



Local Government Energy Audit Report

Bergen Boulevard School

August 29, 2019

Prepared for:

Ridgefield Public Schools

635 Bergen Boulevard

Ridgefield, New Jersey 07657

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility 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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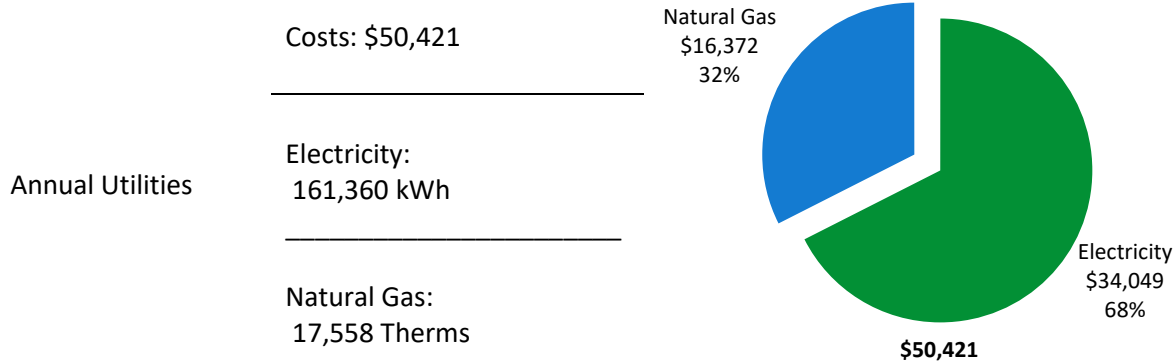
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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) report for Bergen Boulevard School. This report provides you with information about the school's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in the school. 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



ENERGY STAR® Benchmarking Score	71 <i>(1-100 scale)</i>	This building performs slightly below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.
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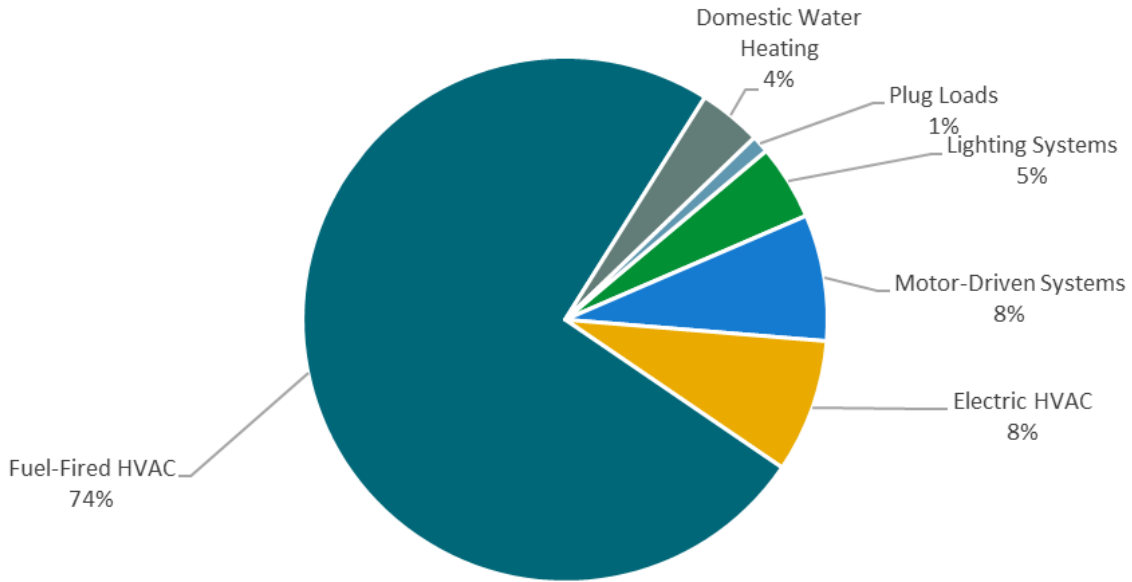


Figure 1 - Energy Use by System

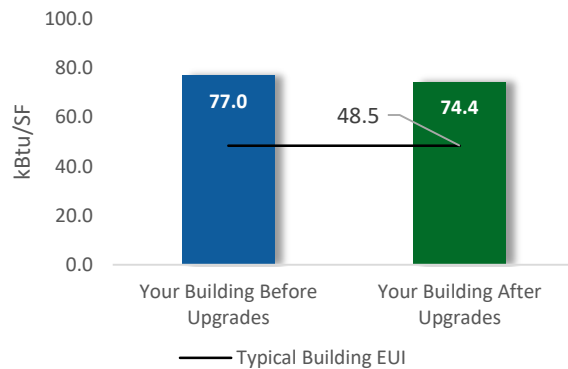
POTENTIAL IMPROVEMENTS



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.

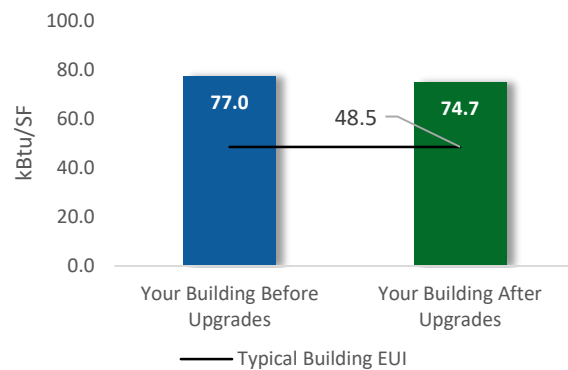
Scenario 1: Full Package (all evaluated measures)

Installation Cost	\$34,103
Potential Rebates & Incentives ¹	\$2,083
Annual Cost Savings	\$4,893
Annual Energy Savings	Electricity: 23,285 kWh
Greenhouse Gas Emission Savings	12 Tons
Simple Payback	6.5 Years
Site Energy Savings (all utilities)	3%



Scenario 2: Cost Effective Package²

Installation Cost	\$20,239
Potential Rebates & Incentives	\$1,441
Annual Cost Savings	\$4,329
Annual Energy Savings	Electricity: 20,611 kWh
Greenhouse Gas Emission Savings	10 Tons
Simple Payback	4.3 Years
Site Energy Savings (all utilities)	3%



