52,869
Potential Rebates & Incentives[1]	$15,037
Annual Cost Savings	$6,861
Annual Energy Savings	Electricity: 56,396 kWh Natural Gas: 99 Therms
Greenhouse Gas Emission Savings	29 Tons
Simple Payback	5.5 Years
Site Energy Savings (all utilities)	6%



Scenario 2: Cost Effective Package[2]

Installation Cost	$33,075
Potential Rebates & Incentives	$13,577
Annual Cost Savings	$6,359
Annual Energy Savings	Electricity: 53,377 kWh
Greenhouse Gas Emission Savings	27 Tons
Simple Payback	3.1 Years
Site Energy Savings (all utilities)	5%



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			**35,842**	**11.5**	**-7**	**$4,204**	**$16,769**	**$8,868**	**$7,901**	**1.9**	**35,215**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	35,842	11.5	-7	$4,204	$16,769	$8,868	$7,901	1.9	35,215
Lighting Control Measures			**6,966**	**1.5**	**-1**	**$817**	**$6,385**	**$2,555**	**$3,830**	**4.7**	**6,844**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	5,194	1.2	-1	$609	$4,360	$980	$3,380	5.5	5,103
ECM 3	Install High/Low Lighting Controls	Yes	1,772	0.3	0	$208	$2,025	$1,575	$450	2.2	1,741
Variable Frequency Drive (VFD) Measures			**5,407**	**1.9**	**0**	**$647**	**$7,467**	**$1,950**	**$5,517**	**8.5**	**5,444**
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	5,407	1.9	0	$647	$7,467	$1,950	$5,517	8.5	5,444
Electric Unitary HVAC Measures			**1,682**	**1.3**	**0**	**$201**	**$11,638**	**$1,460**	**$10,178**	**50.6**	**1,694**
ECM 5	Install High Efficiency Air Conditioning Units	No	1,682	1.3	0	$201	$11,638	$1,460	$10,178	50.6	1,694
HVAC System Improvements			**1,336**	**0.0**	**16**	**$345**	**$8,208**	**$36**	**$8,172**	**23.7**	**3,254**
ECM 6	Implement Demand Control Ventilation (DCV)	No	1,336	0.0	12	$300	$8,157	$0	$8,157	27.2	2,792
ECM 7	Install Pipe Insulation	Yes	0	0.0	4	$45	$52	$36	$16	0.4	463
Domestic Water Heating Upgrade			**0**	**0.0**	**3**	**$28**	**$122**	**$68**	**$54**	**1.9**	**294**
ECM 8	Install Low-Flow DHW Devices	Yes	0	0.0	3	$28	$122	$68	$54	1.9	294
Food Service & Refrigeration Measures			**5,163**	**0.6**	**0**	**$618**	**$2,280**	**$100**	**$2,180**	**3.5**	**5,199**
ECM 9	Replace Refrigeration Equipment	Yes	3,551	0.4	0	$425	$2,050	$0	$2,050	4.8	3,576
ECM 10	Vending Machine Control	Yes	1,612	0.2	0	$193	$230	$100	$130	0.7	1,623
TOTALS (COST EFFECTIVE MEASURES)			**53,377**	**15.5**	**-2**	**$6,359**	**$33,075**	**$13,577**	**$19,498**	**3.1**	**53,459**
TOTALS (ALL MEASURES)			**56,396**	**16.8**	**10**	**$6,861**	**$52,869**	**$15,037**	**$37,832**	**5.5**	**57,945**

* - 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 multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Retrofit Fixtures with LED Lamps	X	X	
ECM 2	Install Occupancy Sensor Lighting Controls	X	X	
ECM 3	Install High/Low Lighting Controls	X	X	
ECM 4	Install VFDs on Constant Volume (CV) Fans	X	X	
ECM 5	Install High Efficiency Air Conditioning Units	X	X	
ECM 6	Implement Demand Control Ventilation (DCV)		X	
ECM 7	Install Pipe Insulation	X	X	
ECM 8	Install Low-Flow DHW Devices	X	X	
ECM 9	Replace Refrigeration Equipment		X	
ECM 10	Vending Machine Control	X	X	

Figure 3 – Funding Options

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

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

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

Individual Measures with SmartStart

For facilities wishing to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

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

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings.

More Options from Around the State

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the ESIP. Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

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

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

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce 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 Ravine Drive 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 July 23, 2020, TRC performed an energy audit at Ravine Drive Elementary School located in Matawan, New Jersey. TRC met with Joe Czimcharo to review the facility operations and help focus our investigation on specific energy-using systems.

Ravine Drive Elementary School is a one-story, 48,600 square foot building built in 1966 with subsequent renovation in 1998.

Spaces include classrooms, gymnasium, auditorium, classrooms, media center, offices, cafeteria, corridors, offices, kitchen, and boiler room.

2.2 Building Occupancy

The facility is occupied regular hours from September through June (school season - 10 months). On weekdays, the school occasionally remains open after regular hours for some activities. The school is closed on weekends. Typical weekday occupancy is approximately 62 staff and 326 students.

The school is closed during summer break (late June, July and August).

Building Name	Weekday/Weekend	Operating Schedule
Ravine Dr. Elementary School (Regular Hours)	Weekday	7:00 AM - 5:00 PM
	Weekend	Closed
	Summer	Varies
Ravine Dr. Elementary School (Custodial Hours)	Weekday	6:00 AM - 11:00 PM
	Weekend	Closed
	Summer	Varies

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

The building walls are made of concrete masonry units (CMUs) with a brick veneer. The majority of the roof is flat, has a white EPDM finish, and is in good condition. The school also has two small sections of pitched roof that was replaced in the last five years. Site staff did not report any issues with the building envelope.

The windows are double glazed with aluminum frames. The glass-to-frame seals are in good condition.

Exterior doors have aluminum frames with fire reinforced plastic (FRP) and double pane glazing in the center. All doors are in good condition with undamaged weather stripping.

Roof

Exterior wall with windows

Exterior wall with windows

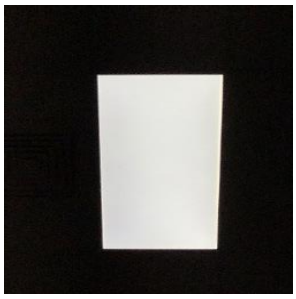
Window

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 50-Watt and 40-Watt 2' x 4' LED fixtures in the cafeteria, the gymnasium, corridors, and a few classrooms. In addition, there are some compact fluorescent lamps (CFL), general purpose LED lamps, and a few 32-Watt U-shaped T8 fluorescent lamps and incandescent lamps.

Fixture types include 1-lamp, 2-lamp, 3-lamp, and 4-lamp, 4-foot long suspended, recessed and surface mounted fixtures. There are also some 2-foot fixtures with linear T8 and U-bend fluorescent lamps. Most fixtures are in good condition.

All exit signs are LED type.



2' x 4' LED fixture

2' x 4' T8 4-lamp fixture

2' x 4' T8 1-lamp fixture

2' x 4' T8 3-lamp fixture

Lighting fixtures in most classrooms, main office, nurse's office, media center, classroom pod corridor, and some restrooms are controlled by occupancy sensors. All the remaining interior lighting is manually controlled by wall switches.

Ceiling-mounted occupancy sensor

Multipurpose Room

Exterior fixtures include pole-mounted fixtures with LED lamps, LED wall-mounted fixtures, and pole-mounted LED fixtures. All exterior fixtures are controlled by timeclocks.

Pole-mounted fixture with LED lamp

Wall-mounted LED fixture

Pole-mounted LED fixture

Wall-mounted LED fixture

2.5 Air Handling Systems

Single Packaged Vertical Units (Unit Ventilators)

There are 14 classrooms with Airedale single packaged vertical units which have replaced older unit ventilators. These self-contained units are equipped with direct expansion (DX) coils for cooling and hot water coils for heating. The units have either 3-ton or 4-ton cooling capacity. These units were installed over the last five years (2015, 2018, and 2019).

