Local Government Energy Audit Report

Billingsport Early Childhood Center

April 15, 2022

Prepared for:
Paulsboro Public Schools
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Disclaimer

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

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

TRC bases estimated material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on selected products and installers. TRC and NJBPU do not guarantee cost estimates and shall in no event be held liable should actual installed costs vary from these material and labor estimates.

Incentive values provided in this report are estimated based of previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility 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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ENERGY EFFICIENCY INCENTIVE & REBATE TRANSITION

For the purposes of your LGEA, estimated incentives and rebates are included as placeholders for planning purposes. New Jersey utilities are rolling out their own energy efficiency programs, which your project may be eligible for depending on individual measures, quantities, and size of the building.

In 2018, Governor Murphy signed into law the landmark legislation known as the Clean Energy Act. The law called for a significant overhaul of New Jersey's clean energy systems by building sustainable infrastructure in order to fight climate change and reduce carbon emissions, which will in turn create well-paying local jobs, grow the state's economy, and improve public health while ensuring a cleaner environment for current and future residents.

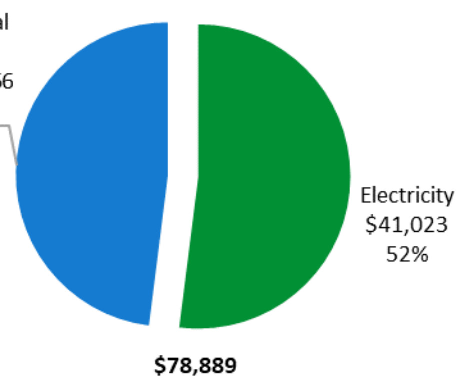
These next generation energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and incentives directly to customers like you. NJCEP will still offer programs for new construction, renewable energy, the Energy Savings Improvement Program (ESIP), and large energy users.

New utility programs are under development. Keep up to date with developments by visiting the NJCEP website.

1 Executive Summary

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $78,889 Electricity: 261,000 kWh Natural Gas: 29,692 Therms	
ENERGY STAR® Benchmarking Score	8 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

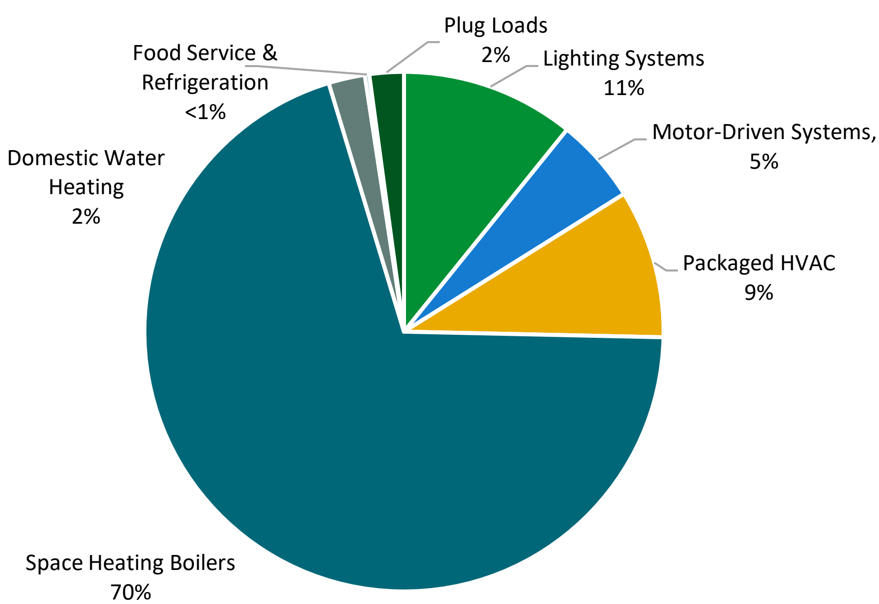


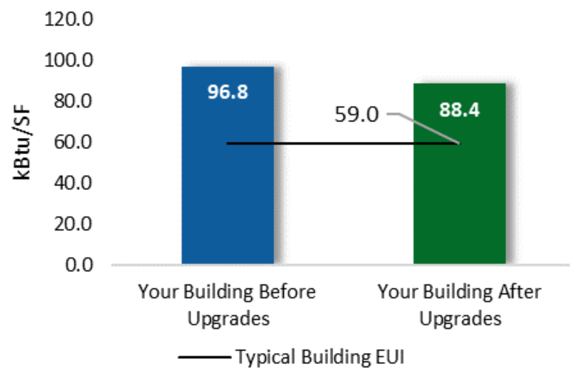
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

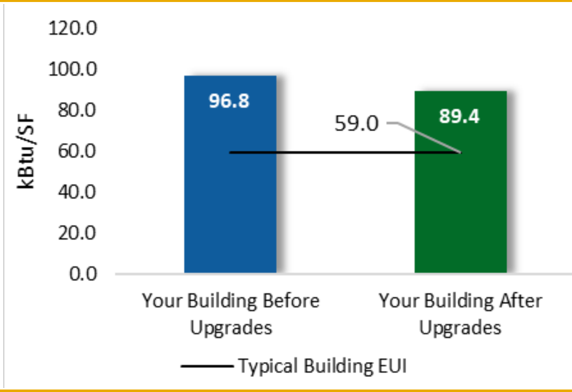
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$103,115
Potential Rebates & Incentives[1]	$10,697
Annual Cost Savings	$15,032
Annual Energy Savings	Electricity: 94,568 kWh Natural Gas: 132 Therms
Greenhouse Gas Emission Savings	48 Tons
Simple Payback	6.1 Years
Site Energy Savings (All Utilities)	9%



Scenario 2: Cost Effective Package[2]

Installation Cost	$37,853
Potential Rebates & Incentives	$6,262
Annual Cost Savings	$14,291
Annual Energy Savings	Electricity: 92,328 kWh Natural Gas: -173 Therms
Greenhouse Gas Emission Savings	45 Tons
Simple Payback	2.2 Years
Site Energy Savings (all utilities)	8%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on previously run state rebate programs. Contact your utility provider for current program incentives that may apply.