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	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Lifetime Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		2,825	0.8	-1	\$591	\$8,859	\$1,877	\$211	\$1,666	2.8	2,776
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,119	0.3	0	\$234	\$3,509	\$924	\$90	\$834	3.6	1,100
ECM 2	Retrofit Fixtures with LED Lamps	1,513	0.5	0	\$316	\$4,745	\$663	\$121	\$542	1.7	1,487
ECM 3	Install LED Exit Signs	193	0.0	0	\$40	\$604	\$290	\$0	\$290	7.2	189
Lighting Control Measures		7,678	2.3	-2	\$1,605	\$12,843	\$10,460	\$1,320	\$9,140	5.7	7,545
ECM 4	Install Occupancy Sensor Lighting Controls	6,992	2.1	-1	\$1,462	\$11,694	\$9,760	\$1,230	\$8,530	5.8	6,870
ECM 5	Install Daylight Dimming Controls	45	0.0	0	\$10	\$77	\$250	\$90	\$160	16.7	46
ECM 6	Install High/Low Lighting Controls	641	0.2	0	\$134	\$1,072	\$450	\$0	\$450	3.4	630
Variable Frequency Drive (VFD) Measures		10,153	1.2	0	\$2,142	\$32,137	\$8,152	\$0	\$8,152	3.8	10,224
ECM 7	Install VFDs on Heating Water Pumps	10,153	1.2	0	\$2,142	\$32,137	\$8,152	\$0	\$8,152	3.8	10,224
Electric Unitary HVAC Measures		2,629	1.4	0	\$555	\$8,320	\$13,614	\$552	\$13,062	23.5	2,647
ECM 8	Install High Efficiency Air Conditioning Units	2,629	1.4	0	\$555	\$8,320	\$13,614	\$552	\$13,062	23.5	2,647
TOTALS (COST EFFECTIVE MEASURES)		20,611	4.4	-2	\$4,329	\$53,762	\$20,239	\$1,441	\$18,798	4.3	20,499
TOTALS (ALL MEASURES)		23,285	5.8	-2	\$4,893	\$62,159	\$34,103	\$2,083	\$32,020	6.5	23,192

* - 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 Fluorescent Fixtures with LED Lamps and Drivers	x	x	
ECM 2	Retrofit Fixtures with LED Lamps	x	x	
ECM 3	Install LED Exit Signs	x	x	
ECM 4	Install Occupancy Sensor Lighting Controls		x	
ECM 5	Install Daylight Dimming Controls		x	
ECM 6	Install High/Low Lighting Controls		x	
ECM 7	Install VFDs on Hot Water Pumps	x	x	
ECM 8	Install High Efficiency Electric AC	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 Bergen Boulevard School. This report provides information on how the school uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey’s Clean Energy Program (NJCEP) for implementing ECMs.

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

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

2.1 Site Overview

On April 10, 2019, TRC performed an energy audit at Bergen Boulevard School located in Ridgefield, New Jersey. TRC met with James Malaquias to review the school operations and help focus our investigation on specific energy-using systems.

Bergen Boulevard School is a two-story, 29,954 square foot building built in 1923. Spaces include: classrooms, multipurpose rooms, offices, and mechanical space.

2.2 Building Occupancy

The school is occupied from September through June. Typical weekday occupation is 250 people including staff and students.

Building Name	Weekday/Weekend	Operating Schedule
Bergen Boulevard School	Weekday	8:00 AM - 4:00 PM
	Weekend	No Operation

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a brick facade. The roof is flat and covered with black EPDM membrane. This was newly installed in 2007 and is in good condition.

Most of the windows are double-glazed and have aluminum frames. All windows were replaced in 2016. The glass-to-frame seals are in good condition. Exterior doors have aluminum frames, are in good condition, and show no signs of excessive air infiltration.



Façade and windows



Exterior doors

2.4 Lighting Systems

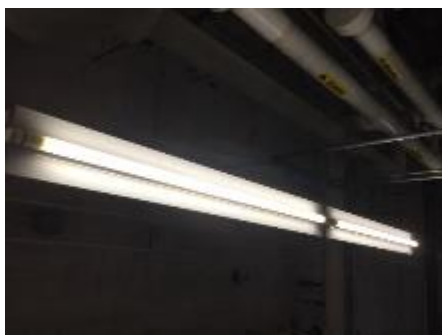
The primary interior lighting system uses 14-Watt LED linear tubes. There are also few 32-Watt T8 and 40-Watt T12 fixtures. Additionally, there are some 23-watt compact fluorescent lamps (CFL), 60-watt incandescent, and 13-watt LED general purpose lamps located in service spaces. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 2-, 3-, or 4-lamp, 2- or 4-foot long troffer and surface-mounted fixtures and 2-foot fixtures with U-bend lamps. Most fixtures are in good condition.

Gymnasium fixtures have 150-watt high bay LED fixtures controlled using manual switches. Most exit signs are LED, although there are a few CFL units. Interior lighting levels were generally sufficient.

Exterior lighting for the school includes 150-watt LED wall pack fixtures and 13-watt LED screw-in lamps. The wall pack fixtures are on a timeclock, and the screw-in lamp fixtures are controlled using wall switches.

The portable classrooms also have a few 4-foot 2 lamp T8 linear fixtures that are controlled using occupancy sensors.



T8 Fixtures



T8 Fixtures

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators provide heating only to the zones. They are equipped with supply fan motors, pneumatically controlled outside air dampers, and fan coil valves. This system is original to the building and appears to be in fair operating condition.

Packaged Units and Air Conditioners

The portable classroom has a packaged unit that provides electrical heating and cooling. For analytical purposes, the capacities are assumed for this unit as the data was not available on site. We assumed a 3-ton cooling capacity and a heating unit of 5 kW. This unit is old and has been evaluated for replacement.

Other spaces, including offices and classrooms, are cooled with 1.5-ton window AC units. These units are fairly new, have an EER of 10.8, and are in good condition. Because all areas were not accessible at the time of the site visit, we have estimated there to be 18 units. The temperatures are controlled locally at the units.



AC Window Unit

2.6 Heating Hot Water Systems

Space heating is provided using two gas-fired EASCO non-condensing hot water boilers, each with an output capacity of 2876 MBh and a heating efficiency of 83%. The boilers are configured in a lead-lag control scheme. The hot water is circulated using two constant speed 5 hp pumps. Installed in the year 2007, the boilers are in good condition and maintained well.

The heat is distributed to the end uses through heating and ventilating units in the multipurpose rooms and through unit ventilators in the classrooms.

The temperatures in the spaces can be adjusted by the facility contacts within a narrow deadband. The space temperature ranges are set by the HVAC controls company.