Packaged Units

There are six packaged rooftop units (RTUs) which include a dedicated outside air unit (DOAS). All RTUs have direct expansion (DX) coils for cooling. Except for a 12-ton York unit for the main office, all RTUs are equipped with gas-fired furnaces for heating. Also, the two RTUs serving the classrooms (RTU 22 and RTU 23) are variable air volume (VAV) type units. The table below lists the RTU tag names and other relevant details:

	Tag Name	Area Served	Cooling Capacity (Tons)	Cooling EER	Heating Output Capacity (MBh)	Heating Efficiency	Manufacturer
1	DOAS 3	Hallways	6.00	13.00	81.00	81%	Aaon
2	RTU - 19	Cafeteria	11.00	12.88	218.70	81%	Aaon
3	No tag name	Main office	6.00	12.00	Cooling only	N/A	York
4	RTU 22	Classrooms	16.00	11.39	218.70	81%	Aaon
5	RTU 23	Classrooms	16.00	11.39	218.70	81%	Aaon
6	RTU 20	Gymnasium	16.00	11.39	218.70	81%	Aaon

Refer to Appendix A for detailed information about each unit.

Air Conditioners and Heat Pump Systems

There are five 1-ton capacity ductless mini split air-source heat pumps, one 10-ton split AC system, and one window air conditioner (AC) with a 1.8-ton cooling capacity. The ductless mini split air-source heat pumps serve faculty break room, the main office copy room, and the nurse's office. The split AC system serves the media center, and the window AC is installed in the faculty break room.

The SEER value for the window AC is 10.3; the SEER values for the ductless mini split systems range between 19.0 and 20.20, and the nameplate EER value for the split system AC is 9.22.

The single split AC system is old and beyond useful life. The window AC and ductless mini split air-source heat pumps are in good condition and within their useful life.

Air Handling Units

The media center is served by a single air handling unit (AHU). It has a 5 hp supply fan and a 1.5 hp return fan. DX coils from the 10-ton York condensing unit provide space cooling. and hot water coils from the boiler hot water loop provide space heating.

Exhaust Fans

There are approximately 20 exhaust fans installed on the roof. The exhaust fans serve hallways, the kitchen cooking area, restrooms, gymnasium, and boiler room. Exhaust fan motor range from 0.16 hp to 0.5 hp. The exhaust fans are in fair condition.

Destratification Fans

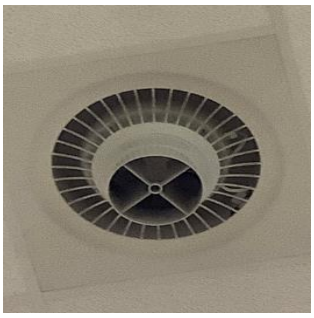
There are four destratification fans installed in the gymnasium that circulate air from the ceiling to floor level. Each fan is estimated to have a 0.5 hp motor. The destratification fans are in good condition.

Packaged rooftop unit


Ductless mini-split heat pump


Outdoor condensing unit


Outdoor condensing unit


Destratification fan in gymnasium


Air handling unit

2.6 Heating Hot Water Systems

Three Lochinvar 1,380 MBh output, hot water boilers serve the building space heating load. The boilers are condensing type with a nominal efficiency of 92%. They are configured in an automated lead-lag control scheme. The boilers were installed in 2014 and are in good condition.

Heating hot water is supplied throughout the building by two pairs of pumps, and each pump is driven by a 3 hp motor. One pair supplies hot water to the classroom area and the other pair provides hot water for the remaining school. All four pump motors are equipped with variable frequency drives.

In addition to the above pumps, there are four 0.75 hp and three 0.33 hp constant speed pumps. The 0.75 hp pumps are part of the hot water circulation system and the 0.33 hp pumps are installed at the return lines for each boiler.

The pumps operate in an automated lead-lag control scheme. The boilers and pumps provide hot water to hot water coils in the single packaged vertical units, reheat coils in the classroom area and to the library AHU.

The hot water supply temperature remains between 170°F and 180°F during peak winter periods and is reduced to 120°F or lower during summer for supplying reheat for the VAV system in classroom area.

Three condensing hot water boilers

Hot water pumps

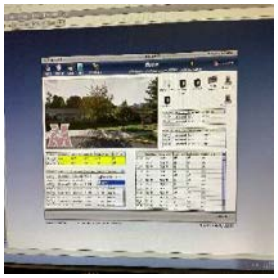
Variable frequency drive (VFD) controls

Hot water pumps

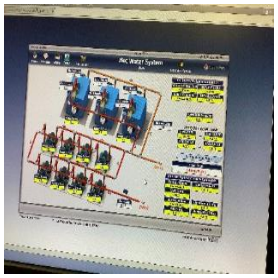
2.7 Building Energy Management Systems (EMS)

A new Honeywell Tritium EMS controls approximately 80% of the HVAC equipment, boilers, RTUs, and AHUs. The remaining HVAC equipment is controlled by an old Johnson Controls Metasys EMS and some pneumatic controls. Both EMS's provide equipment scheduling, monitoring and controlling of space temperatures, supply air temperatures, humidity, and heating water loop temperatures. Some spaces and classrooms have occupancy-controlled HVAC systems.

The facility manager expressed an interest in expanding the level of control provided by the Honeywell Tritium EMS to 100% of the HVAC equipment.



EMS home screen



Boiler graphics

2.8 Domestic Hot Water

Domestic hot water (DHW) for use in kitchen, restrooms, and other areas of the building is produced by one 117-gallon, 500 MBh gas-fired Lochinvar storage water heater and one 65-gallon, 65 MBh gas-fired A.O Smith storage water heater. The Lochinvar water heater is a condensing type with a maximum efficiency of 96% and the A.O. Smith water heater is a non-condensing type with a maximum efficiency of 80%. While the 117-gallon Lochinvar water heater is within its useful life and in good condition, the 65-gallon A.O. Smith water heater was installed in 2008, is approaching the end of its useful life and is in fair condition.

While the domestic hot water pipes for the Lochinvar water heater are insulated and the insulation is in good condition; the hot water piping for the A.O. Smith water heater does not have insulation.

Condensing domestic hot water heater

Non-condensing domestic hot water heater

2.9 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used to prepare and store meals for students. Most of the cooking is done using a convection gas-fired oven. Also, there is one electric insulated food holding cabinet.

There is no dishwasher in this school.

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

Gas-fired oven

Electric food storage heated cabinet

2.10 Refrigeration

The kitchen has three stand-up, solid door commercial refrigerators, a stand-up solid door freezer and two freezer chests. All equipment except one freezer chest is in good condition. The stand-up, solid door freezer is ENERGY STAR® rated.

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

Solid door stand-up refrigerator

Freezer chest

Glass door stand-up refrigerator

Solid door stand-up refrigerator

2.11 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 265 desktop and laptop computers throughout the facility. Other plug loads throughout the building include general cafe, office equipment. Café equipment includes heated/chilled serving tables in the kitchen, microwave ovens and toaster ovens, residential-style refrigerators, coffee makers and hot/cold water dispensers in the break room and nurse's office. Office and other equipment include printers, copiers, and a paper shredder. There is also typical classroom plug load equipment such as smart boards, projectors, televisions and fans.

There is one refrigerated beverage vending machine in the faculty break room.

Mini refrigerator

Residential style refrigerator

Large copier/printer

Chilled serving table

2.12 Water-Using Systems

Faucet flow rate in restrooms is at 0.5 gallons per minute (gpm). Faucet flow rates in the kitchen, classrooms and faculty break room are at 2.5 gpm.

Restroom faucet

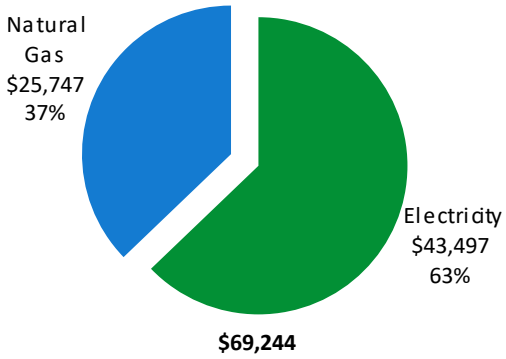
2.13 Process Equipment

Some HVAC equipment in the school is controlled by a pneumatic control system and the air compressor provides compressed air for it. It has two 3.0 hp motors to run the air compressor. It runs intermittently and as much as needed to maintain the required air pressure in the pneumatic system.