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**62,973**	**9.8**	**-13**	**$9,730**	**$17,942**	**$4,870**	**$13,072**	**1.3**	**61,871**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	62,973	9.8	-13	$9,730	$17,942	$4,870	$13,072	1.3	61,871
Lighting Control Measures			**19,930**	**3.1**	**-4**	**$3,079**	**$7,254**	**$985**	**$6,269**	**2.0**	**19,581**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	19,930	3.1	-4	$3,079	$7,254	$985	$6,269	2.0	19,581
Motor Upgrades			**1,732**	**0.4**	**0**	**$272**	**$5,156**	**$0**	**$5,156**	**18.9**	**1,744**
ECM 3	Premium Efficiency Motors	No	1,732	0.4	0	$272	$5,156	$0	$5,156	18.9	1,744
Variable Frequency Drive (VFD) Measures			**7,462**	**0.9**	**0**	**$1,173**	**$12,542**	**$350**	**$12,192**	**10.4**	**7,514**
ECM 4	Install VFDs on Heating Water Pumps	Yes	7,462	0.9	0	$1,173	$12,542	$350	$12,192	10.4	7,514
Unitary HVAC Measures			**508**	**0.6**	**0**	**$80**	**$5,831**	**$201**	**$5,630**	**70.4**	**512**
ECM 5	Install High Efficiency Air Conditioning Units	No	508	0.6	0	$80	$5,831	$201	$5,630	70.4	512
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**30**	**$389**	**$54,275**	**$4,234**	**$50,042**	**128.7**	**3,570**
ECM 6	Install High Efficiency Hot Water Boilers	No	0	0.0	30	$389	$54,275	$4,234	$50,042	128.7	3,570
Domestic Water Heating Upgrade			**1,963**	**0.0**	**0**	**$308**	**$115**	**$57**	**$57**	**0.2**	**1,976**
ECM 7	Install Low-Flow DHW Devices	Yes	1,963	0.0	0	$308	$115	$57	$57	0.2	1,976
TOTALS (COST EFFECTIVE MEASURES)			**92,328**	**13.9**	**-17**	**$14,291**	**$37,853**	**$6,262**	**$31,591**	**2.2**	**90,943**
TOTALS (ALL MEASURES)			**94,568**	**14.9**	**13**	**$15,032**	**$103,115**	**$10,697**	**$92,418**	**6.1**	**96,770**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - 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 breakout 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

Utility-run energy efficiency programs, such as 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.

For details on these programs please visit New Jersey's Clean Energy Program website or contact your utility provider.

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 and Power (CHP)

The CHP program provides incentives for combined heat and power (i.e., 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.

Successor Solar Incentive Program (SuSI)

New Jersey is committed to supporting solar energy. Solar projects help the state reach the renewable goals outlined in the state's Energy Master Plan. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available, but certified solar projects are able to earn one SREC II (Solar Renewable Energy Certificates II) for each megawatt-hour of solar electricity produced from a qualifying solar facility.

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.

Large Energy User Program (LEUP)

LEUP designed to promote self-investment in energy efficiency and combined heat and power or fuel cell projects. It incentivizes owners/users of buildings to upgrade or install energy conserving measures in existing buildings to help offset the capital costs associated with the project. The efficiency upgrades are customized to meet the requirements of the customers' existing facilities, while advancing the State's energy efficiency, conservation, and greenhouse gas reduction goals.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Billingsport Early Childhood Center. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

2.1 Site Overview

On January 19, 2022, TRC performed an energy audit at Billingsport Early Childhood Center located in Paulsboro, New Jersey. TRC met with John Swanson to review the facility operations and help focus our investigation on specific energy-using systems.

Billingsport Early Childhood Center, located at 441 Naussau Avenue, Paulsboro, New Jersey, is a multi-story, 39,863 square foot building built in 1923. The school serves pre-school to 2nd grade children from Paulsboro. The facility spaces include classrooms, multipurpose room, offices, corridors, stairwells, ballrooms, and basement mechanical space.

Facility lighting consists mainly of 32-Watt T8 fluorescent fixtures and LED fixtures. The building is fully conditioned; heated mostly by two aging Lochinvar non-condensing hot water boilers and cooled by window, split systems and packaged unit air conditioners.

Recent improvements and Facility Concerns

The facility has recently completed a lighting system upgrade to use LED sources. However, this work was completed after the period corresponding to the baseline utility period used in this report. For the purpose of this analysis and to properly balance usage against historical data, we have entered information for the lighting system that corresponds to the baseline electric billing period, mainly T8 fluorescent lamps. As such, you likely already achieved most of the project savings for the lighting upgrade measures, ECM 1 and ECM 2.

The facility is interested in replacing the old unit ventilators and some older roof mounted exhaust fans that serve the boys and girl's bathrooms.

Facility concerns include old HVAC and high electric bills.

2.2 Building Occupancy

The school operates on a 10-month schedule from September to June. The multi-purpose room is used after classes for sports and other events. The entire facility is shut down at approximately 11:00 PM after the cleaning process is completed.

During a typical day, the facility is occupied by 362 students, with a student-teacher ratio of 14 to 1. It should be noted that the energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary based on changes to building use patterns.

Building Name	Weekday/Weekend	Operating Schedule
Billingsport ECC-General Operating	Weekday	5:30 AM -11:00 PM
Billingsport ECC-Classes Hours	Weekday	7:00 AM- 3:00PM
	Sunday	Closed

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete masonry units (CMU) over structural steel with a brick façade, with a gypsum drywall painted CMU interior finish. The building walls are in good condition. The original building has a flat shingle roof supported with steel trusses. The 1999 addition has flat roof sections supported by wood trusses, with a wood deck covered with asphalt shingles that are in good condition.

The windows are constructed of double paned glass with aluminum frames. Windows in both the original building and in the 1999 addition sections appear in good condition. The glass-to-frame seals are in fair condition. The window weather seals are in good condition, showing some evidence of little wear.

Some windows are tinted to filter out the sunlight. All the exterior doors in the original building are made of fiber glass with metal frames and are in good condition.


Original Building (1931) & Building (1999) Walls


Flat Roof (1999 Addition - Multipurpose Room) & Windows (1923 Building)


Exit & Entrance Doors (1999 Addition)

2.4 Lighting Systems

The facility has retrofitted most of the interior lighting systems to linear LED tubes and LED screw-based lamps. To better match the baseline energy data and energy billing periods for this audit, we have used information about the baseline lighting systems that correspond to the systems in use during the billing period we used in our analysis. This is represented in Appendix A and in the savings calculations.

The interior lighting system was recently converted from using mainly 32-Watt linear fluorescent T8 lamps to operate LED replacement tubes in the original fixtures. Fixture types include 2-lamp or 4-lamp, 4-foot-long troffer, recessed, surface mounted fixtures. Exit signs also use LED sources.

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

Facility exterior perimeter illumination is mainly provided by wall and recessed mounted LED fixtures. Exterior fixtures are controlled by photocells; however, they appear not to be working. According to site staff, some fixtures do not have a control system and were observed to be operating during the site visit.

LED Tubes & Lamps

LED Exit Sign, Recessed, and Wall Mounted Exiterior LED Fixtures

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators provide heating and ventilation to original building classrooms. They are equipped with supply fan motors and digitally controlled outside air dampers, connected to the fan coil distribution system. They are connected to the heating hot water loop. All the unit ventilators are in fair operating condition.

Unit Ventilators

Unitary Electric HVAC Equipment

Classrooms and some small offices are cooled by 1.5-ton window air conditioning (AC) units. There are 17 window ACs and all appear in good condition.

The principal, nurse and secretary offices are served by a single split system cooling unit with a cooling capacity of 2.0 tons. It is controlled by a programmable thermostat.

Typical Window ACs & Condensing Unit

Packaged Units

The multipurpose room is served by two Trane 10-ton package units connected to a ducted distribution system. These units are equipped with natural gas-fired furnaces, each with a 120 MBh heating capacity. The units appears in good condition.

The main entrance hallway is served is by a single Lennox 1.95-ton package unit which appears in poor condition and has been evaluated for replacement. The hallway unit has a gas-fired furnace with a 23.88 MBh heating capacity.