Boiler



Heating Hot Water Pumps



Unit Ventilators



Boiler Draft Fan

2.7 Domestic Hot Water

Hot water is produced with a gas-fired tank hot water heater. We have estimated the unit to have an input capacity of 70 MBh and a tank capacity of 50 gallons.

The water is circulated to the end uses in the facility using fractional horsepower pumps. The water heater is assumed to be within the useful life of the equipment as the exact age is unknown.

2.8 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 1% percent of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area, as well as Energy Efficient Best Practices.

There are approximately 13 computer work stations throughout the school. Plug loads throughout the building include general café and office equipment.

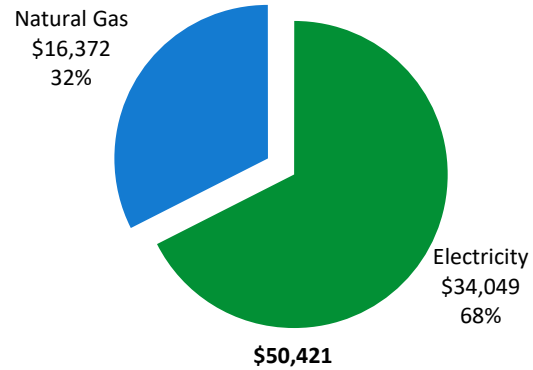
2.9 Water-Using Systems

Faucet flow rates are at 2.2 gallons per minute (gpm) or lower. Toilets are rated at 1.6 gallons per flush (gpf) and urinals are rated at 1.0 gpf.

3 ENERGY USE AND COSTS

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

Utility Summary		
Fuel	Usage	Cost
Electricity	161,360 kWh	\$34,049
Natural Gas	17,558 Therms	\$16,372
Total		\$50,421



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

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

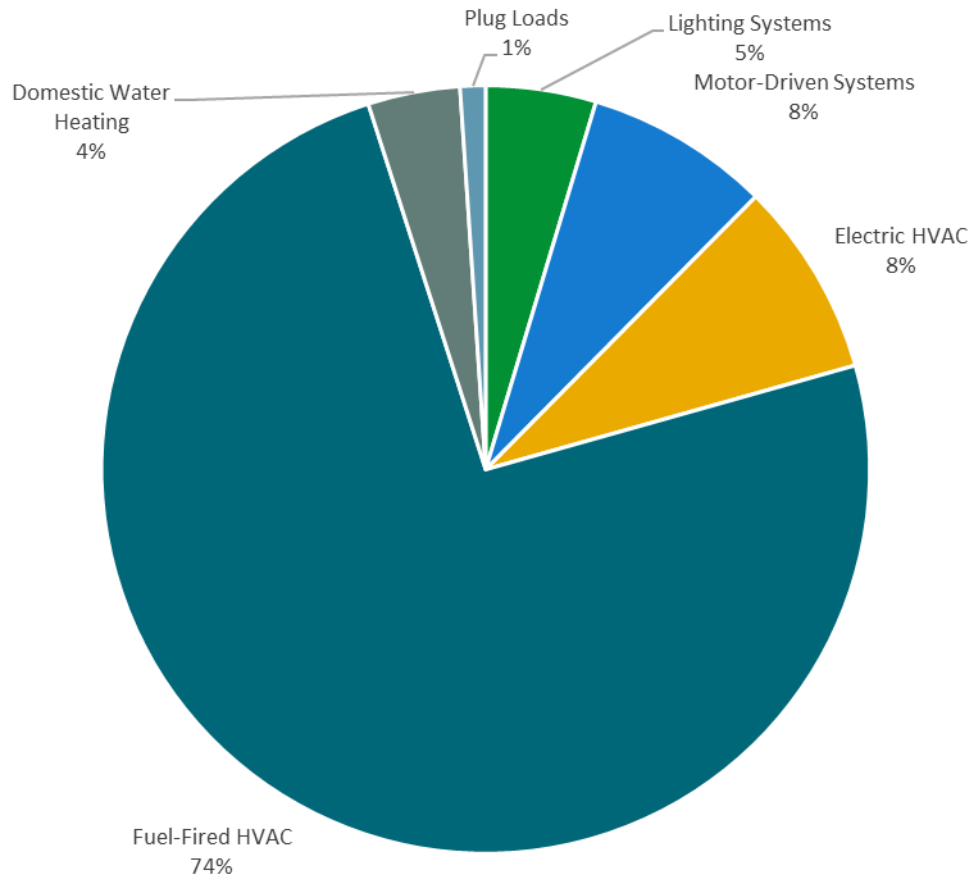
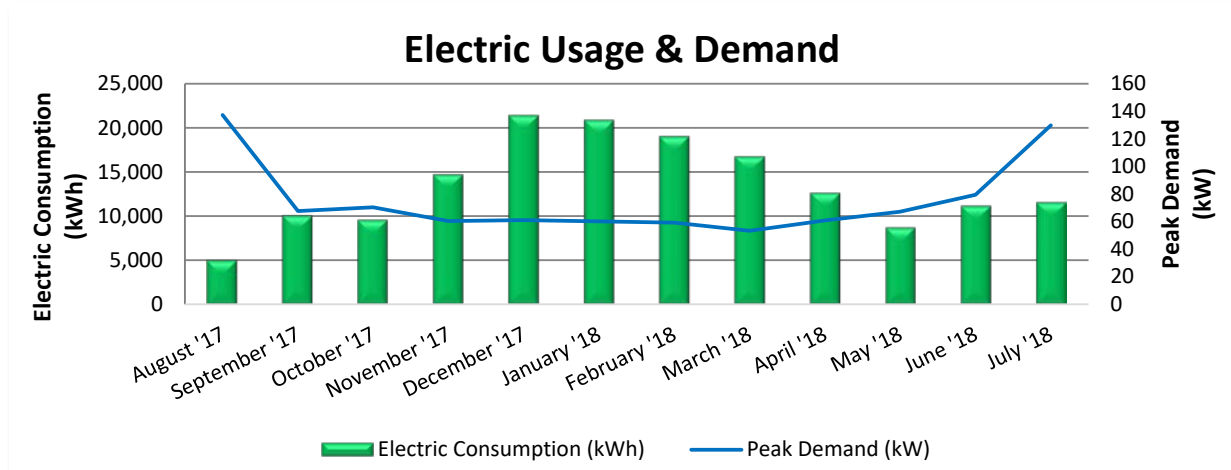


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class GLP, with electric production provided by a third-party supplier.