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	363,484 kWh	$43,497
Natural Gas	22,704 Therms	$25,747
Total		**$69,244**



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.

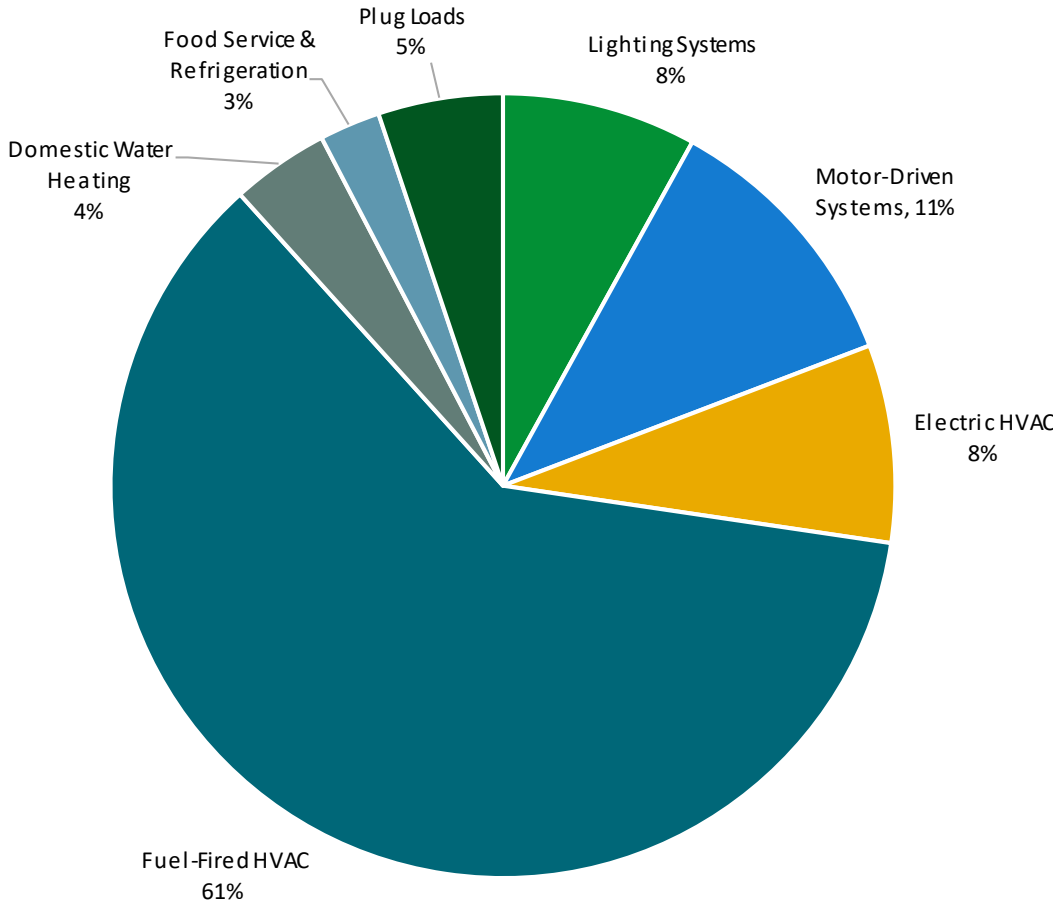
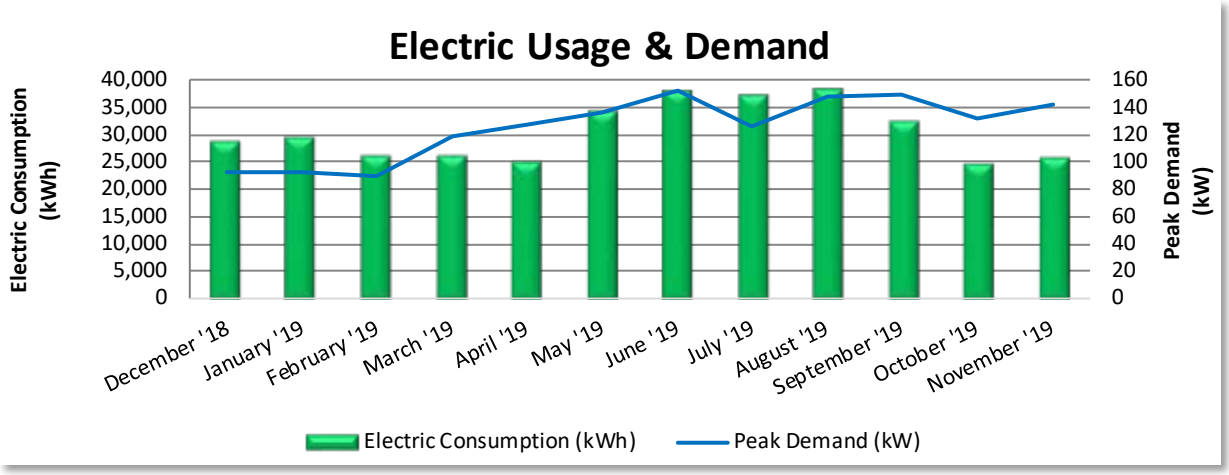


Figure 5 - Energy Balance

3.1 Electricity

JCP&L delivers electricity under rate class General Service Secondary 3 phase, with electric production provided by East Coast Power & Gas of New Jersey, a third-party supplier.



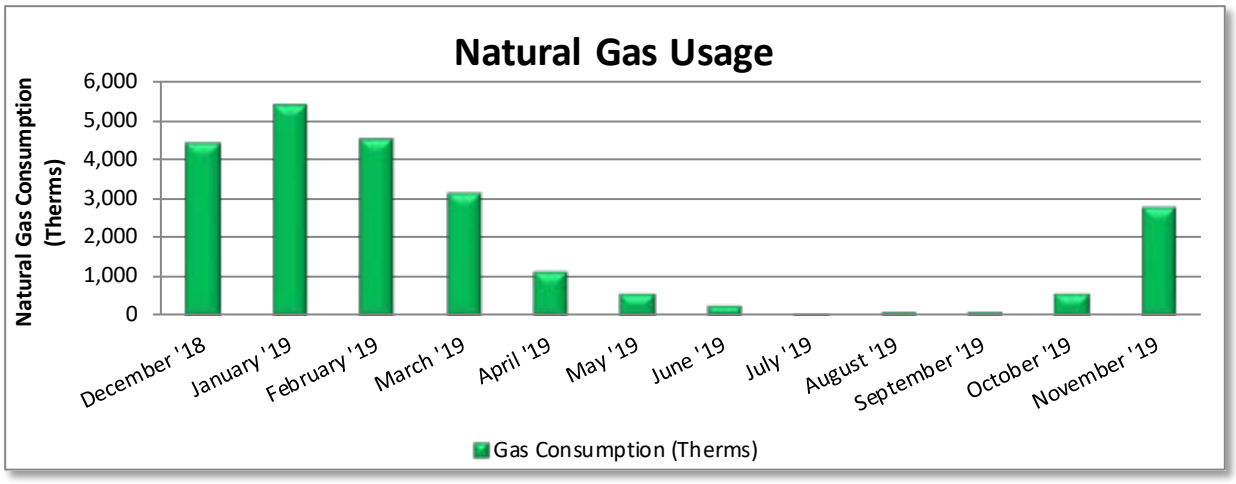
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
1/15/19	34	28,480	93	$519	$3,213
2/13/19	29	29,440	93	$519	$3,353
3/12/19	27	25,920	89	$498	$2,944
4/12/19	31	26,080	119	$682	$3,143
5/14/19	32	25,120	128	$740	$3,203
6/13/19	30	34,080	137	$843	$4,012
7/15/19	32	37,760	152	$941	$4,623
8/14/19	30	36,960	126	$770	$4,380
9/13/19	30	38,080	149	$920	$4,638
10/14/19	31	32,160	149	$858	$4,004
11/12/19	29	24,640	131	$749	$3,175
12/13/19	31	25,760	142	$427	$2,929
Totals	**366**	**364,480**	**152**	**$8,466**	**$43,616**
Annual	**365**	**363,484**	**152**	**$8,443**	**$43,497**

Notes:

- Peak demand of 152 kW occurred in June 2019.
- Average demand over the past 12 months was 126 kW.
- The average electric cost over the past 12 months was $0.120/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.

