Local Government Energy Audit Report

Glenview Avenue Elementary School

January 14, 2021

Prepared for:
Haddon Heights Board of Education
1700 Sycamore St.
Haddon Heights, NJ 08035

Prepared by:
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Disclaimer

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

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

TRC bases estimated 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.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

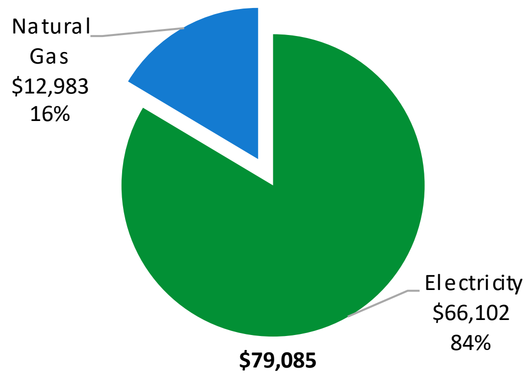
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $79,085 Electricity: 468,405 kWh Natural Gas: 13,898 Therms	
ENERGY STAR® Benchmarking Score	36 *(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.

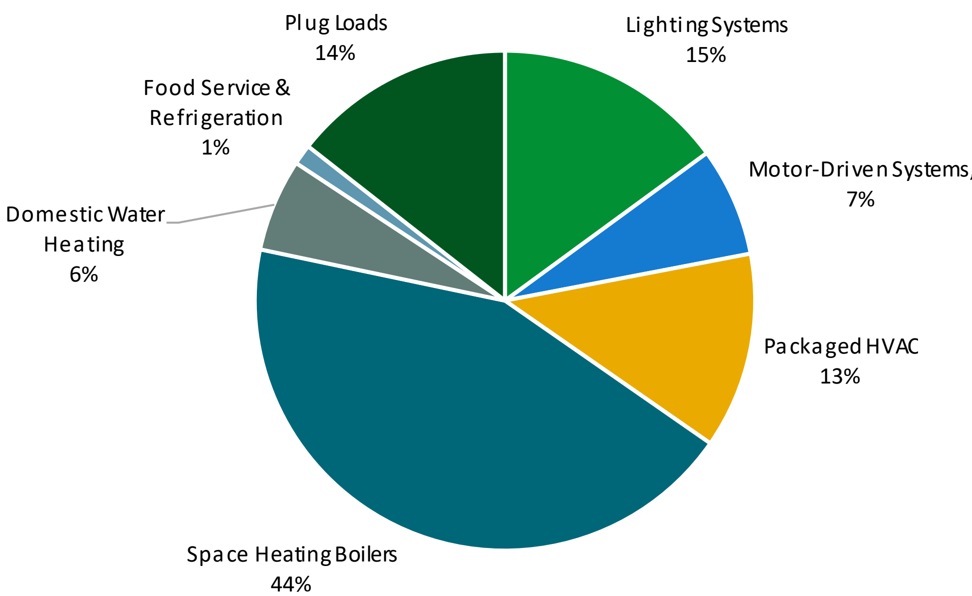


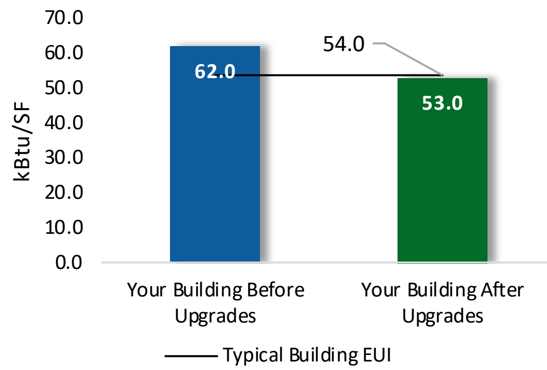
Figure 1 - Energy Use by System

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.

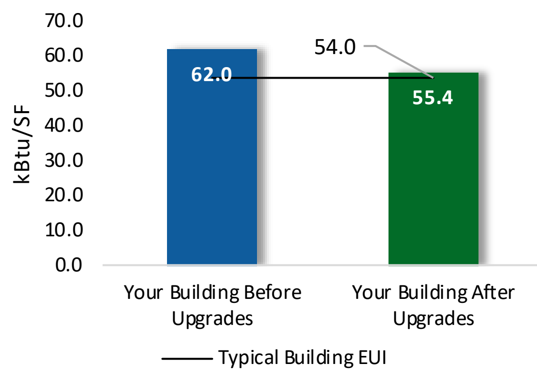
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$135,282
Potential Rebates & Incentives[1]	$31,916
Annual Cost Savings	$16,426
Annual Energy Savings	Electricity: 108,633 kWh Natural Gas: 1,173 Therms
Greenhouse Gas Emission Savings	62 Tons
Simple Payback	6.3 Years
Site Energy Savings (all utilities)	16%