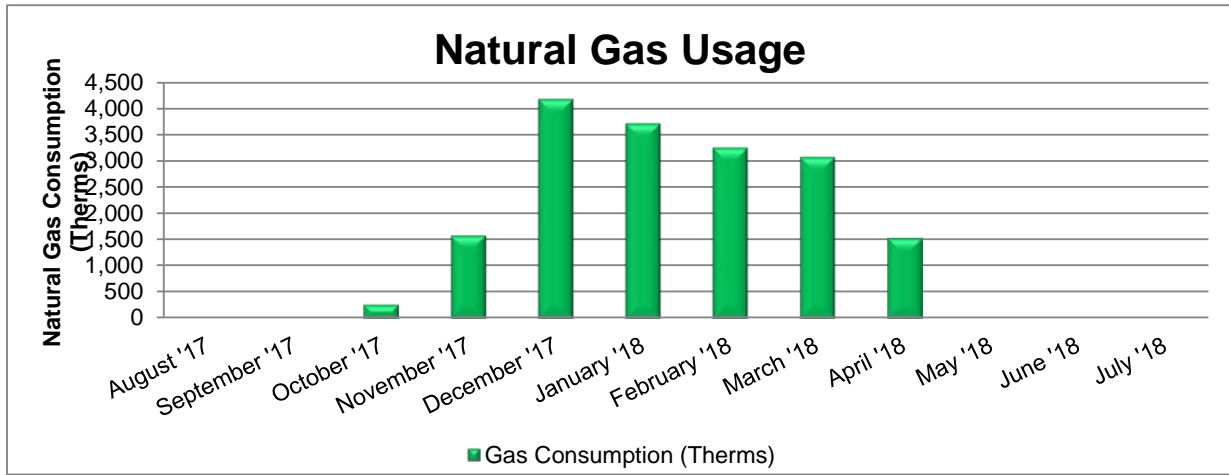
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
8/31/17	30	5,012	137	\$620	\$3,905
10/2/17	32	10,120	68	\$309	\$2,506
10/31/17	29	9,590	70	\$322	\$1,773
12/1/17	31	14,741	60	\$276	\$2,369
1/3/18	33	21,412	61	\$279	\$3,291
2/1/18	29	20,909	60	\$274	\$3,181
3/5/18	32	19,050	59	\$270	\$3,005
4/4/18	30	16,765	53	\$244	\$2,713
5/3/18	29	12,676	61	\$263	\$2,280
6/4/18	32	8,730	67	\$291	\$1,964
7/2/18	28	11,207	80	\$345	\$2,797
8/2/18	31	11,590	130	\$562	\$4,360
Totals	366	161,802	137	\$4,056	\$34,143
Annual	365	161,360	137	\$4,044	\$34,049

Notes:

- Peak demand of 137 kW occurred in August '17. There is a sudden peaking in the months of July and August that show as estimated readings in the original bills. These might be faulty readings and need to be verified.
- The average electric cost over the past 12 months was \$0.211/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

PSE&G delivers natural gas under rate class GSG, with natural gas supply provided by a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
8/31/17	30	0	\$239
10/2/17	32	0	\$119
10/31/17	29	267	\$286
12/1/17	31	1,584	\$1,766
1/3/18	33	4,177	\$3,699
2/1/18	29	3,712	\$3,250
3/5/18	32	3,252	\$3,169
4/4/18	30	3,076	\$2,298
5/3/18	29	1,538	\$1,159
6/4/18	32	0	\$157
7/3/18	29	0	\$131
8/2/18	30	0	\$144
Totals	366	17,607	\$16,417
Annual	365	17,558	\$16,372

Notes:

- The average gas cost for the past 12 months is \$0.932/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 county, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

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

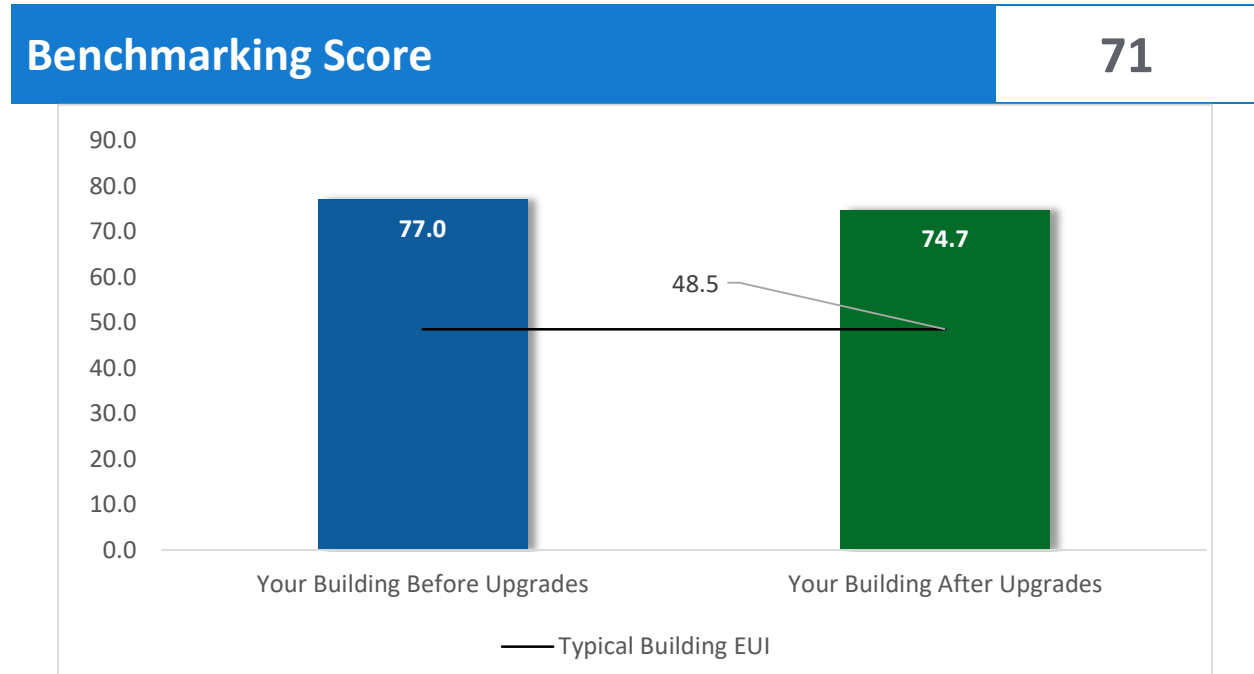


Figure 6 - Energy Use Intensity Comparison

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

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

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 website³.