3.2 Natural Gas

NJ Natural Gas delivers natural gas under rate class Monthly 057CNN2G, with natural gas supply provided by UGI Energy Services, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
1/8/19	34	4,407	$4,992
2/5/19	28	5,357	$5,455
3/7/19	30	4,490	$4,386
4/8/19	32	3,112	$3,002
5/7/19	29	1,120	$1,347
6/6/19	30	566	$887
7/10/19	34	213	$607
8/7/19	28	37	$465
9/6/19	30	61	$482
10/4/19	28	98	$490
11/5/19	32	548	$865
12/6/19	31	2,756	$2,841
Totals	**366**	**22,766**	**$25,818**
Annual	**365**	**22,704**	**$25,747**

Notes:

- The average gas cost for the past 12 months is $1.134/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	**53**

Due to its unique characteristics, this building type is not able to receive a benchmarking score. This report contains suggestions about how to improve building performance and reduce energy costs.

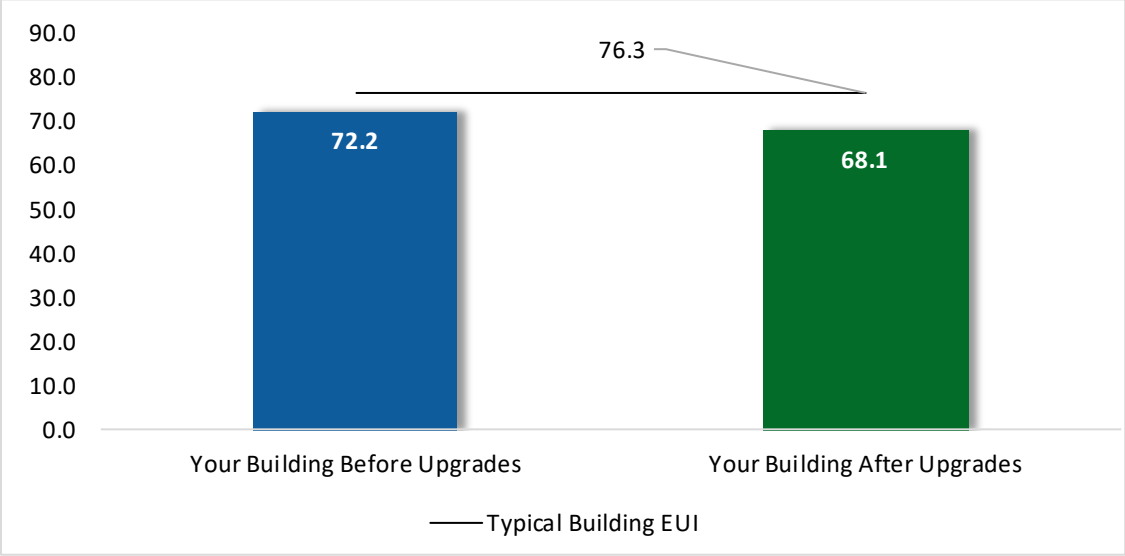


Figure 6 - Energy Use Intensity Comparison[3]

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

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, se**e 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			**35,842**	**11.5**	**-7**	**$4,204**	**$16,769**	**$8,868**	**$7,901**	**1.9**	**35,215**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	35,842	11.5	-7	$4,204	$16,769	$8,868	$7,901	1.9	35,215
Lighting Control Measures			**6,966**	**1.5**	**-1**	**$817**	**$6,385**	**$2,555**	**$3,830**	**4.7**	**6,844**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	5,194	1.2	-1	$609	$4,360	$980	$3,380	5.5	5,103
ECM 3	Install High/Low Lighting Controls	Yes	1,772	0.3	0	$208	$2,025	$1,575	$450	2.2	1,741
Variable Frequency Drive (VFD) Measures			**5,407**	**1.9**	**0**	**$647**	**$7,467**	**$1,950**	**$5,517**	**8.5**	**5,444**
ECM 4	Install VFDs on Constant Volume (CV) Fans	Yes	5,407	1.9	0	$647	$7,467	$1,950	$5,517	8.5	5,444
Electric Unitary HVAC Measures			**1,682**	**1.3**	**0**	**$201**	**$11,638**	**$1,460**	**$10,178**	**50.6**	**1,694**
ECM 5	Install High Efficiency Air Conditioning Units	No	1,682	1.3	0	$201	$11,638	$1,460	$10,178	50.6	1,694
HVAC System Improvements			**1,336**	**0.0**	**16**	**$345**	**$8,208**	**$36**	**$8,172**	**23.7**	**3,254**
ECM 6	Implement Demand Control Ventilation (DCV)	No	1,336	0.0	12	$300	$8,157	$0	$8,157	27.2	2,792
ECM 7	Install Pipe Insulation	Yes	0	0.0	4	$45	$52	$36	$16	0.4	463
Domestic Water Heating Upgrade			**0**	**0.0**	**3**	**$28**	**$122**	**$68**	**$54**	**1.9**	**294**
ECM 8	Install Low-Flow DHW Devices	Yes	0	0.0	3	$28	$122	$68	$54	1.9	294
Food Service & Refrigeration Measures			**5,163**	**0.6**	**0**	**$618**	**$2,280**	**$100**	**$2,180**	**3.5**	**5,199**
ECM 9	Replace Refrigeration Equipment	Yes	3,551	0.4	0	$425	$2,050	$0	$2,050	4.8	3,576
ECM 10	Vending Machine Control	Yes	1,612	0.2	0	$193	$230	$100	$130	0.7	1,623
TOTALS			**56,396**	**16.8**	**10**	**$6,861**	**$52,869**	**$15,037**	**$37,832**	**5.5**	**57,945**

* - 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		**35,842**	**11.5**	**-7**	**$4,204**	**$16,769**	**$8,868**	**$7,901**	**1.9**	**35,215**
ECM 1	Retrofit Fixtures with LED Lamps	35,842	11.5	-7	$4,204	$16,769	$8,868	$7,901	1.9	35,215
Lighting Control Measures		**6,966**	**1.5**	**-1**	**$817**	**$6,385**	**$2,555**	**$3,830**	**4.7**	**6,844**
ECM 2	Install Occupancy Sensor Lighting Controls	5,194	1.2	-1	$609	$4,360	$980	$3,380	5.5	5,103
ECM 3	Install High/Low Lighting Controls	1,772	0.3	0	$208	$2,025	$1,575	$450	2.2	1,741
Variable Frequency Drive (VFD) Measures		**5,407**	**1.9**	**0**	**$647**	**$7,467**	**$1,950**	**$5,517**	**8.5**	**5,444**
ECM 4	Install VFDs on Constant Volume (CV) Fans	5,407	1.9	0	$647	$7,467	$1,950	$5,517	8.5	5,444
HVAC System Improvements		**0**	**0.0**	**4**	**$45**	**$52**	**$36**	**$16**	**0.4**	**463**
ECM 7	Install Pipe Insulation	0	0.0	4	$45	$52	$36	$16	0.4	463
Domestic Water Heating Upgrade		**0**	**0.0**	**3**	**$28**	**$122**	**$68**	**$54**	**1.9**	**294**
ECM 8	Install Low-Flow DHW Devices	0	0.0	3	$28	$122	$68	$54	1.9	294
Food Service & Refrigeration Measures		**5,163**	**0.6**	**0**	**$618**	**$2,280**	**$100**	**$2,180**	**3.5**	**5,199**
ECM 9	Replace Refrigeration Equipment	3,551	0.4	0	$425	$2,050	$0	$2,050	4.8	3,576
ECM 10	Vending Machine Control	1,612	0.2	0	$193	$230	$100	$130	0.7	1,623
TOTALS		**53,377**	**15.5**	**-2**	**$6,359**	**$33,075**	**$13,577**	**$19,498**	**3.1**	**53,459**

* - 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		**35,842**	**11.5**	**-7**	**$4,204**	**$16,769**	**$8,868**	**$7,901**	**1.9**	**35,215**
ECM 1	Retrofit Fixtures with LED Lamps	35,842	11.5	-7	$4,204	$16,769	$8,868	$7,901	1.9	35,215

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: 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, CFL, and incandescent 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		**6,966**	**1.5**	**-1**	**$817**	**$6,385**	**$2,555**	**$3,830**	**4.7**	**6,844**
ECM 2	Install Occupancy Sensor Lighting Controls	5,194	1.2	-1	$609	$4,360	$980	$3,380	5.5	5,103
ECM 3	Install High/Low Lighting Controls	1,772	0.3	0	$208	$2,025	$1,575	$450	2.2	1,741

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 2: 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: cafeteria, break rooms, gymnasium, and IT equipment room.