Scenario 2: Cost Effective Package[2]

Installation Cost	$66,861
Potential Rebates & Incentives	$21,642
Annual Cost Savings	$15,270
Annual Energy Savings	Electricity: 107,519 kWh Natural Gas: 104 Therms
Greenhouse Gas Emission Savings	55 Tons
Simple Payback	3.0 Years
Site Energy Savings (all utilities)	13%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**77,624**	**14.1**	**-14**	**$10,819**	**$25,276**	**$12,148**	**$13,128**	**1.2**	**76,470**
ECM 1	Install LED Fixtures	Yes	5,549	0.0	0	$783	$4,322	$1,400	$2,922	3.7	5,588
ECM 2	Retrofit Fixtures with LED Lamps	Yes	72,074	14.1	-14	$10,036	$20,955	$10,748	$10,207	1.0	70,882
Lighting Control Measures			**17,849**	**3.6**	**-4**	**$2,484**	**$13,085**	**$5,415**	**$7,670**	**3.1**	**17,537**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	15,032	3.0	-3	$2,092	$10,160	$2,590	$7,570	3.6	14,769
ECM 4	Install High/Low Lighting Controls	Yes	2,816	0.6	-1	$392	$2,925	$2,825	$100	0.3	2,767
Variable Frequency Drive (VFD) Measures			**11,426**	**2.6**	**0**	**$1,612**	**$10,598**	**$2,200**	**$8,398**	**5.2**	**11,506**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	11,426	2.6	0	$1,612	$10,598	$2,200	$8,398	5.2	11,506
Unitary HVAC Measures			**334**	**0.1**	**0**	**$47**	**$5,043**	**$80**	**$4,963**	**105.2**	**337**
ECM 6	Install High Efficiency Air Conditioning Units	No	260	0.1	0	$37	$703	$0	$703	19.2	262
ECM 7	Install High Efficiency PTAC/PTHP	No	74	0.0	0	$10	$4,340	$80	$4,260	406.4	75
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**107**	**$999**	**$60,659**	**$10,194**	**$50,465**	**50.5**	**12,518**
ECM 8	Install High Efficiency Hot Water Boilers	No	0	0.0	107	$999	$60,659	$10,194	$50,465	50.5	12,518
HVAC System Improvements			**780**	**0.0**	**0**	**$110**	**$2,719**	**$0**	**$2,719**	**24.7**	**785**
ECM 9	Implement Demand Control Ventilation (DCV)	No	780	0.0	0	$110	$2,719	$0	$2,719	24.7	785
Domestic Water Heating Upgrade			**278**	**0.0**	**29**	**$306**	**$17,671**	**$1,879**	**$15,792**	**51.6**	**3,628**
ECM 10	Install High Efficiency Gas-Fired Water Heater	Yes	0	0.0	12	$116	$17,542	$1,750	$15,792	135.7	1,459
ECM 11	Install Low-Flow DHW Devices	Yes	278	0.0	16	$190	$129	$129	$0	0.0	2,169
Food Service & Refrigeration Measures			**343**	**0.0**	**0**	**$48**	**$230**	**$0**	**$230**	**4.8**	**345**
ECM 12	Vending Machine Control	Yes	343	0.0	0	$48	$230	$0	$230	4.8	345
TOTALS (COST EFFECTIVE MEASURES)			**107,519**	**20.3**	**10**	**$15,270**	**$66,861**	**$21,642**	**$45,219**	**3.0**	**109,485**
TOTALS (ALL MEASURES)			**108,633**	**20.4**	**117**	**$16,426**	**$135,282**	**$31,916**	**$103,366**	**6.3**	**123,125**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey's Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	x	x	
ECM 2	Retrofit Fixtures with LED Lamps	x	x	
ECM 3	Install Occupancy Sensor Lighting Controls	x	x	
ECM 4	Install High/Low Lighting Controls	x		
ECM 5	Install VFDs on Constant Volume (CV) Fans	x		
ECM 6	Install High Efficiency Air Conditioning Units		x	
ECM 7	Install High Efficiency PTAC/PTHP	x	x	
ECM 8	Install High Efficiency Hot Water Boilers	x	x	
ECM 9	Implement Demand Control Ventilation (DCV)		x	
ECM 10	Install High Efficiency Gas-Fired Water Heater	x	x	
ECM 11	Install Low-Flow DHW Devices	x	x	
ECM 12	Vending Machine Control	x	x	

Figure 3 – Funding Options

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

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

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

Individual Measures with SmartStart

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

Turnkey Installation with Direct Install

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

Whole Building Approach with Pay for Performance

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

More Options from Around the State

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

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

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

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

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce electric demand during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Glenview Avenue Elementary School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

2.1 Site Overview

On October 20, 2020, TRC performed an energy audit at Glenview Avenue Elementary School located in Haddon Heights, New Jersey. TRC met with Dave Binder to review the facility operations and help focus our investigation on specific energy-using systems.