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

4 ENERGY CONSERVATION MEASURES

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

Calculations of energy use and savings are based on the current version of *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

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

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

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		2,825	0.8	-1	\$591	\$1,877	\$211	\$1,666	2.8	2,776
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,119	0.3	0	\$234	\$924	\$90	\$834	3.6	1,100
ECM 2	Retrofit Fixtures with LED Lamps	1,513	0.5	0	\$316	\$663	\$121	\$542	1.7	1,487
ECM 3	Install LED Exit Signs	193	0.0	0	\$40	\$290	\$0	\$290	7.2	189
Lighting Control Measures		7,678	2.3	-2	\$1,605	\$10,460	\$1,320	\$9,140	5.7	7,545
ECM 4	Install Occupancy Sensor Lighting Controls	6,992	2.1	-1	\$1,462	\$9,760	\$1,230	\$8,530	5.8	6,870
ECM 5	Install Daylight Dimming Controls	45	0.0	0	\$10	\$250	\$90	\$160	16.7	46
ECM 6	Install High/Low Lighting Controls	641	0.2	0	\$134	\$450	\$0	\$450	3.4	630
Variable Frequency Drive (VFD) Measures		10,153	1.2	0	\$2,142	\$8,152	\$0	\$8,152	3.8	10,224
ECM 7	Install VFDs on Heating Water Pumps	10,153	1.2	0	\$2,142	\$8,152	\$0	\$8,152	3.8	10,224
Electric Unitary HVAC Measures		2,629	1.4	0	\$555	\$13,614	\$552	\$13,062	23.5	2,647
ECM 8	Install High Efficiency Air Conditioning Units	2,629	1.4	0	\$555	\$13,614	\$552	\$13,062	23.5	2,647
TOTALS		23,285	5.8	-2	\$4,893	\$34,103	\$2,083	\$32,020	6.5	23,192

* - 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		2,825	0.8	-1	\$591	\$1,877	\$211	\$1,666	2.8	2,776
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,119	0.3	0	\$234	\$924	\$90	\$834	3.6	1,100
ECM 2	Retrofit Fixtures with LED Lamps	1,513	0.5	0	\$316	\$663	\$121	\$542	1.7	1,487
ECM 3	Install LED Exit Signs	193	0.0	0	\$40	\$290	\$0	\$290	7.2	189
Lighting Control Measures		7,633	2.3	-2	\$1,596	\$10,210	\$1,230	\$8,980	5.6	7,499
ECM 4	Install Occupancy Sensor Lighting Controls	6,992	2.1	-1	\$1,462	\$9,760	\$1,230	\$8,530	5.8	6,870
ECM 6	Install High/Low Lighting Controls	641	0.2	0	\$134	\$450	\$0	\$450	3.4	630
Variable Frequency Drive (VFD) Measures		10,153	1.2	0	\$2,142	\$8,152	\$0	\$8,152	3.8	10,224
ECM 7	Install VFDs on Heating Water Pumps	10,153	1.2	0	\$2,142	\$8,152	\$0	\$8,152	3.8	10,224
TOTALS		20,611	4.4	-2	\$4,329	\$20,239	\$1,441	\$18,798	4.3	20,499

* - 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		2,825	0.8	-1	\$591	\$1,877	\$211	\$1,666	2.8	2,776
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,119	0.3	0	\$234	\$924	\$90	\$834	3.6	1,100
ECM 2	Retrofit Fixtures with LED Lamps	1,513	0.5	0	\$316	\$663	\$121	\$542	1.7	1,487
ECM 3	Install LED Exit Signs	193	0.0	0	\$40	\$290	\$0	\$290	7.2	189

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

ECM 1: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected building areas: all areas with fluorescent fixtures with T12 tubes.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent, CFL, 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 direct replacements for most other lighting technologies.

This measure saves energy by installing LEDs, which use less power than other lighting technologies while providing 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.

ECM 3: Install LED Exit Signs

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

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Control Measures		7,678	2.3	-2	\$1,605	\$10,460	\$1,320	\$9,140	5.7	7,545
ECM 4	Install Occupancy Sensor Lighting Controls	6,992	2.1	-1	\$1,462	\$9,760	\$1,230	\$8,530	5.8	6,870
ECM 5	Install Daylight Dimming Controls	45	0.0	0	\$10	\$250	\$90	\$160	16.7	46
ECM 6	Install High/Low Lighting Controls	641	0.2	0	\$134	\$450	\$0	\$450	3.4	630

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

ECM 4: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected building areas: offices, classrooms, multipurpose room, library, restrooms, and storage rooms.

ECM 5: Install Daylight Shut Off Controls

Install daylight shut off controls that use photosensors to reduce electric lighting in areas when ample daylight lighting is present. Use photosensor controls for fixtures serving areas that are lit by sunlight. As sunlight levels increase in the room, artificial lighting decreases or turns off.

This measure reduces energy use in spaces where ambient daylight provides sufficient lighting levels.

Affected building areas: exterior fixtures currently subject to manual switching controls.

ECM 6: Install High/Low Lighting Controls

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

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

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

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

Affected building areas: hallways.

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 ₂ e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		10,153	1.2	0	\$2,142	\$8,152	\$0	\$8,152	3.8	10,224
ECM 7	Install VFDs on Heating Water Pumps	10,153	1.2	0	\$2,142	\$8,152	\$0	\$8,152	3.8	10,224

VFDs 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.

ECM 7: Install VFDs on Heating Water Pumps

Install VFDs to control heating water pumps. Two-way valves must serve the hot water coils and the hot water loop must have a differential pressure sensor installed. If a bypass leg or three-way valves are used in the hot water distribution, they will need to be modified when this measure is implemented. As the hot water valves close, the differential pressure increases and the VFD modulates the pump speed to maintain a differential pressure setpoint.

Energy savings result from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

Affected pumps: two 5 hp heating hot water pumps.

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 ₂ e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		2,629	1.4	0	\$555	\$13,614	\$552	\$13,062	23.5	2,647
ECM 8	Install High Efficiency Air Conditioning Units	2,629	1.4	0	\$555	\$13,614	\$552	\$13,062	23.5	2,647

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 the school are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high-efficiency unit can be justified by the marginal savings from the improved efficiency. When the equipment name is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 8: Install High-Efficiency Air Conditioning Units

Replace standard-efficiency packaged air conditioning units in the portable buildings with high-efficiency packaged air conditioning units. Consider electing heat pump models, which will provide heating more efficiently than standing electric resistance configurations. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high-efficiency unit, average cooling load, and estimated annual operating hours.