ECM 3: 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 considered 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.

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 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		**5,407**	**1.9**	**0**	**$647**	**$7,467**	**$1,950**	**$5,517**	**8.5**	**5,444**
ECM 4	Install VFDs on Constant Volume (CV) Fans	5,407	1.9	0	$647	$7,467	$1,950	$5,517	8.5	5,444

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 4: 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.

VAV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g. 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

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: media center AHU.

4.4 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		**1,682**	**1.3**	**0**	**$201**	**$11,638**	**$1,460**	**$10,178**	**50.6**	**1,694**
ECM 5	Install High Efficiency Air Conditioning Units	1,682	1.3	0	$201	$11,638	$1,460	$10,178	50.6	1,694

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 10-ton Trane split AC system is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 5: 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: Trane split AC system for media center.

4.5 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		**1,336**	**0.0**	**16**	**$345**	**$8,208**	**$36**	**$8,172**	**23.7**	**3,254**
ECM 6	Implement Demand Control Ventilation (DCV)	1,336	0.0	12	$300	$8,157	$0	$8,157	27.2	2,792
ECM 7	Install Pipe Insulation	0	0.0	4	$45	$52	$36	$16	0.4	463

ECM 6: Implement Demand Control Ventilation (DCV)

We evaluated installing demand control ventilation (DCV), which 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, and media center.

ECM 7: Install Pipe Insulation

Install insulation on domestic hot water system piping. Distribution system losses are dependent on system fluid 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.

Affected building systems: hot water piping associated with the A.O. Smith water heater.

4.6 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**3**	**$28**	**$122**	**$68**	**$54**	**1.9**	**294**
ECM 8	Install Low-Flow DHW Devices	0	0.0	3	$28	$122	$68	$54	1.9	294

ECM 8: 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
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. Pre-rinse spray valves (PRSVs) — often used in commercial and institutional kitchens — remove food waste from dishes prior to dishwashing.

Additional cost savings may result from reduced water usage.

4.7 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		**5,163**	**0.6**	**0**	**$618**	**$2,280**	**$100**	**$2,180**	**3.5**	**5,199**
ECM 9	Replace Refrigeration Equipment	3,551	0.4	0	$425	$2,050	$0	$2,050	4.8	3,576
ECM 10	Vending Machine Control	1,612	0.2	0	$193	$230	$100	$130	0.7	1,623

ECM 9: Replace Refrigeration Equipment

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

ECM 10: Vending Machine Control

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

4.8 Measures for Future Consideration

There are additional opportunities for improvement that Matawan Aberdeen Regional School District may wish to consider. These potential upgrades typically require further analysis, involve substantial capital investment and/or include significant system reconfiguration. These measure(s) are therefore beyond the scope of this energy audit. These measure(s) are described here to support a whole building approach to energy efficiency and sustainability.

Matawan Aberdeen Regional School District may wish to consider the Energy Savings Improvement Program (ESIP) or a whole building approach. With interest in implementing comprehensive, largescale and/or complex system wide projects, these measures may be pursued during development of a future energy savings plan. We recommend that you work with your energy service company (ESCO) and/or design team to:

- evaluate these measures further
- develop firm costs
- determine measure savings
- prepare detailed implementation plans.

Other modernization or capital improvement funds may be leveraged for these types of refurbishments. As you plan for capital upgrades, be sure to consider the energy impact of the building systems and controls being specified.

Retro-Commissioning Study

Due to the complexity of today's HVAC systems and controls a thorough analysis and rebalance of heating, ventilation, and cooling systems should periodically be conducted. There are indications at this site that systems may be not be operating correctly or as efficiently as they could be. One important tool available to building operators to ensure proper system operation is retro-commissioning.

Retro-commissioning is a common practice recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to be implemented every few years. We recommend that you contact a reputable engineering firm that specializes in energy control systems and retro-commissioning. Ask them to propose a scope of work and an outline of the procedures and processes to be implemented, including a schedule and the roles of all responsible parties.

Once goals and responsibilities are established, the objective of the investigation process is to understand how the building is currently operating, identify the issues, and determine the most cost-effective way to improve performance. The retro-commissioning agent will review building documentation, interview building occupants, and inspect and test the equipment. Information is then compiled into a report and shared with facility staff, who will select which recommendations to implement after reviewing the findings.

The implementation phase puts the selected processes into place. Typical measures may include sensor calibration, equipment schedule changes, damper linkage repair and similar relatively low-cost adjustments -- although more expensive sophisticated programming and building control system upgrades may be warranted. Approved measures may be implemented by the agent, the building staff, or by subcontractors. Typically, a combination of these individuals makes up the retro-commissioning team.

After the approved measures are implemented, the team will verify that the changes are working as expected. Baseline and post-case measurements will allow building staff to monitor equipment and ensure that the benefits are maintained.

Finally, site staff has expressed an interest in consolidating EMS controls into a single system, the Honeywell Tritium EMS, which currently controls about 80% of the HVAC equipment. A retro-commissioning process should be included as part of the control function mapping from the legacy Johnson Controls Metasys system to the new Honeywell system.

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.

Operation and maintenance (O&M) plans enhance the operational efficiency of HVAC and other energy intensive systems and could save between 5 to 20 percent of the energy usage in your building without substantial capital investment. A successful plan includes your records of energy usage trends and costs, building equipment lists, current maintenance practices, planned capital upgrades, and incorporates your ideas for improved building operation. Your plan will address goals for energy-efficient operation, provide detail on how to reach the goals, and will outline procedures for measuring and reporting whether goals have been achieved.

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.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly. Adjust exterior lighting time clock controls seasonally as needed to match your lighting requirements.

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

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.

Economizer Maintenance

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

Periodic inspection and maintenance will keep economizers working in sync with the heating and cooling system. This maintenance should be part of annual system maintenance, and it should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position.

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

Duct maintenance has two primary goals: keep the ducts clean to avoid air quality problems and seal leaks to save energy. Check for cleanliness, obstructions that block airflow, water damage, and leaks. Ducts should be inspected at least every two years.

The biggest symptoms of clogged air ducts are differing temperatures throughout the building and areas with limited airflow from supply registers. If a particular air duct is clogged, then air flow will only be cut off to some rooms in the building - not all of them. The reduced airflow will make it more difficult for those areas to reach the temperature setpoint which will cause the HVAC system to run longer to cool or heat that area properly. If you suspect clogged air ducts, ensure that all areas in front of supply registers are clear of items that may block or restrict air flow, and check for fire dampers or balancing dampers that have failed closed.

Duct leakage in commercial buildings can account for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building wasting conditioned air. Check ductwork for leakage. Eliminating duct leaks can improve ventilation system performance and reduce heating and cooling system operation.

Distribution system losses are dependent on-air system temperature, the size of the distribution system, and the level of insulation of the ductwork. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is missing or worn, the system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Boiler Maintenance

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

Furnace Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas / carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

Water Heater Maintenance

The lower the supply water temperature that is used for hand washing sinks, the less energy is needed to heat the water. Reducing the temperature results in energy savings and the change is often unnoticeable to users. Be sure to review the domestic water temperature requirements for sterilizers and dishwashers as you investigate reducing the supply water temperature.

Also, 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.

Compressed Air System Maintenance

Compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan for compressed air systems should include:

- Inspection, cleaning, and replacement of inlet filter cartridges
- Cleaning of drain traps
- Daily inspection of lubricant levels to reduce unwanted friction
- Inspection of belt condition and tension
- Check for leaks and adjust loose connections
- Overall system cleaning

Contact a qualified technician for help with setting up periodic maintenance schedule.

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

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.

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

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

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

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

Procurement Strategies

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

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.