Multipurpose Room Packaged AC-2

Lennox Roof Top Unit

2.6 General Exhaust Systems

Various general exhaust fans serve all-purpose room, restrooms, and other spaces. The exhaust fans each have a fractional horsepower motor that runs at constant speed. They vary in fair and good condition.

Typical Building Exhaust System

2.7 Heating Hot Water Systems

Two Lochinvar 1,209.60 MBh non-condensing hot water boilers serve the building heating load. The burners are non-modulating with a nominal efficiency of 84%. The boilers are in fair condition and have been evaluated for replacement.

The hydronic distribution system is a two-pipe heating only system. The boilers are configured in a constant flow distribution with 1 hp and 2 hp supply pumps. The pumps are not equipped with variable frequency drives and operate in an automated lead-lag control scheme.

The boilers provide hot water to unit ventilators and hydronic heaters. The boilers run based on outside air temperature and are controlled manually.

Lochinvar Non-Condensing Boilers

2.8 Domestic Hot Water

There are three, 40-gallon electric storage tank water heaters, one each in the electric panel room, gymnasium office, and boiler room. The domestic hot water pipes are insulated, and the insulation is in good condition.

Storage Tank Water Heater

2.9 Food Service Equipment

The building has no kitchen. Food is supplied from the high school. The multipurpose room has two food holding cabinets and a refrigerator chest.

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

Refrigerator Chest

Food Holding Cabinet

2.10 Plug Load and Vending Machines

The facility has 30 desk top computers. Plug loads include general café and office equipment. There are typical classroom loads such as smart projectors and typical office loads such as scanner/copiers, small printers, microwaves, and mini fridges. There are three residential-style refrigerators.

Copier/Scanner

Residential-Style Refrigerator

2.11 Water-Using Systems

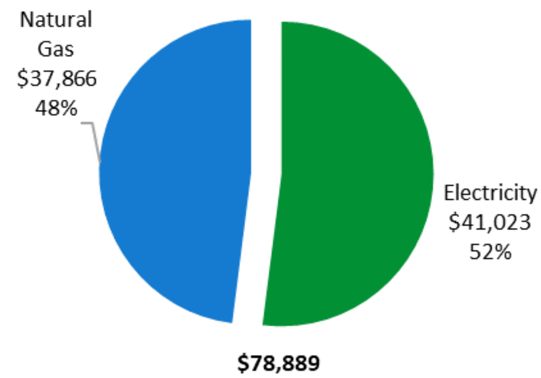
There are several restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.0 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf.

Restroom Sinks

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	261,000 kWh	$41,023
Natural Gas	29,692 Therms	$37,866
Total		**$78,889**



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.

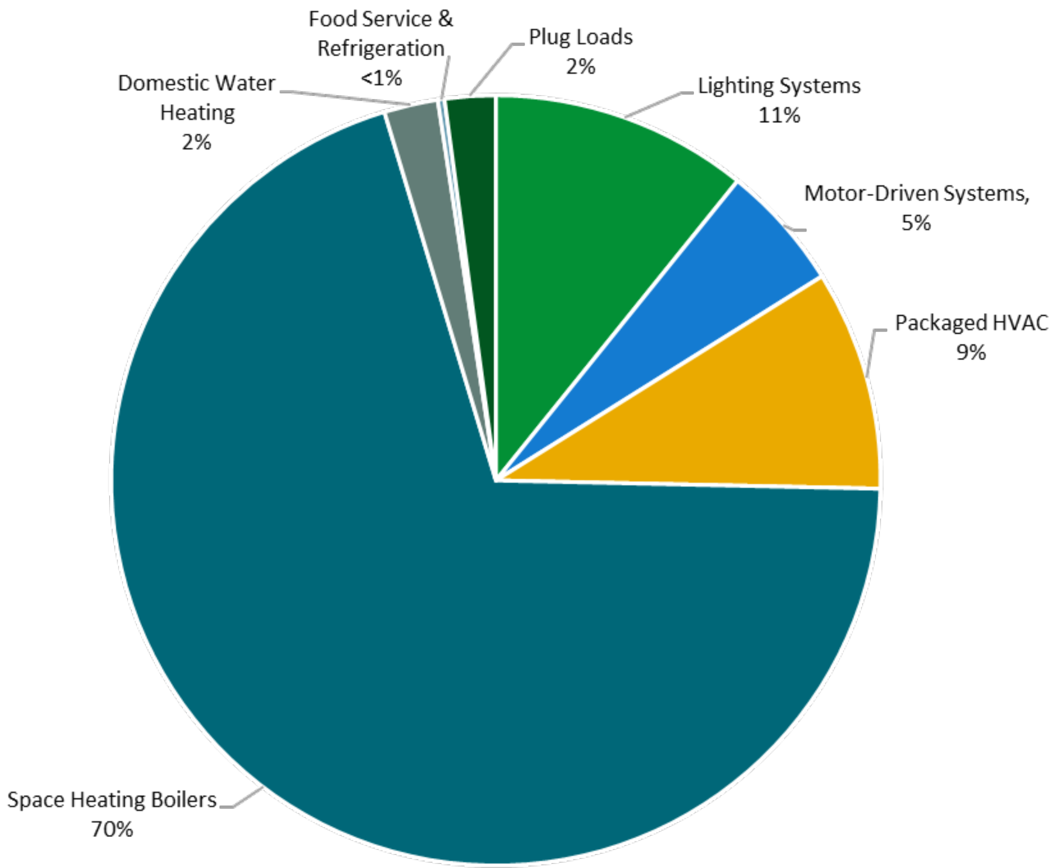
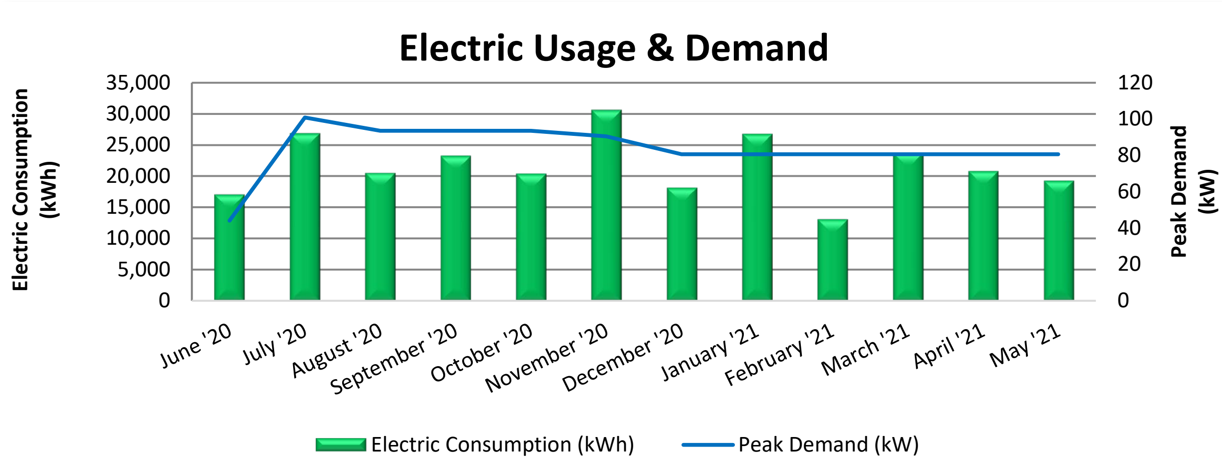


Figure 4 - Energy Balance

3.1 Electricity

Atlantic City Electric delivers electricity under rate class Annual General Service Secondary, with electric production provided by EDF, a third-party supplier.