5 ENERGY EFFICIENT BEST PRACTICES

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

Energy Tracking with ENERGY STAR® Portfolio Manager®



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

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.

Thermostat Schedules and Temperature Resets



Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

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.

Boiler Maintenance

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

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

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

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.

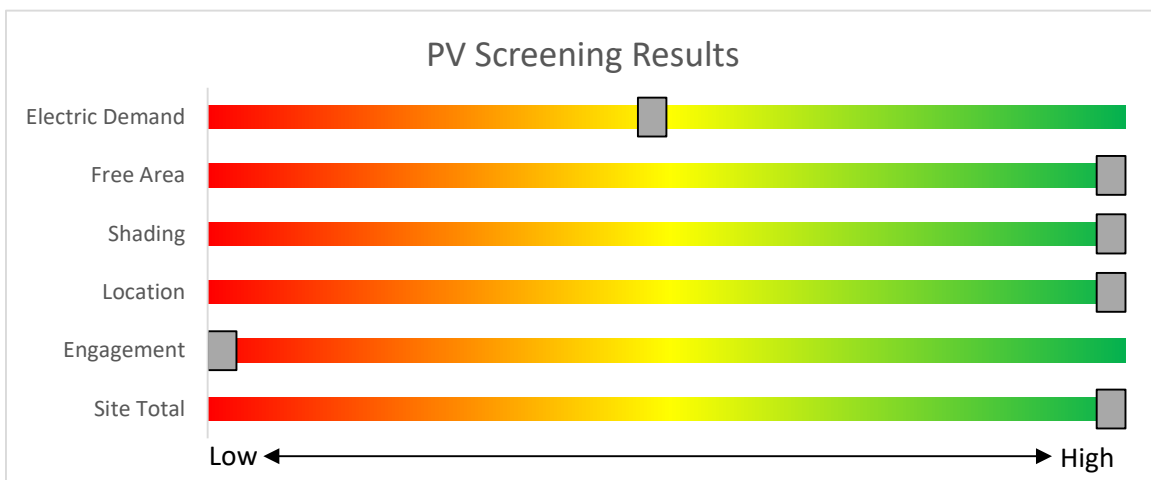
6.1 Solar Photovoltaic

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	76	kW DC STC
Electric Generation	90,545	kWh/yr
Displaced Cost	\$19,110	/yr
Installed Cost	\$197,600	

Figure 9 - Photovoltaic Screening

Solar Renewable Energy Credit (SREC) Registration Program

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

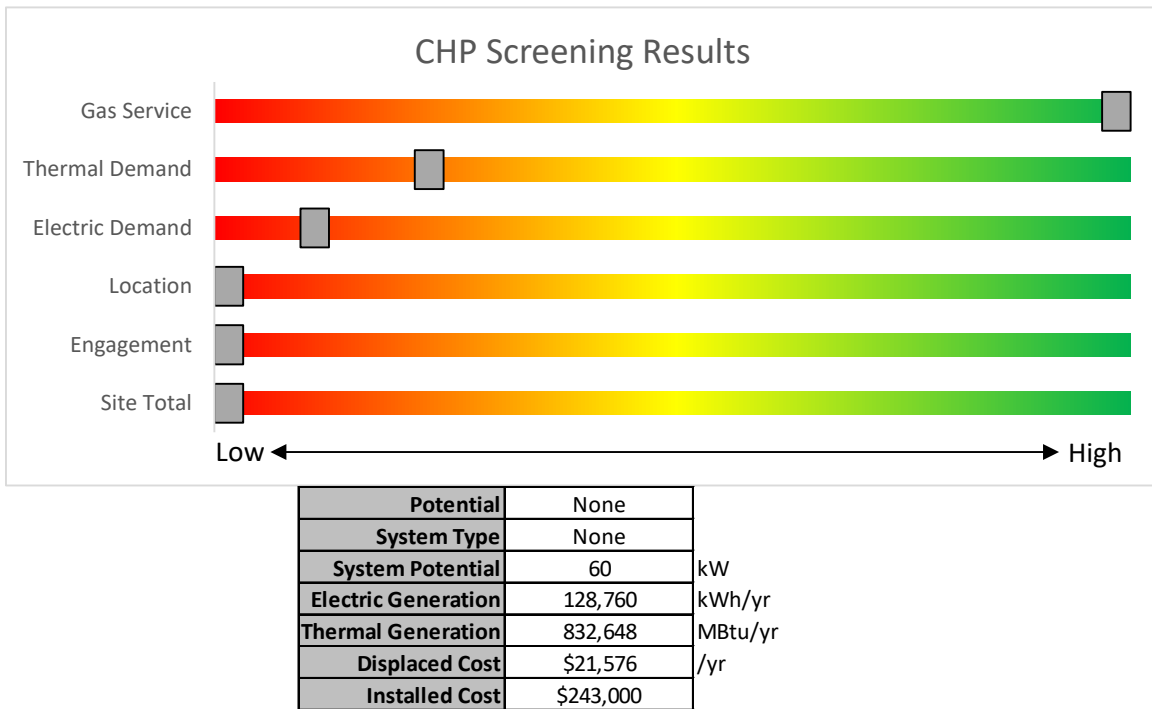


Figure 10 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

	SmartStart <i>Flexibility to install at your own pace</i>	Direct Install <i>Turnkey installation</i>	Pay for Performance <i>Whole building upgrades</i>
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.
<p>Take the next step by visiting www.njcleanenergy.com for program details, applications, and to contact a qualified contractor.</p>			

7.1 SmartStart



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

SmartStart routinely adds, removes, or modifies incentives from year-to-year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers

Electric Unitary HVAC

Gas Cooling

Gas Heating

Gas Water Heating

Ground Source Heat Pumps

Lighting

Lighting Controls

Refrigeration Doors

Refrigeration Controls

Refrigerator/Freezer Motors

Food Service Equipment

Variable Frequency Drives

Incentives

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

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at \$0.16/kWh and \$1.60/therm based on estimated annual savings. Incentives are capped at 50% of the total installed incremental project cost, or a project cost buy down to a one-year payback (whichever is less). Program incentives are capped at \$500,000 per electric account and \$500,000 per natural gas account, per fiscal year.