Glenview Avenue Elementary School is a 2-story, 47,167 square foot building built in 1955. Spaces include classrooms, gymnasium/multipurpose room, offices, cafeteria, corridors, stairwells, mechanical spaces, kitchen, restrooms, and exterior spaces.

The site is interested in a new EMS for the gymnasium but has been unable to fund the project.

Facility staff did not voice any specific concerns.

2.2 Building Occupancy

The facility is occupied ten months out of the year. Typical weekday occupancy is 50 staff and 277 students.

Building Name	Weekday/Weekend	Operating Schedule
Glenview Elementary School	Weekday	School Hours 7:00 AM to 11:00 PM Custodian Hours 8:00 AM to 4:00 PM
	Weekend	N/A

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are brick over structural steel with a brick facade. The roof is flat and covered with black and white membrane and is in fair condition.

Most of the windows are double pane and have metal frames. The operable window weather seals are in fair condition. Exterior doors have metal frames and are in fair condition. Degraded window and door seals increase drafts and outside air infiltration.

Windows

Building Envelope

Exterior Doors

Roof

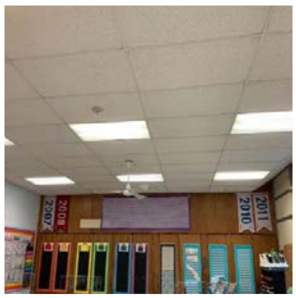
2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps and some T5 linear fluorescent lamps. Additionally, there are some incandescent and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

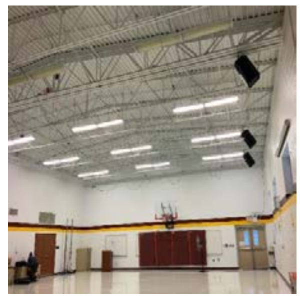
Fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long recessed mounted fixtures and 2-foot fixtures with linear tube lamps. Most fixtures are in fair condition.

Gymnasium/multipurpose room fixtures have high bay T5HO linear fluorescent lamps and are manually controlled. All exit signs are LED.

Interior lighting levels were generally sufficient. Interior Lighting fixtures are controlled by wall switches.



Classroom Fixtures



Gymnasium/Multipurpose Room Fixtures

Exterior fixtures include wall packs and flood lights with high intensity discharge (HID) lamps and LED fixtures. There are a few incandescent lamps.

Exterior fixtures are timer and photocell controlled.

Exterior Fixture

Exterior Fixture

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators (UV) are equipped with supply fan motors and radiant heating hot water coils. UVs provide cooling as described below. This system is original to the building and appears to be in fair operating condition.

Packaged Units

There are twenty-one split system outdoor condensing units, mostly serving the indoor unit ventilators for cooling. The cooling capacities range from 3.0 tons to 4.0 tons. All have energy efficiency ratings of 13 EER.

The principal and guidance offices are served with packaged terminal air conditioning (PTAC) units controlled by room thermostats. These 10.0 EER units each have a 1.0-ton cooling capacity.

The gym, main office area, and the new wing are served by multiple packaged roof top units, including:

Unit	Area Served	Size	Efficiency
Package Unit	New wing	3.00	10.00
Package Unit	Gym	12.58	11.30
Package Unit	Main Office Area	3.00	10.00

Refer to Appendix A for detailed information about each unit.

Condensing Unit

Unit Ventilator

Rooftop Packaged Unit

Rooftop Packaged Unit

Unitary Electric HVAC Equipment

Classrooms 117, 118, and the main office areas are cooled by window, through-the wall air conditioning (AC) units. These are 1.0 ton in capacity. The units are in poor condition. They range in efficiency between 10.0 EER to 13.0 EER. They are not ENERGY STAR® labeled.

2.6 Heating Hot Water Systems

Two HB Smith 1,699 MBh hot water boilers serve the building heating requirements. The burners are non-modulating with a nominal efficiency of 78 percent. The boilers are configured in a lead-lag control scheme. Installed in 1990, they are in poor condition.

The boilers serve a primary/secondary distribution system with two constant speed 0.75 hp pumps circulating the primary loop, and two VFD controlled 5.0 hp heating hot water pumps operating in lead-lag fashion on the secondary loop. Heating is distributed through unit ventilators and some package units.

Hydronic Boilers

Hot water Pumps

2.7 Domestic Hot Water

Hot water is produced by an 80 gallon, 250 MBh gas-fired storage water heater with an 80% Energy Factor (EF).