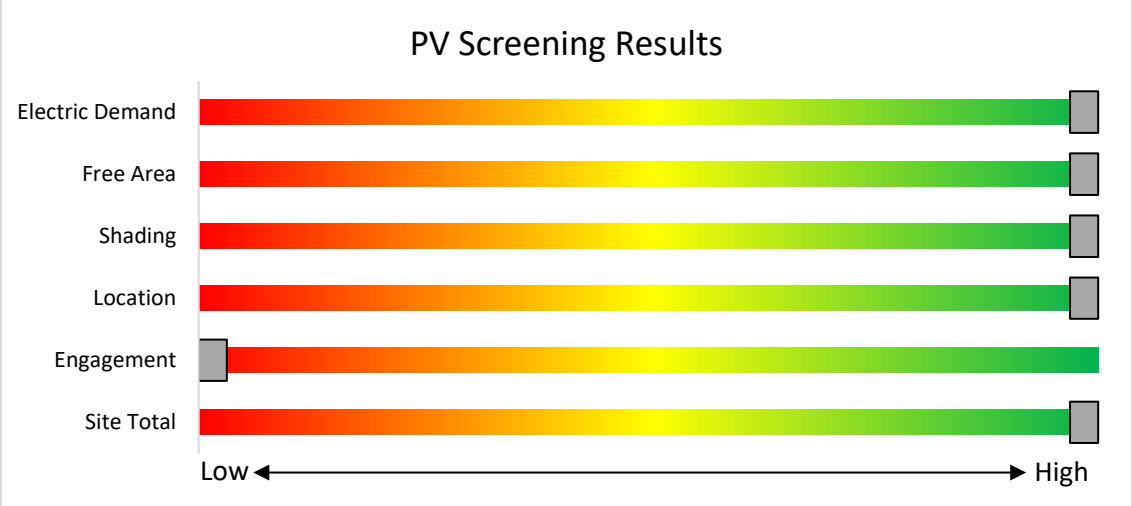
6.1 Solar Photovoltaic

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	89	kW DC STC
Electric Generation	106,032	kWh/yr
Displaced Cost	$12,690	/yr
Installed Cost	$231,400	

Figure 9 - Photovoltaic Screening

Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program 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 TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installation.

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:

Transition Incentive (TI) Program: https://www.njcleanenergy.com/renewable-energy/programs/transition-incentive-program

- **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. Low and infrequent thermal load are the most significant factors contributing to the lack of CHP potential.

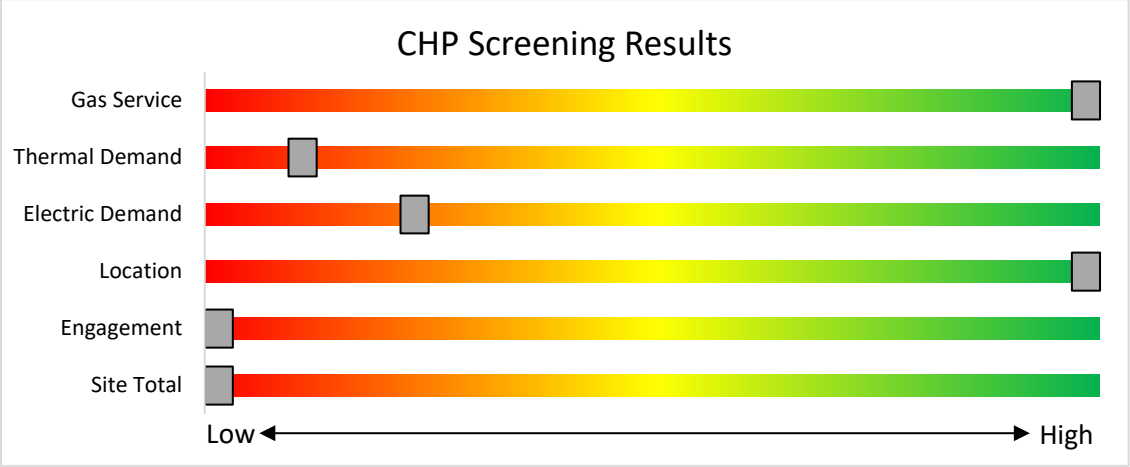


Figure 10 – CHP Screening

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 New Jersey 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.

Based on the site building and utility data provided, the facility meets the requirements of the current DI program.

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.

Based on the site building and utility data provided, the facility does not meet the requirements of the current P4P program.

Incentives

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

How to Participate

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

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

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

7.4 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 into 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 description 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 Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program 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 TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installations. NJBPU calculates the value of a Transition Renewable Energy Certificate (TREC) by multiplying the base compensation rate ($152/MWh) by the project's assigned factor (i.e. $152 x 0.85 = $129.20/MWh). The TREC factors are defined based on the chart below:

Project Type	Factor
Subsection (t): landfill, brownfield, areas of historic fill	1.00
Grid supply (Subsection (r)) rooftop	1.00
Net metered non-residential rooftop and carport	1.00
Community solar	0.85
Grid supply (Subsection (r)) ground mount	0.60
Net metered residential ground mount	0.60
Net metered residential rooftop and carport	0.60
Net metered non-residential ground mount	0.60

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 TRECs.

Eligible projects may generate TRECs for 15 years following the commencement of commercial operations (also referred to as the "Transition Incentive Qualification Life"). After 15 years, projects may be eligible for a NJ Class I REC.

TRECs will be used by the identified compliance entities to satisfy a compliance obligation tied to a new Transition Incentive Renewable Portfolio Standard ("TI-RPS"), which will exist in parallel with, and completely separate from, the existing Solar RPS for Legacy SRECs. The TI-RPS is a carve-out of the current Class I RPS requirement. The creation of TRECs is based upon metered generation supplied to PJM-EIS General Attribute Tracking System ("GATS") by the owners of eligible facilities or their agents. GATS would create one TREC for each MWh of energy produced from a qualified facility.

TRECs will be purchased monthly by a TREC Administrator who will allocate the TRECs to the Load Serving Entities (BGS Providers and Third-Party Suppliers) annually based on their market share of retail electricity sold during the relevant Energy Year.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan. The Transition Incentive Program online portal is now open to new applications effective May 1, 2020. There are instructions on "How and When to Transfer my SRP Registration to the Transition Incentive Program". If you are considering installing solar photovoltaics on your building, visit the following link for more information:

https://www.njcleanenergy.com/renewable-energy/programs/transition-incentive-program

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
Boiler room	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
Boiler room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.2	559	0	$66	$256	$140	1.8
Boiler room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	1	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.1	240	0	$28	$110	$60	1.8
Book room	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,973	1	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,973	0.2	729	0	$86	$438	$240	2.3
Cafeteria	12	LED - Fixtures: 50W Hard Ceiling LED Fixtures	Wall Switch	S	50	3,300	2	None	Yes	12	LED - Fixtures: 50W Hard Ceiling LED Fixtures	Occupancy Sensor	50	2,277	0.1	675	0	$79	$270	$70	2.5
Classroom 1	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 10	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 11	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 12	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 2	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	990	1	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	990	0.0	15	0	$2	$16	$6	5.9
Classroom 2	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 28	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	990	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	990	0.0	54	0	$6	$55	$30	3.9
Classroom 28	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,973	1	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,973	0.5	1,459	0	$171	$876	$480	2.3
Classroom 3	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 4	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 5	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 6	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 7	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 8	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom 9	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	684	0	$80	$329	$180	1.9
Classroom A	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
Classroom A	1	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	S	20	990		None	No	1	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	20	990	0.0	0	0	$0	$0	$0	0.0
Classroom A	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	990	1	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	990	0.0	15	0	$2	$16	$6	5.9
Classroom A	23	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	23	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.3	874	0	$102	$420	$230	1.9
Classroom A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,860	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,860	0.0	104	0	$12	$37	$20	1.4