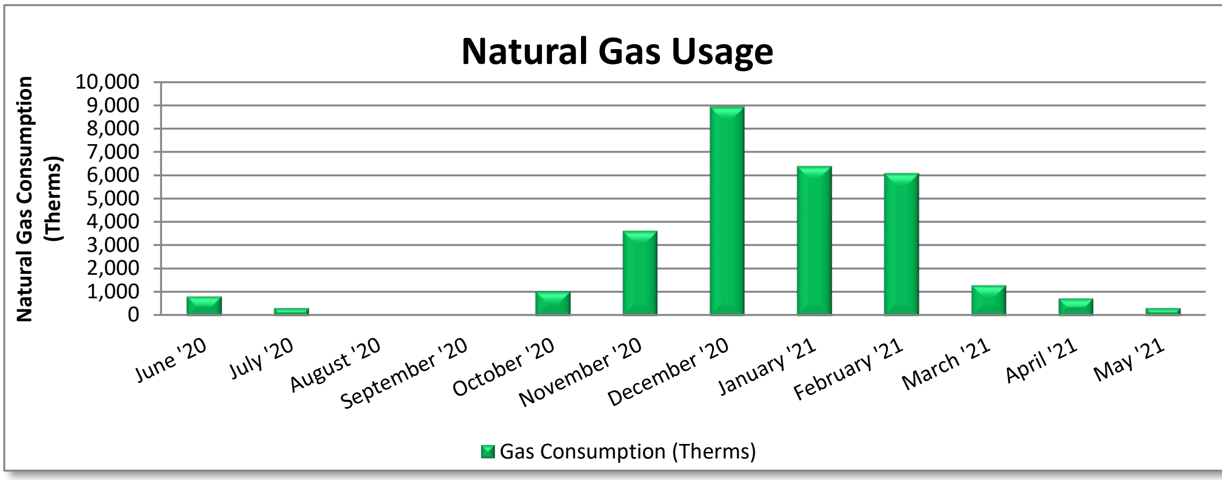
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/30/20	29	17,120	44	$957	$2,872
8/4/20	35	26,920	101	$1,309	$4,573
9/3/20	30	20,560	94	$1,042	$3,256
10/2/20	29	23,280	94	$1,008	$3,537
11/2/20	31	20,400	94	$1,089	$3,351
12/2/20	30	30,640	90	$1,018	$4,308
1/5/21	34	18,200	81	$1,059	$3,123
2/2/21	28	26,800	81	$817	$3,694
3/1/21	27	13,120	81	$817	$2,315
3/31/21	30	23,800	81	$908	$3,558
4/30/21	30	20,840	81	$915	$3,260
6/1/21	32	19,320	81	$976	$3,177
Totals	**365**	**261,000**	**101**	**$11,916**	**$41,023**
Annual	**365**	**261,000**	**101**	**$11,916**	**$41,023**

Notes:

- Peak demand of 101 kW occurred in July 2020.
- Average demand over the past 12 months was 83 kW.
- The average electric cost over the past 12 months was $0.157/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

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



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
7/2/20	31	835	$982
8/4/20	33	340	$416
9/2/20	29	0	$31
10/2/20	30	0	$32
11/3/20	32	1,049	$1,366
12/2/20	29	3,629	$4,621
1/8/21	37	8,935	$11,329
2/2/21	25	6,400	$8,116
3/2/21	28	6,092	$7,787
4/5/21	34	1,320	$1,724
5/4/21	29	751	$994
6/1/21	28	341	$469
Totals	**365**	**29,692**	**$37,866**
Annual	**365**	**29,692**	**$37,866**

Notes:

- The average gas cost for the past 12 months is $1.275/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	**8**

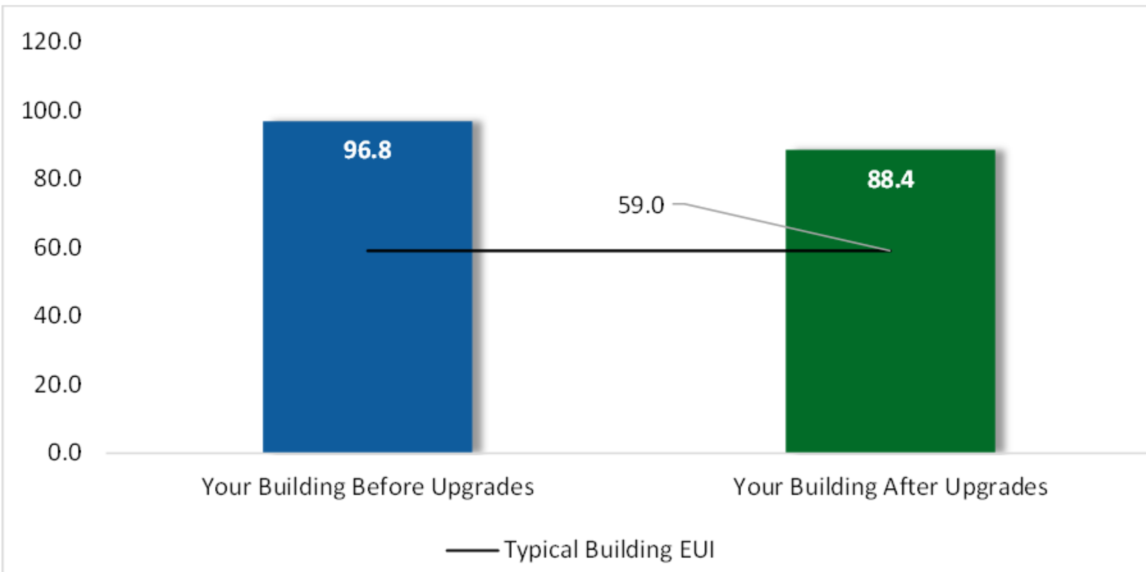


Figure 5 - Energy Use Intensity Comparison[3]

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

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

Financial incentives are based on previously run state rebate programs. New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website. Some measures and proposed upgrades may be eligible for higher incentives than those shown below.