How to Participate

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

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

7.2 Direct Install



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

installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

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

How to Participate

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

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

7.3 Pay for Performance - Existing Buildings



Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings. P4P is a generally a good option for medium-to-large sized facilities looking to implement as many

measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

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

Incentives

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

How to Participate

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

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

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

7.4 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	>3 MW	\$350		
	Fuel Cells with Heat Recovery	>3 MW	\$350		
Waste Heat to Power*	<1 MW	\$1,000	30%	\$2 million	
	> 1MW	\$500		\$3 million	

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

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

How to Participate

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

7.5 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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

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

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

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

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

7.6 SREC Registration Program

The SREC Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey SRECs. SREC's are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SREC's to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

8.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website⁵.

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 website⁶.

⁵ www.state.nj.us/bpu/commercial/shopping.html.

⁶ www.state.nj.us/bpu/commercial/shopping.html

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	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	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	2,160	4	None	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,490	0.0	85	0	\$18	\$270	\$35	13.2
Storage office	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.0	85	0	\$18	\$116	\$0	6.5
Storage office	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.0	85	0	\$18	\$116	\$0	6.5
Storage	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.0	128	0	\$27	\$116	\$0	4.3
Exit	2	Exit Signs: Fluorescent	None		11	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	96	0	\$20	\$145	\$0	7.2
Stairway	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160		None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Hallway	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	6	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,490	0.0	85	0	\$18	\$225	\$0	12.6
Exit	2	Exit Signs: Fluorescent	None		11	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	96	0	\$20	\$145	\$0	7.2
Trailers 100A	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	1,490		None	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	0	0	\$0	\$0	\$0	0.0
Trailers 100B	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	1,490		None	No	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	0	0	\$0	\$0	\$0	0.0
Restroom 100A	1	Compact Fluorescent: Screw-in - 2 lamps	Occupancy Sensor	S	46	1,490	2	Relamp	No	1	LED Lamps: Screw-in 2 lamps	Occupancy Sensor	32	1,490	0.0	23	0	\$5	\$34	\$2	6.9
Restroom 100B	1	Compact Fluorescent: Screw-in - 2 lamps	Occupancy Sensor	S	46	1,490	2	Relamp	No	1	LED Lamps: Screw-in 2 lamps	Occupancy Sensor	32	1,490	0.0	23	0	\$5	\$34	\$2	6.9
CR 101	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,160	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.3	898	0	\$188	\$599	\$125	2.5
CR 102	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$540	\$70	5.8
CR 103	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	342	0	\$71	\$540	\$70	6.6
CR 103	1	Incandescent: Screw-in - 1 Lamp	Wall Switch	S	60	2,160	2	Relamp	No	1	LED Lamps: Screw-in 1 lamp	Wall Switch	9	2,160	0.0	121	0	\$25	\$17	\$1	0.6
Faculty room	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.0	85	0	\$18	\$270	\$35	13.2
Faculty room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Faculty room	2	Incandescent: Screw-in - 1 Lamp	Wall Switch	S	60	2,160	2, 4	Relamp	Yes	2	LED Lamps: Screw-in 1 lamp	Occupancy Sensor	9	1,490	0.1	256	0	\$53	\$34	\$2	0.6
Hallway	13	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	6	None	Yes	13	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,490	0.2	555	0	\$116	\$225	\$0	1.9
CR 106	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	342	0	\$71	\$540	\$70	6.6
Speech room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	43	0	\$9	\$116	\$20	10.7
Restroom	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.1	171	0	\$36	\$270	\$35	6.6
Restroom	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.1	171	0	\$36	\$270	\$35	6.6
Stairway	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,160	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,160	0.0	138	0	\$29	\$145	\$20	4.3

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	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
Exit	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
CR 109	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$270	\$35	2.9
CR 109	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	2,160	4	None	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,490	0.0	11	0	\$2	\$0	\$0	0.0
CR 111	10	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	S	46	2,160	1, 4	Relamp & Reballast	Yes	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,490	0.3	855	0	\$179	\$775	\$85	3.9
CR 111	1	Incandescent: Screw-in - 1 Lamp	Wall Switch	S	60	2,160	2, 4	Relamp	Yes	1	LED Lamps: Screw-in 1 lamp	Occupancy Sensor	9	1,490	0.0	128	0	\$27	\$17	\$1	0.6
Sensory room	2	LED Lamps: Screw-in - 1 Lamp	Wall Switch	S	13	2,160	4	None	Yes	2	LED Lamps: Screw-in - 1 Lamp	Occupancy Sensor	13	1,490	0.0	19	0	\$4	\$116	\$20	24.0
CR 110	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	2,160		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Stage	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160		None	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Stage	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
Multipurpose room	12	LED - Fixtures: High-Bay	Wall Switch	S	150	2,160	4	None	Yes	12	LED - Fixtures: High-Bay	Occupancy Sensor	150	1,490	0.4	1,326	0	\$277	\$540	\$70	1.7
Multipurpose room	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
Stairway	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160		None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Main office	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	85	0	\$18	\$270	\$35	13.2
Conference room	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	85	0	\$18	\$270	\$35	13.2
Main office	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	128	0	\$27	\$270	\$35	8.8
Main office	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	2,160		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Main office	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160		None	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,160	0.0	0	0	\$0	\$0	\$0	0.0
CR 209	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$540	\$70	5.8
CR 208	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	342	0	\$71	\$540	\$70	6.6
Hallway	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160		None	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,160	0.0	0	0	\$0	\$0	\$0	0.0
Stairway	4	U-Bend Fluorescent - T12: UT12 (34W) - 2L	Wall Switch	S	72	2,160	1	Relamp & Reballast	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,160	0.1	371	0	\$77	\$419	\$40	4.9
Exterior	2	LED Lamps: Screw-in - 1 Lamp	Wall Switch		13	4,368	5	None	Yes	2	LED Lamps: Screw-in - 1 Lamp	Daylight Dimming	13	2,621	0.0	45	0	\$10	\$250	\$90	16.7
CR 207	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	299	0	\$63	\$540	\$70	7.5
CR 206	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$540	\$70	5.8
CR 205	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.0	43	0	\$9	\$270	\$35	26.3