	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
Exterior lighting (Bldg envelope)	19	LED - Fixtures: 35W Pole Light LED Fixtures	Timeclock		35	3,285		None	No	19	LED - Fixtures: 35W Pole Light LED Fixtures	Timeclock	35	3,285	0.0	0	0	$0	$0	$0	0.0
Exterior lighting (Bldg envelope)	4	LED - Fixtures: 50W Pole Light LED Fixtures	Timeclock		50	3,285		None	No	4	LED - Fixtures: 50W Pole Light LED Fixtures	Timeclock	50	3,285	0.0	0	0	$0	$0	$0	0.0
Exterior lighting (Bldg envelope)	19	LED - Fixtures: 40W Wall Pack LED Fixtures	Timeclock		40	3,285		None	No	19	LED - Fixtures: 40W Wall Pack LED Fixtures	Timeclock	40	3,285	0.0	0	0	$0	$0	$0	0.0
Exterior lighting (Bldg envelope)	2	LED - Fixtures: 45W Wall Pack LED Fixtures	Timeclock		45	3,285		None	No	2	LED - Fixtures: 45W Wall Pack LED Fixtures	Timeclock	45	3,285	0.0	0	0	$0	$0	$0	0.0
Exterior lighting (Bldg envelope)	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Timeclock		10	3,285		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Timeclock	10	3,285	0.0	0	0	$0	$0	$0	0.0
Faculty break room	10	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,860	1, 2	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	692	0	$81	$453	$170	3.5
Gymnasium	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
Gymnasium	9	Halogen Incandescent: (1) 150W PAR40 Plug-In Lamp	Wall Switch	S	150	250	1, 2	Relamp	Yes	9	LED Lamps: (1) 23W PAR40 Plug-In Lamp	Occupancy Sensor	23	173	0.9	332	0	$39	$542	$124	10.7
Gymnasium	20	LED - Fixtures: 50W Hard Ceiling LED Fixtures	Wall Switch	S	50	3,520	2	None	Yes	20	LED - Fixtures: 50W Hard Ceiling LED Fixtures	Occupancy Sensor	50	2,429	0.2	1,200	0	$141	$540	$140	2.8
Gymnasium	2	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	S	20	2,860	2	None	Yes	2	LED Lamps: (2) 10W A19 Screw-In Lamps	Occupancy Sensor	20	1,973	0.0	39	0	$5	$0	$0	0.0
Gymnasium	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,860	1, 2	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,973	0.0	67	0	$8	$33	$12	2.6
Gymnasium	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,860	1, 2	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.2	661	0	$77	$183	$100	1.1
Janitorial Closet 1	1	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	100	2,860	1	Relamp	No	1	LED Lamps: (1) 15W Plug-In Lamp	Wall Switch	15	2,860	0.1	267	0	$31	$17	$2	0.5
Kitchen	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
Kitchen	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	990	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	990	0.0	17	0	$2	$33	$12	10.0
Kitchen	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,860	1, 2	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.5	2,246	0	$263	$1,161	$480	2.6
Library	14	Compact Fluorescent: (2) 13W Plug-In Lamps	Wall Switch	S	26	2,860	1, 2	Relamp	Yes	14	LED Lamps: (2) 10W Plug-In Lamp	Occupancy Sensor	20	1,973	0.1	537	0	$63	$620	$126	7.8
Library	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
Library	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
Library	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	990	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	683	0.1	91	0	$11	$189	$40	13.9
Library	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,973	1	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.1	215	0	$25	$110	$60	2.0
Library	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,973	1	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.1	215	0	$25	$110	$60	2.0
Library	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,860	1, 2	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.2	1,057	0	$124	$562	$230	2.7
Library	30	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,860	1, 2	Relamp	Yes	30	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,973	1.4	5,945	-1	$697	$2,183	$1,040	1.6
Library	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,860	1, 2	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,973	0.4	1,862	0	$218	$854	$390	2.1

	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 AHU	1	Compact Fluorescent: (2) 13W Plug-In Lamps	Wall Switch	S	26	990	1	Relamp	No	1	LED Lamps: (2) 10W Plug-In Lamp	Wall Switch	20	990	0.0	7	0	$1	$25	$4	27.4
Library AHU	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	990	1	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	990	0.2	287	0	$34	$292	$160	3.9
Lobby - Between Gym and Classrooms	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
Lobby - Between Gym and Classrooms	6	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Wall Switch	S	40	3,520	3	None	Yes	6	LED - Fixtures: 40W Hard Ceiling LED Fixtures	High/Low Control	40	2,429	0.1	288	0	$34	$225	$225	0.0
Lobby - Classrooms A to 12	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
Lobby - Classrooms A to 12	13	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Wall Switch	S	40	3,520	3	None	Yes	13	LED - Fixtures: 40W Hard Ceiling LED Fixtures	High/Low Control	40	2,429	0.1	624	0	$73	$675	$675	0.0
Lobby - Near Library	4	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Wall Switch	S	40	3,520	3	None	Yes	4	LED - Fixtures: 40W Hard Ceiling LED Fixtures	High/Low Control	40	2,429	0.0	192	0	$23	$225	$225	0.0
Lobby - Near Main office	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
Lobby - Near Main office	5	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Wall Switch	S	40	3,520	3	None	Yes	5	LED - Fixtures: 40W Hard Ceiling LED Fixtures	High/Low Control	40	2,429	0.0	240	0	$28	$225	$225	0.0
Lobby - POD Classrooms	7	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Lobby - POD Classrooms	16	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Occupancy Sensor	S	40	1,973		None	No	16	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Occupancy Sensor	40	1,973	0.0	0	0	$0	$0	$0	0.0
Lobby - Vestibule near main office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,520	1, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,429	0.1	325	0	$38	$298	$40	6.8
Lobby - Vestibule near POD	6	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Wall Switch	S	40	3,520	3	None	Yes	6	LED - Fixtures: 40W Hard Ceiling LED Fixtures	High/Low Control	40	2,429	0.1	288	0	$34	$225	$225	0.0
Lobby - Vestibule near POD	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,520	1, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,429	0.1	325	0	$38	$298	$40	6.8
Main Office Area	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,277	1	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,277	0.1	372	0	$44	$164	$90	1.7
Main Office Area	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,277	1	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,277	0.1	372	0	$44	$164	$90	1.7
Main Office Area	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,277	1	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,277	0.1	496	0	$58	$219	$120	1.7
Main Office Area	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,277	1	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,277	0.3	1,116	0	$131	$493	$270	1.7
Nurse's Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,300	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,300	0.0	64	0	$7	$18	$10	1.1
Nurse's Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.1	304	0	$36	$146	$80	1.9
POD Break Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	990	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	990	0.0	19	0	$2	$18	$10	3.7
POD Break Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	990	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	990	0.0	19	0	$2	$18	$10	3.7
POD Break Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,860	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.1	396	0	$46	$380	$130	5.4
POD Classroom 13	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
POD Classroom 13	1	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	S	20	990		None	No	1	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	20	990	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
POD Classroom 13	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	990	1	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	990	0.0	15	0	$2	$16	$6	5.9
POD Classroom 13	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 14	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
POD Classroom 14	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	990		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	990	0.0	0	0	$0	$0	$0	0.0
POD Classroom 14	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	990		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	990	0.0	0	0	$0	$0	$0	0.0
POD Classroom 14	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	990	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	990	0.0	17	0	$2	$33	$12	10.0
POD Classroom 14	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 15	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
POD Classroom 15	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	990	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	990	0.0	17	0	$2	$33	$12	10.0
POD Classroom 15	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 15	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	990	1	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	990	0.0	32	0	$4	$72	$20	14.2
POD Classroom 16	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
POD Classroom 16	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	990	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	990	0.0	17	0	$2	$33	$12	10.0
POD Classroom 16	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 17	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
POD Classroom 17	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	990	2	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	683	0.0	7	0	$1	$116	$0	146.5
POD Classroom 17	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 18	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
POD Classroom 18	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 19	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
POD Classroom 19	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	990	2	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	683	0.0	7	0	$1	$116	$0	146.5
POD Classroom 19	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 20	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
POD Classroom 20	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 21	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