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**62,973**	**9.8**	**-13**	**$9,730**	**$17,942**	**$4,870**	**$13,072**	**1.3**	**61,871**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	62,973	9.8	-13	$9,730	$17,942	$4,870	$13,072	1.3	61,871
Lighting Control Measures			**19,930**	**3.1**	**-4**	**$3,079**	**$7,254**	**$985**	**$6,269**	**2.0**	**19,581**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	19,930	3.1	-4	$3,079	$7,254	$985	$6,269	2.0	19,581
Motor Upgrades			**1,732**	**0.4**	**0**	**$272**	**$5,156**	**$0**	**$5,156**	**18.9**	**1,744**
ECM 3	Premium Efficiency Motors	No	1,732	0.4	0	$272	$5,156	$0	$5,156	18.9	1,744
Variable Frequency Drive (VFD) Measures			**7,462**	**0.9**	**0**	**$1,173**	**$12,542**	**$350**	**$12,192**	**10.4**	**7,514**
ECM 4	Install VFDs on Heating Water Pumps	Yes	7,462	0.9	0	$1,173	$12,542	$350	$12,192	10.4	7,514
Unitary HVAC Measures			**508**	**0.6**	**0**	**$80**	**$5,831**	**$201**	**$5,630**	**70.4**	**512**
ECM 5	Install High Efficiency Air Conditioning Units	No	508	0.6	0	$80	$5,831	$201	$5,630	70.4	512
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**30**	**$389**	**$54,275**	**$4,234**	**$50,042**	**128.7**	**3,570**
ECM 6	Install High Efficiency Hot Water Boilers	No	0	0.0	30	$389	$54,275	$4,234	$50,042	128.7	3,570
Domestic Water Heating Upgrade			**1,963**	**0.0**	**0**	**$308**	**$115**	**$57**	**$57**	**0.2**	**1,976**
ECM 7	Install Low-Flow DHW Devices	Yes	1,963	0.0	0	$308	$115	$57	$57	0.2	1,976
TOTALS			**94,568**	**14.9**	**13**	**$15,032**	**$103,115**	**$10,697**	**$92,418**	**6.1**	**96,770**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**62,973**	**9.8**	**-13**	**$9,730**	**$17,942**	**$4,870**	**$13,072**	**1.3**	**61,871**
ECM 1	Retrofit Fixtures with LED Lamps	62,973	9.8	-13	$9,730	$17,942	$4,870	$13,072	1.3	61,871
Lighting Control Measures		**19,930**	**3.1**	**-4**	**$3,079**	**$7,254**	**$985**	**$6,269**	**2.0**	**19,581**
ECM 2	Install Occupancy Sensor Lighting Controls	19,930	3.1	-4	$3,079	$7,254	$985	$6,269	2.0	19,581
Variable Frequency Drive (VFD) Measures		**7,462**	**0.9**	**0**	**$1,173**	**$12,542**	**$350**	**$12,192**	**10.4**	**7,514**
ECM 4	Install VFDs on Heating Water Pumps	7,462	0.9	0	$1,173	$12,542	$350	$12,192	10.4	7,514
Domestic Water Heating Upgrade		**1,963**	**0.0**	**0**	**$308**	**$115**	**$57**	**$57**	**0.2**	**1,976**
ECM 7	Install Low-Flow DHW Devices	1,963	0.0	0	$308	$115	$57	$57	0.2	1,976
TOTALS		**92,328**	**13.9**	**-17**	**$14,291**	**$37,853**	**$6,262**	**$31,591**	**2.2**	**90,943**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 7 – 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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**62,973**	**9.8**	**-13**	**$9,730**	**$17,942**	**$4,870**	**$13,072**	**1.3**	**61,871**
ECM 1	Retrofit Fixtures with LED Lamps	62,973	9.8	-13	$9,730	$17,942	$4,870	$13,072	1.3	61,871

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 of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs. Note, due to the ongoing retrofit and upgrade work, many of the project fixtures have now been addressed.

ECM 1: Retrofit Fixtures with LED Lamps

Replace fluorescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

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

Affected Building Areas: areas with T-8 fluorescent lamps.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**19,930**	**3.1**	**-4**	**$3,079**	**$7,254**	**$985**	**$6,269**	**2.0**	**19,581**
ECM 2	Install Occupancy Sensor Lighting Controls	19,930	3.1	-4	$3,079	$7,254	$985	$6,269	2.0	19,581

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

ECM 2: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: offices, conference rooms, classrooms, multipurpose room, library, restrooms, and storage rooms.

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**1,732**	**0.4**	**0**	**$272**	**$5,156**	**$0**	**$5,156**	**18.9**	**1,744**
ECM 3	Premium Efficiency Motors	1,732	0.4	0	$272	$5,156	$0	$5,156	18.9	1,744

ECM 3: Premium Efficiency Motors

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

The school district is considering replacing most of the old fan coil units at this site. The primary savings from replacing fan coil units will be from improved fan motor efficiency; however, those savings are unlikely to justify replacing the fan coils. The next potential savings would be from installing fan coils that provide for more optimal use of outside air than the existing fan coil units.

The potential savings from installing new fan coils with electronically commutated (EC) motors was evaluated. EC motors are generally more efficient than other fractional hp motors and have the capability of operating at variable speeds. In general, replacing the fan coils should be considered a capital improvement measure that has the potential to provide energy savings and improve occupant comfort.

Affected Motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Classrooms	Unit Ventilators	17	Fan Coil Unit	0.2	Unit Ventilators

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

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**7,462**	**0.9**	**0**	**$1,173**	**$12,542**	**$350**	**$12,192**	**10.4**	**7,514**
ECM 4	Install VFDs on Heating Water Pumps	7,462	0.9	0	$1,173	$12,542	$350	$12,192	10.4	7,514

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

ECM 4: Install VFDs on Heating Water Pumps

Install variable frequency drives (VFD) 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 three-way valves or a bypass leg 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: boiler room pumps.

4.5 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**508**	**0.6**	**0**	**$80**	**$5,831**	**$201**	**$5,630**	**70.4**	**512**
ECM 5	Install High Efficiency Air Conditioning Units	508	0.6	0	$80	$5,831	$201	$5,630	70.4	512

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 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 rooftop unit is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 5: Install High Efficiency Air Conditioning Units

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

Affected Units: Lennox rooftop unit gas-fired heating

4.6 Gas Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**30**	**$389**	**$54,275**	**$4,234**	**$50,042**	**128.7**	**3,570**
ECM 6	Install High Efficiency Hot Water Boilers	0	0.0	30	$389	$54,275	$4,234	$50,042	128.7	3,570

ECM 6: Install High Efficiency Hot Water Boilers

We evaluated replacing older inefficient hot water boilers with high efficiency hot water boilers. Energy savings resulted from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are evaluated when the return water temperature is less than 130°F during most of the operating hours.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load. In many cases installing multiple modular boilers, rather than one or two large boilers, will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers are nearing, the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**1,963**	**0.0**	**0**	**$308**	**$115**	**$57**	**$57**	**0.2**	**1,976**
ECM 7	Install Low-Flow DHW Devices	1,963	0.0	0	$308	$115	$57	$57	0.2	1,976

ECM 7: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm

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

5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs.

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

You may already be doing some of these things—see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

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

Weatherization

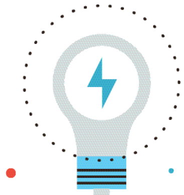
Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. Materials used may include caulk, polyurethane foam, and other weather-stripping materials. There is an energy savings opportunity by reducing the uncontrolled air exchange between the outside and inside of the building. Blower door assisted comprehensive building air sealing will reduce the amount of air exchange, which will in turn reduce the load on the buildings heating and cooling equipment, providing energy savings and increased occupant comfort.