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	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
CR 204	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	2,160	4	None	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,490	0.0	85	0	\$18	\$270	\$35	13.2
CR 204	1	Compact Fluorescent: Screw-in - 2 Lamps	Wall Switch	S	26	2,160	2, 4	Relamp	Yes	1	LED Lamps: Screw-in 2 Lamps	Occupancy Sensor	18	1,490	0.0	32	0	\$7	\$34	\$2	4.9
CR 204	1	Incandescent: Screw-in - 1 Lamp	Wall Switch	S	60	2,160	2, 4	Relamp	Yes	1	LED Lamps: Screw-in 1 lamp	Occupancy Sensor	9	1,490	0.0	128	0	\$27	\$17	\$1	0.6
Hallway	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160		None	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,160	0.0	0	0	\$0	\$0	\$0	0.0
CR 203	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$540	\$70	5.8
CR 202	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$540	\$70	5.8
CR 201	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,160	4	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,490	0.1	384	0	\$80	\$540	\$70	5.8
Exterior	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		150	4,368		None	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	150	4,368	0.0	0	0	\$0	\$0	\$0	0.0

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions							Proposed Conditions				Energy Impact & Financial Analysis							
		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
Boiler room	Boiler	2	Heating Hot Water Pump	5.0	84.0%	No	W	2,745	7	No	89.5%	Yes	2	1.2	10,153	0	\$2,142	\$8,152	\$0	3.8
Classrooms	Classrooms	20	Supply Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Roof	All school	8	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler room	DHW	1	Water Supply Pump	0.1	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Attic	Gym	1	Supply Fan	2.0	84.0%	No	W	2,745		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Attic	Gym	1	Return Fan	0.8	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler room	Boiler	2	Combustion Air Fan	1.5	60.0%	No		2,745		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Trailer	Trailer	2	Supply Fan	0.5	78.0%	No		2,745		No	78.0%	No		0.0	0	0	\$0	\$0	\$0	0.0

Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis					
		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
Classrooms	Classrooms	20	Window AC	1.50		W		No						0.0	0	0	\$0	\$0	\$0	0.0
Trailer	Trailer	2	Packaged AC	3.00		B	8	Yes	2	Packaged AC	3.00		14.00	1.4	2,629	0	\$555	\$13,614	\$552	23.5
Trailer	Trailer	2	Electric Resistance Heat		17.06	B		No						0.0	0	0	\$0	\$0	\$0	0.0

Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis					
		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	All school	2	Non-Condensing Hot Water Boiler	2,876.00	W		No						0.0	0	0	\$0	\$0	\$0	0.0

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis					
		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	Restrooms and kitchen	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	\$0	\$0	\$0	0.0

Commercial Refrigerator/Freezer Inventory & Recommendations

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

Plug Load Inventory

Existing Conditions				
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Bergen Boulevard School	13	Desktop Computer	145.0	Yes
Bergen Boulevard School	3	Printer - Medium	60.0	Yes
Bergen Boulevard School	1	Printer - Large	200.0	Yes
Bergen Boulevard School	1	Coffee	400.0	Yes
Bergen Boulevard School	3	Microwave	900.0	Yes
Bergen Boulevard School	2	Toaster	1,200.0	Yes
Bergen Boulevard School	10	Chrome book carts	40.0	Yes
Bergen Boulevard School	2	Refrigerator	100.0	Yes

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®
Score¹

Bergen Boulevard School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 29,954
Built: 1923

For Year Ending: July 31, 2018
Date Generated: May 20, 2019

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

Property & Contact Information		
Property Address Bergen Boulevard School 635 Bergen Boulevard Ridgefield, New Jersey 07657	Property Owner Ridgefield Board of Education 555 Chestnut Street Bergen, NJ 7657 () -	Primary Contact Julyana Ortiz 555 Chestnut Street Bergen, NJ 7657 201-945-7747 JOrtiz@ridgefieldschools.com
Property ID: 6787869		

Energy Consumption and Energy Use Intensity (EUI)			
Site EUI	Annual Energy by Fuel		National Median Comparison
77.2 kBtu/ft ²	Electric - Grid (kBtu)	550,948 (24%)	National Median Site EUI (kBtu/ft ²) 95.9
	Natural Gas (kBtu)	1,760,655 (76%)	National Median Source EUI (kBtu/ft ²) 140.7
			% Diff from National Median Source EUI -20%
Source EUI			Annual Emissions
113.2 kBtu/ft ²			Greenhouse Gas Emissions (Metric Tons CO ₂ e/year) 149

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

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Professional Engineer Stamp (if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is \$22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
Btu	<i>British thermal unit</i> : 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	<i>Combined heat and power</i> . Also referred to as cogeneration.
COP	<i>Coefficient of performance</i> : 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	<i>Demand control ventilation</i> : a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need.
US DOE	<i>United States Department of Energy</i>
EC Motor	<i>Electronically commutated motor</i>
ECM	<i>Energy conservation measure</i>
EER	<i>Energy efficiency ratio</i> : a measure of efficiency in terms of cooling energy provided divided by electric input.
EUI	<i>Energy Use Intensity</i> : 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	<i>United States Environmental Protection Agency</i>
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
GHG	<i>Greenhouse gas</i> : 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	<i>Gallons per flush</i>

gpm	<i>Gallon per minute</i>
HID	<i>High intensity discharge</i> : high-output lighting lamps such as high-pressure sodium, metal halide, and mercury vapor.
hp	<i>Horsepower</i>
HPS	<i>High-pressure sodium</i> : a type of HID lamp.
HSPF	<i>Heating seasonal performance factor</i> : a measure of efficiency typically applied to heat pumps. Heating energy provided divided by seasonal energy input.
HVAC	<i>Heating, ventilating, and air conditioning</i>
IHP 2014	US DOE Integral Horsepower rule. The current ruling regarding required electric motor efficiency.
IPLV	<i>Integrated part load value</i> : a measure of the part load efficiency usually applied to chillers.
kBtu	One thousand British thermal units
kW	<i>Kilowatt</i> : equal to 1,000 Watts.
kWh	<i>Kilowatt-hour</i> : 1,000 Watts of power expended over one hour.
LED	<i>Light emitting diode</i> : a high-efficiency source of light with a long lamp life.
LGEA	<i>Local Government Energy Audit</i>
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	<i>Metal halide</i> : a type of HID lamp.
MBh	<i>Thousand Btu per hour</i>
MBtu	<i>One thousand British thermal units</i>
MMBtu	<i>One million British thermal units</i>
MV	<i>Mercury Vapor</i> : a type of HID lamp.
NJBPU	<i>New Jersey Board of Public Utilities</i>
NJCEP	<i>New Jersey's Clean Energy Program</i> : 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	<i>Photovoltaic</i> : refers to an electronic device capable of converting incident light directly into electricity (direct current).

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