	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
POD Classroom 21	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	990	2	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	683	0.0	7	0	$1	$116	$0	146.5
POD Classroom 21	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 22	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
POD Classroom 22	19	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	19	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.2	722	0	$85	$347	$190	1.9
POD Classroom 23	13	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Occupancy Sensor	S	40	1,973		None	No	13	LED - Fixtures: 40W Hard Ceiling LED Fixtures	Occupancy Sensor	40	1,973	0.0	0	0	$0	$0	$0	0.0
POD Classroom 23	1	LED - Fixtures: 40W Hard Ceiling LED Fixture	Wall Switch	S	40	990		None	No	1	LED - Fixtures: 40W Hard Ceiling LED Fixture	Wall Switch	40	990	0.0	0	0	$0	$0	$0	0.0
POD Electrical Room	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	990	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	990	0.0	17	0	$2	$33	$12	10.0
POD IT Eqp room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,860	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,973	0.1	528	0	$62	$416	$150	4.3
POD Janitorial Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,860	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,860	0.0	55	0	$6	$18	$10	1.3
Restroom 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	990	1	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	990	0.0	15	0	$2	$16	$6	5.9
Restroom 2	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	990	1	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	990	0.0	15	0	$2	$16	$6	5.9
Restroom 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	990	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	990	0.0	36	0	$4	$37	$20	3.9
Restroom 4	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.1	228	0	$27	$110	$60	1.9
Restroom 5	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.1	152	0	$18	$73	$40	1.9
Restroom 6	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,973	1	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,973	0.1	228	0	$27	$110	$60	1.9
Storage Room 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	990	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	683	0.1	91	0	$11	$189	$40	13.9

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	Large EF	1	Exhaust Fan	0.5	78.2%	No	W	3,150		No	78.2%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Medium EF	5	Exhaust Fan	0.3	73.4%	No	W	3,150		No	73.4%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Small EF	14	Exhaust Fan	0.2	60.0%	No	W	3,150		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler room	Classroom POD HHW pumps (#3 & 4)	2	Heating Hot Water Pump	3.0	89.5%	Yes	W	3,569		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler room	HHW pumps (#1 & #2)	2	Heating Hot Water Pump	3.0	89.5%	Yes	W	3,569		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler room	Red pumps on HW outlet from boiler	3	Heating Hot Water Pump	0.3	73.4%	No	W	3,569		No	73.4%	No		0.0	0	0	$0	$0	$0	0.0
Boiler room	HHW Pumps	4	Heating Hot Water Pump	0.8	81.1%	No	W	3,569		No	81.1%	No		0.0	0	0	$0	$0	$0	0.0
Library AHU	Library AHU Return	1	Return Fan	1.5	86.5%	No	W	2,640	4	No	86.5%	Yes	1	0.4	1,281	0	$153	$3,391	$150	21.1
Library AHU	Library AHU	1	Supply Fan	5.0	89.5%	No	W	2,640	4	No	89.5%	Yes	1	1.4	4,126	0	$494	$4,076	$1,800	4.6
POD Electrical Room	Supply Fan	1	Supply Fan	0.8	81.1%	No	W	2,640		No	81.1%	No		0.0	0	0	$0	$0	$0	0.0
Gymnasium	Gymnasium	4	Other	0.5	78.2%	No	W	3,500		No	78.2%	No		0.0	0	0	$0	$0	$0	0.0
Roof	DOAS 3	1	Supply Fan	0.5	78.2%	No	W	2,640		No	78.2%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Cafeteria RTU - 19	1	Supply Fan	3.0	89.5%	Yes	W	2,640		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Main office RTU	1	Supply Fan	3.0	91.0%	Yes	W	3,000		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	POD area RTU 22	1	Supply Fan	5.0	89.5%	Yes	W	2,860		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	POD area RTU 23	1	Supply Fan	5.0	89.5%	Yes	W	2,640		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU 20 (gym)	1	Supply Fan	5.0	89.5%	Yes	W	3,500		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 1	Unit Ventilator	1	Supply Fan	1.0	85.5%	No	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 10	Unit Ventilator	1	Supply Fan	1.0	85.5%	No	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 11	Unit Ventilator	1	Supply Fan	1.0	85.5%	No	W	2,745		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0

Electric HVAC Inventory & Recommendations

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	For library AHU	1	Split-System AC	10.00		B	5	Yes	1	Split-System AC	10.00		11.50		1.3	1,682	0	$201	$11,638	$1,460	50.6
Roof	DOAS 3	1	Packaged AC	6.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Cafeteria RTU - 19	1	Packaged AC	11.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Main office	1	Packaged AC	6.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	POD area RTU 22	1	Packaged AC	16.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	POD area RTU 23	1	Packaged AC	16.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU 20 (gym)	1	Packaged AC	16.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Faculty break room	2	Ductless Mini-Split HP	1.00	1.13	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Main office copy room	1	Ductless Mini-Split HP	1.00	1.13	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Nurse's office	2	Ductless Mini-Split HP	1.00	1.13	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 1	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 10	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 11	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 12	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 2	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 28	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 3	Unit Ventilator	1	Packaged AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 4	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 5	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 6	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 7	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 8	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 9	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom A	Unit Ventilator	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Faculty break room	Faculty break room	1	Window AC	1.83		W		No							0.0	0	0	$0	$0	$0	0.0

Fuel Heating Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	HHW System	3	Condensing Hot Water Boiler	1,380	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	DOAS 3	1	Furnace	81	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	Cafeteria RTU - 19	1	Furnace	219	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	POD area RTU 22	1	Furnace	219	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	POD area RTU 23	1	Furnace	219	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU 20 (gym)	1	Furnace	219	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
Gymnasium	Gymnasium	6	2.00	16.00	0.00	218.70	0.0	634	4	$122	$2,719	$0	22.3
Cafeteria	Cafeteria	6	2.00	11.00	0.00	218.70	0.0	308	4	$83	$2,719	$0	32.8
Media Center	Media Center	6	2.00	10.00	0.00	200.00	0.0	394	4	$95	$2,719	$0	28.5

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
POD Janitorial Closet	DHW System	7	9	1.00	0.0	0	4	$45	$52	$36	0.4

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
Boiler room	DHW System	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
POD Janitorial Closet	DHW System	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommendation 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
Classrooms	8	16	Faucet Aerator (Kitchen)	2.00	1.50	0.0	0	2	$25	$115	$64	2.0
Kitchen	8	1	Faucet Aerator (Kitchen)	2.50	1.50	0.0	0	0	$3	$7	$4	1.0

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	Freezer Chest	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Freezer Chest	No	9	Yes	0.4	3,551	0	$425	$2,050	$0	4.8
Kitchen	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Convection Oven (Half Size)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	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?
Faculty Break Room	1	Coffee Machine	400	No
Classrooms/Offices	84	Desktop Computers	26	Yes
Classrooms/Offices	182	Laptop Computers	11	Yes
Nurse's Office	1	Ceiling Fan	100	No
Classrooms	29	Wall-mounted Fan	75	No
Faculty Break Room, POD Break Room	4	Microwave	1,200	No
Kitchen	1	Food Display Case	1,500	No
Library/Offices	10	Printer (Medium/Small)	50	Yes
Library/Offices	3	Printer/Copier (large)	550	Yes
Classrooms	25	Projector	200	No
Nurse's Office, POD Break Room	5	Refrigerator (Mini)	100	No
Faculty Break Room	1	Refrigerator (Residential)	600	No
Kitchen	1	Serving Table (Chilled)	750	No
Kitchen	1	Serving Table (Heated)	2,500	No
Main Office	1	Television	120	No
POD Break Room/ POD IT Eqp Room	2	Water Cooler	500	No

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 Break Room	1	Refrigerated	10	Yes	0.2	1,612	0	$193	$230	$100	0.7

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.

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Ravine Drive Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 48,600
Built: 1966

For Year Ending: November 30, 2019
Date Generated: May 17, 2020

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
Ravine Drive Elementary School 170 Ravine Drive Matawan, New Jersey 07747	Matawan-Aberdeen Regional School District One Crest Way Aberdeen, NJ 07747 (732) 705-4016	Adam Nasr One Crest Way Aberdeen, NJ 07747 (732) 705-4013 anasr@marsd.k12.nj.us

Property ID: 3760972

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
74.1 kBtu/ft²

Source EUI
125.6 kBtu/ft²

Annual Energy by Fuel		
Electric - Grid (kBtu)	1,324,850 (37%)	
Natural Gas (kBtu)	2,278,746 (63%)	

National Median Comparison	
National Median Site EUI (kBtu/ft²)	76.3
National Median Source EUI (kBtu/ft²)	129.3
% Diff from National Median Source EUI	-3%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	255

Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

Licensed Professional

___ _____
.
(___)___-_____
_____

Professional Engineer or Registered Architect 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.
TREC	*Transition Incentive Renewable Energy Certificate:* a factorized renewable energy certificate 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.