Doors and Windows

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

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

Lighting Maintenance



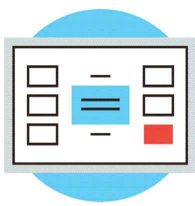
- Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

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

Fans to Reduce Cooling Load

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

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°F-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.

Economizer Maintenance

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

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

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

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

Boiler Maintenance

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

Furnace Maintenance

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

Label HVAC Equipment

For improved coordination in maintenance practices, we recommend labeling or re-labeling the site HVAC equipment. Maintain continuity in labeling by following labeling conventions as indicated in the facility drawings or EMS building equipment list. Use weatherproof or heatproof labeling or stickers for permanence, but do not cover over original equipment nameplates, which should be kept clean and readable whenever possible. Besides equipment, label piping for service and direction of flow when possible. Ideally, maintain a log of HVAC equipment, including nameplate information, asset tag designation, areas served, installation year, service dates, and other pertinent information.

This investment in your equipment will enhance collaboration and communication between your staff and your contracted service providers and may help you with regulatory compliance.

Water Heater Maintenance

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

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

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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense® website[5] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[6] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

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

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

Procurement Strategies

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

6 On-site Generation

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

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

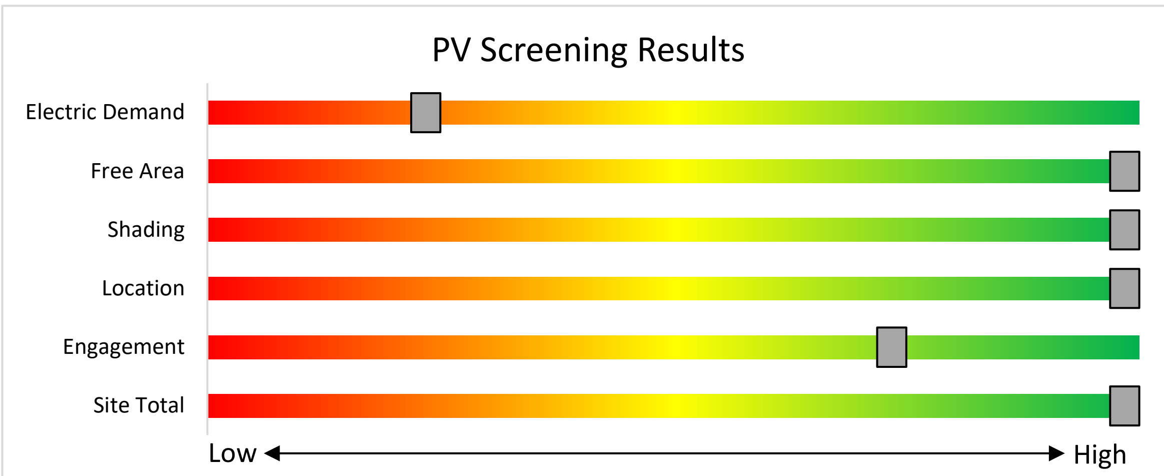
6.1 Solar Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has high potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

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



Potential	High	
System Potential	82	kW DC STC
Electric Generation	97,692	kWh/yr
Displaced Cost	$15,350	/yr
Installed Cost	$213,200	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects. Solar projects may qualify to earn SREC- IIs (Solar Renewable Energy Certificates-II), however, the project owners *must* register their solar projects prior to the start of construction to establish the project's eligibility.

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:

Successor Solar Incentive Program (SuSI): https://www.njcleanenergy.com/renewable-energy/programs/susi-program

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

6.2 Combined Heat and Power

Combined heat and power (CHP) generate 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.

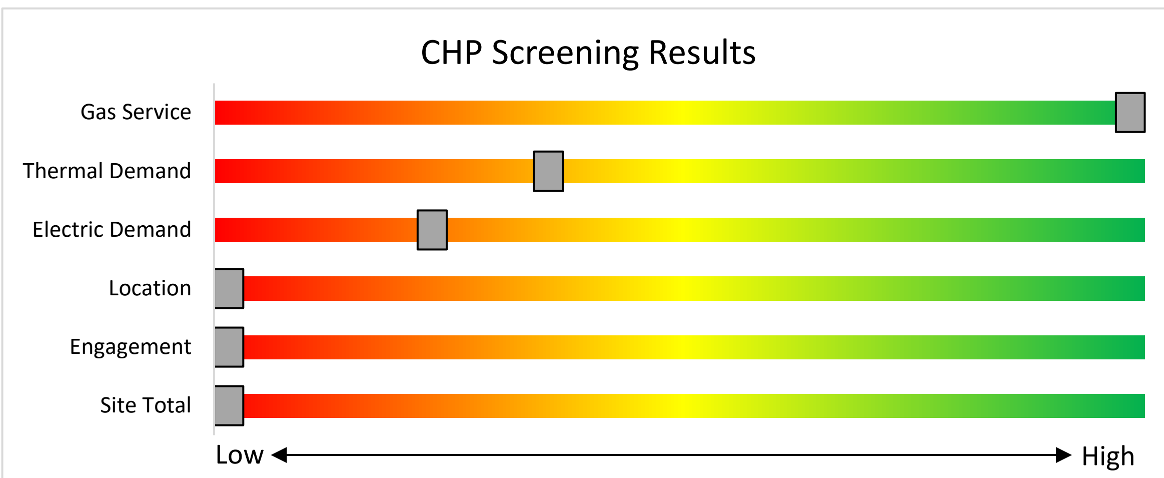


Figure 9 - Combined Heat and Power Screening

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? Your utility provider may be able to help.

7.1 Utility Energy Efficiency Programs

The Clean Energy Act, signed into law by Governor Murphy in 2018, requires New Jersey's investor-owned gas and electric utilities to reduce their customers' use by set percentages over time. To help reach these targets the New Jersey Board of Public Utilities approved a comprehensive suite of energy efficiency programs to be run by the utility companies.

These new utility programs are rolling out in the spring and summer of 2021. Keep up to date with developments by visiting:

https://www.njcleanenergy.com/transition

8 New Jersey's Clean Energy Programs

New Jersey's Clean Energy Program will continue to offer some energy efficiency programs.

8.1 Large Energy Users

The Large Energy Users Program (LEUP) is designed to foster self-directed investment in energy projects. This program is offered to New Jersey's largest energy customers that annually contribute at least $200,000 to the NJCEP aggregate of all buildings/sites. This equates to roughly $5 million in energy costs in the prior fiscal year.

Incentives

Incentives are based on the specifications below. The maximum incentive per entity is the lesser of:

- $4 million
- 75% of the total project(s) cost
- 90% of total NJCEP fund contribution in previous year
- $0.33 per projected kWh saved; $3.75 per projected Therm saved annually

How to Participate

To participate in LEUP, you will first need submit an enrollment application. This program requires all qualified and approved applicants to submit an energy plan that outlines the proposed energy efficiency work for review and approval. Applicants may submit a Draft Energy Efficiency Plan (DEEP), or a Final Energy Efficiency Plan (FEEP). Once the FEEP is approved, the proposed work can begin.

Detailed program descriptions, instructions for applying, and applications can be found at www.njcleanenergy.com/LEUP.

8.2 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

You will 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.

8.3 Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The program is used to register and certify 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 SREC-IIs (Solar Renewable Energy Certificates-II). SuSI consists of two sub-programs. The Administratively Determined Incentive (ADI) Program and the Competitive Solar Incentive (CSI) Program.

Administratively Determined Incentive (ADI) Program

The ADI Program provides administratively set incentives for net metered residential projects, net metered non-residential projects 5 MW or less, and all community solar projects.

After the registration is accepted, construction is complete, and a complete final as-built packet has been submitted, the project is issued a New Jersey certification number, which enables it to generate New Jersey SREC- IIs.

Market Segments	Size MW dc	Incentive Value ($/SREC II)	Public Entities Incentive Value - $20 Adder ($/SRECII)
Net Metered Residential	All types and sizes	$90	N/A
Small Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects smaller than 1 MW	$100	$120
Large Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects 1 MW to 5 MW	$90	$110
Small Net Metered Non-Residential Ground Mount	Projects smaller than 1 MW	$85	$105
Large Net Metered Non-Residential Ground Mount	Projects 1 MW to 5 MW	$80	$100
LMI Community Solar	Up to 5 MW	$90	N/A
Non-LMI Community Solar	Up to 5 MW	$70	N/A
Interim Subsection (t)	All types and sizes	$100	N/A

Eligible projects may generate SREC-IIs for 15 years following the commencement of commercial operations which is defined as permission to operate (PTO) from the Electric Distribution Company. After 15 years, projects may be eligible for a NJ Class I REC.

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

The ADI Program online portal is now open to new registrations effective August 28, 2021.

Competitive Solar Incentive Program

The Competitive Solar Incentive (CSI) Program will provide competitively set incentives for grid supply projects and net metered non-residential projects greater than 5MW. The program is currently under development with the goal of holding the first solicitation by early-to-mid 2022. For updates, please continue to check the Solar Proceedings page on the New Jersey's Clean Energy Program website.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan.

If you are considering installing solar photovoltaics on your building, visit the following link for more information: https://njcleanenergy.com/renewable-energy/programs/susi-program.

8.4 Energy Savings Improvement Program

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

9 PROJECT DEVELOPMENT

Energy conservation measures (ECMs) have been identified for your site, and their energy and economic analyses are provided within this LGEA report. Note that some of the identified projects may be mutually exclusive, such as replacing equipment versus upgrading motors or controls. The next steps with project development are to set goals and create a comprehensive project plan. The graphic below provides an overview of the process flow for a typical energy efficiency or renewable energy project. We recommend implementing as many ECMs as possible prior to undertaking a feasibility study for a renewable project. The cyclical nature of this process flow demonstrates the ongoing work required to continually improve building energy efficiency over time. If your building(s) scope of work is relatively simple to implement or small in scope, the measurement and verification (M&V) step may not be required. It should be noted through a typical project cycle, there will be changes in costs based on specific scopes of work, contractor selections, design considerations, construction, etc. The estimated costs provided throughout this LGEA report demonstrate the unburdened turn-key material and labor cost only. There will be contingencies and additional costs at the time of implementation. We recommend comprehensive project planning that includes the review of multiple bids for project work, incorporates potential operations and maintenance (O&M) cost savings, and maximizes your incentive potential.

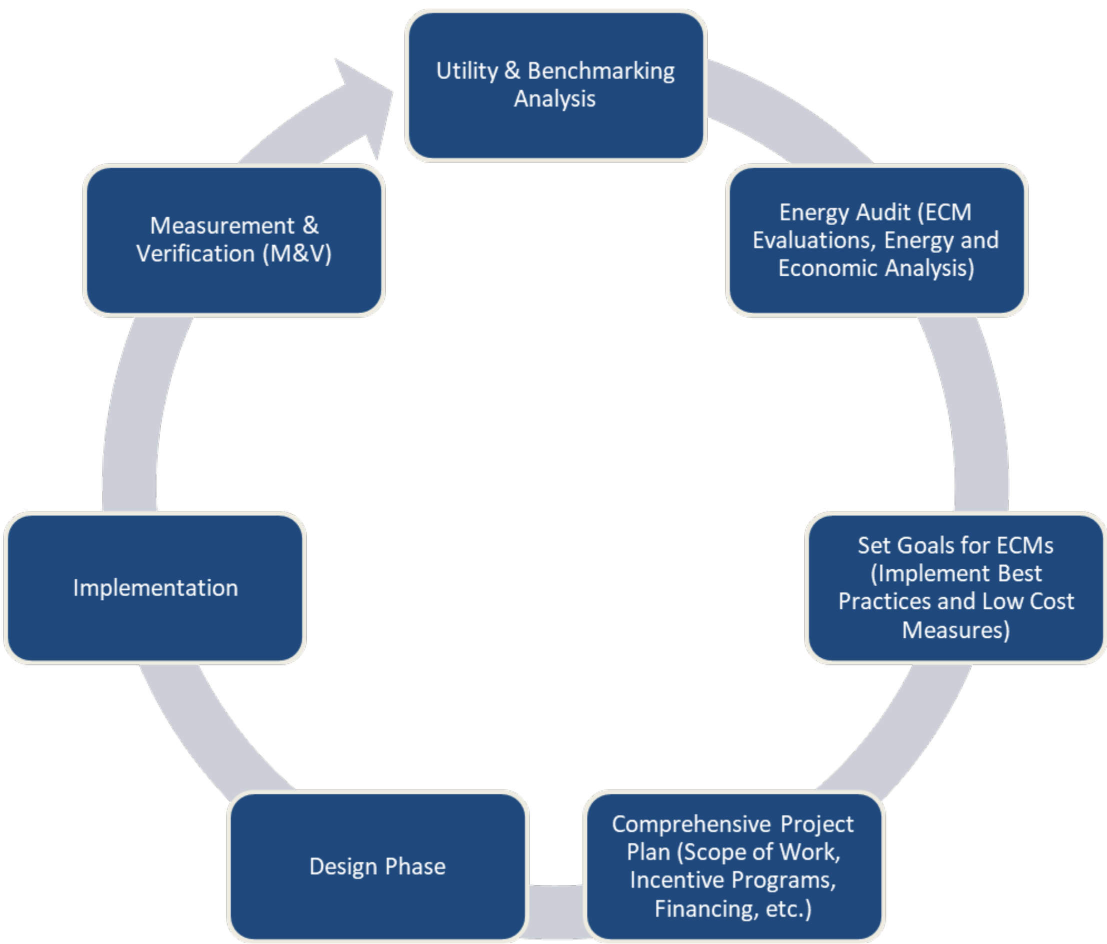


Figure 10 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 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. Though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

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

A list of licensed third-party electric suppliers is available at the NJBPU website[7].

10.2 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 fluctuate monthly. The utility provides basic gas supply service to customers who choose not to buy from a third-party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier typically depends on whether a customer prefers budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third-party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 1	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 11	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 12	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 2	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 3	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 34	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 35	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 36	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 37	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 4	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 5	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 6	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 7	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 8	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Classroom 9	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.6	3,761	-1	$581	$1,073	$255	1.4
Copying room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Electrical Panel	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Gymnasium office	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	4,202		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	4,202	0.0	0	0	$0	$0	$0	0.0
Hallway New wing	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway New wing	13	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	4,202	1, 2	Relamp	Yes	13	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,899	0.2	1,278	0	$197	$963	$148	4.1
Janitorial 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	4,202	0.0	259	0	$40	$73	$20	1.3
Janitorial pre- school	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	4,202	0.0	259	0	$40	$73	$20	1.3
Microwave room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Multipurpose 1	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Multipurpose 1	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.8	5,129	-1	$793	$1,635	$370	1.6
Office - Nurse office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.2	1,368	0	$211	$562	$115	2.1
Office - Principal office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Office - Principal Secretary	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Pre K hallway	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Pre K hallway	23	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	23	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	1.2	7,865	-2	$1,215	$2,220	$530	1.4
Pre-school boys bathroom (1)	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	4,202		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	4,202	0.0	0	0	$0	$0	$0	0.0
Pre-school boys bathroom (1)	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Pre-school girls bathroom	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	4,202		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	4,202	0.0	0	0	$0	$0	$0	0.0
Pre-school girls bathroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Principal office bathroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	4,202	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	4,202	0.0	74	0	$11	$33	$6	2.3
Restroom - Boys	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	4,202		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	4,202	0.0	0	0	$0	$0	$0	0.0
Restroom - Boys	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Restroom - Girls	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	4,202		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	4,202	0.0	0	0	$0	$0	$0	0.0
Restroom - Girls	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1, 2	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,899	0.1	684	0	$106	$262	$60	1.9
Restroom -faculty	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	4,202	1	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	4,202	0.0	74	0	$11	$33	$6	2.3
Storage gym	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	4,202	1	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	4,202	0.0	259	0	$40	$73	$20	1.3

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	Heating System	2	Heating Hot Water Pump	2.0	75.5%	No	Baldor		W	2,745	4	No	86.5%	Yes	2	0.6	5,000	0	$786	$6,522	$200	8.0
Boiler room	Heating System	2	Heating Hot Water Pump	1.0	75.5%	No	Bell & Gosset	AQA56A17D58E	W	2,745	4	No	85.5%	Yes	2	0.3	2,462	0	$387	$6,020	$150	15.2
Boiler room	Elementary School	1	Exhaust Fan	5.0	74.0%	No	WEG	00518OS1OOD18	W	3,157		No	74.0%	No		0.0	0	0	$0	$0	$0	0.0
Classrooms	Unit Ventilators	17	Fan Coil Unit	0.2	65.0%	No			B	3,157	3	Yes	80.0%	No		0.4	1,732	0	$272	$5,156	$0	18.9
Roof	1973 wing Bathrooms	3	Exhaust Fan	0.1	65.0%	No	UL		W	3,157		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Early Childhood Center	1	Exhaust Fan	0.1	65.0%	No	Cook	GR15XL6GR	W	3,157		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Trane RTU-1 & 2	2	Supply Fan	5.0	86.0%	No			W	3,157		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Lennox RTU	1	Supply Fan	0.3	65.0%	No			W	3,157		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office	Indoor AHU	1	Supply Fan	0.5	70.0%	No			W	3,157		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Billinsport ECC	Hydronic Unit Heater	1	Supply Fan	0.1	65.0%	No			W	3,157		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	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/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 1	Classroom 1	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 10	Classroom 10	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 11	Classroom 11	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 12	Classroom 12	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 2	Classroom 2	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 3	Classroom 3	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 34	Classroom 34	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 35	Classroom 35	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 36	Classroom 36	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 37	Classroom 37	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 4	Classroom 4	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 5	Classroom 5	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 6	Classroom 6	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 7	Classroom 7	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 8	Classroom 8	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Classroom 9	Classroom 9	1	Window Air Conditioner	1.50		10.90				W	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	$0	#N/A
Roof	Principal, Nurse & Secretary Offices	1	Split-System	2.00		13.00		Goodman	CK24-1B	B		No							0.0	0	0	$0	$0	$0	0.0
Exterior	RTU-1 & 2 - Multipurpose Room	2	Package Unit	10.00	120.00	11.30	0.8 Et	Trane	YHC120F4	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Billinsport ECC	1	Package Unit	1.95		8.50		Lennox	CHA15-261	B	5	Yes	1	Package Unit	1.95		16.00		0.6	508	0	$80	$5,831	$201	70.4
Roof	Billinsport ECC (Lennox RTU)	1	Electric Resistance Heat		23.88		1 COP	Lennox	CHA15-262	W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	Heating System	2	Non-Condensing Hot Water Boiler	1,210	Lochinvar	CHN1441	B	6	Yes	2	Non-Condensing Hot Water Boiler	1,210	85.00%	Et	0.0	0	30	$389	$54,275	$4,234	128.7

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Electrical Panel room 1	Principal and Nurse Office	1	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	M2405605	W		No						0.0	0	0	$0	$0	$0	0.0
Gymnasium office	Multipurpose Room	1	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	M2405605	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler room	Elementary School Section	2	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	M2405605	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	7	16	Faucet Aerator (Lavatory)	2.00	0.50	0.0	1,963	0	$308	$115	$57	0.2

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Multipurpose 1	1	Refrigerator Chest	Powers	569	No		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Multipurpose	1	Insulated Food Holding Cabinet (Full Size)	FEW	UHS-12	No		No	0.0	0	0	$0	$0	$0	0.0
Multipurpose	1	Insulated Food Holding Cabinet (Full Size)	Vulcan	VP18	No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Billingsport School	20	Desktop	120	No		
Billingsport School	2	Coffee Machine	800	No		
Billingsport School	3	Microwave	1,000	No		
Billingsport School	3	Printer/Copier (Large)	600	No		
Billingsport School	3	Projector	225	No		
Billingsport School	16	Refrigerator (Mini)	150	No		
Billingsport School	2	Refrigerator (Residential)	350	No		
Billingsport School	32	Television	120	No		
Billingsport School	1	Toaster	1,000	No		
Billingsport School	3	Warming Tray	3,000	No		

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Billingsport Early Childhood Center

Primary Property Type: K-12 School
Gross Floor Area (ft²): 39,863
Built: 1923

For Year Ending: May 31, 2021
Date Generated: February 14, 2022

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Billingsport Early Childhood Center 441 Naussau Avenue Paulsboro, New Jersey 08066	Paulsboro Public Schools 662 N. Delaware Street Paulsboro, NJ 08066 (609) 405-1018	Frank Domin 662 N. Delaware Street Paulsboro, NJ 08066 (609) 405-1018 fdomin@paulsboro.k12.nj.us

Property ID: 18911395

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
96.7 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	2,971,544 (77%)
Electric - Grid (kBtu)	885,056 (23%)

Source EUI
140.4 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	59
National Median Source EUI (kBtu/ft²)	85.7
% Diff from National Median Source EUI	64%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	240

Signature & Stamp of Verifying Professional

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

LP Signature: ______________________Date: ___________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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