Hot water is also produced by a 40-gallon, 4.50 kW electric water heater. This water heater serves the new wing gym and restrooms.

Domestic Hot Water heater

Electric Water heater

2.8 Food Service Equipment

The kitchen has all-electric equipment that is used to prepare meals for students. Most cooking is done using a convection electric oven. Bulk prepared foods are held in an electric holding cabinet. Equipment is not high efficiency and is in fair condition.

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

Electric Cabinet

2.9 Refrigeration

The kitchen has one stand-up refrigerator with solid doors. There is also a freezer chest as well as a refrigerator chest. All equipment is standard and in fair condition.

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

Freezer Chest

Refrigerator Chest

2.10 Plug Load & Vending Machines

You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are 27 computer workstations throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such projectors, and fans.

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

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

Breakroom Vending Machine

Copier

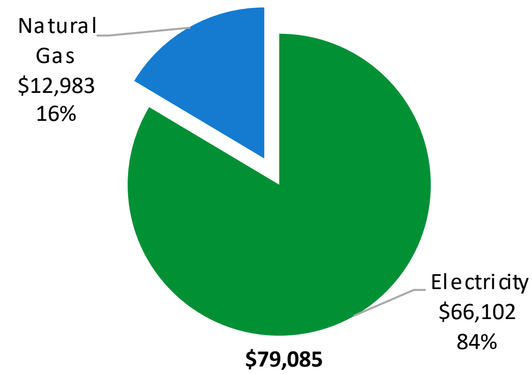
2.11 Water-Using Systems

There are 18 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher.

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	468,405 kWh	$66,102
Natural Gas	13,898 Therms	$12,983
Total		**$79,085**



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

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

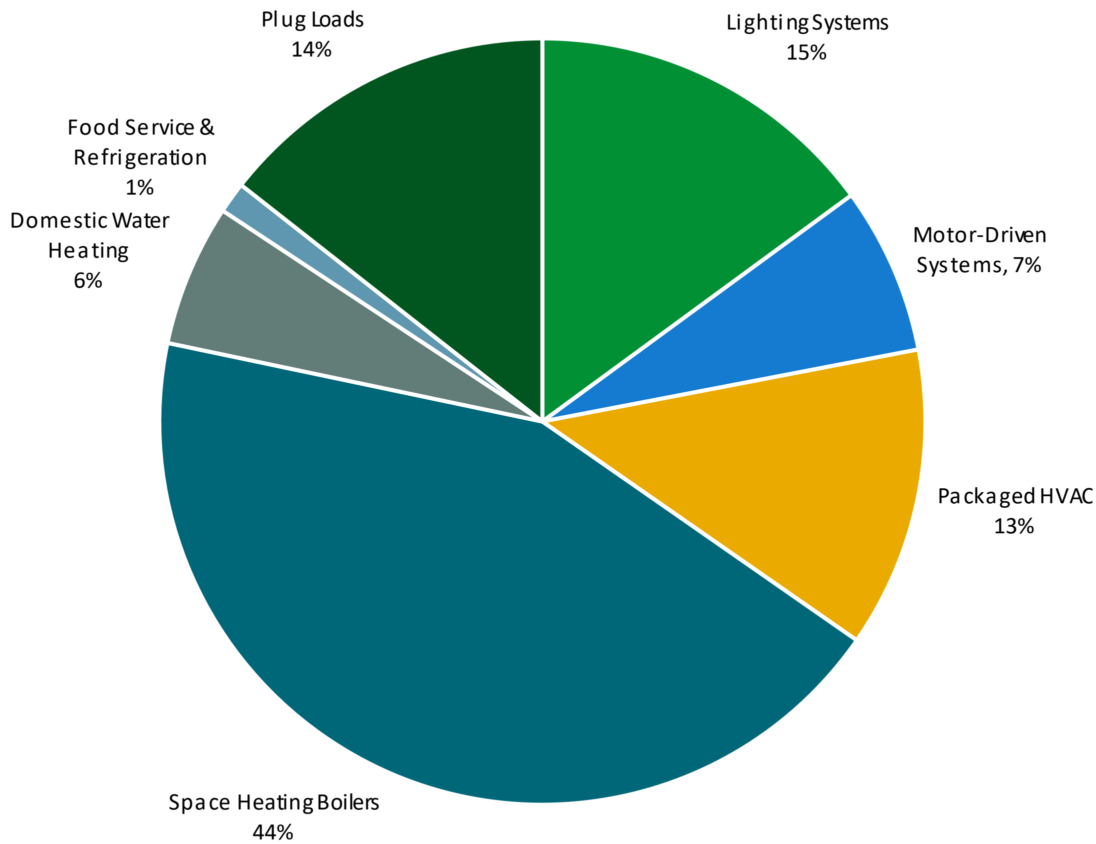
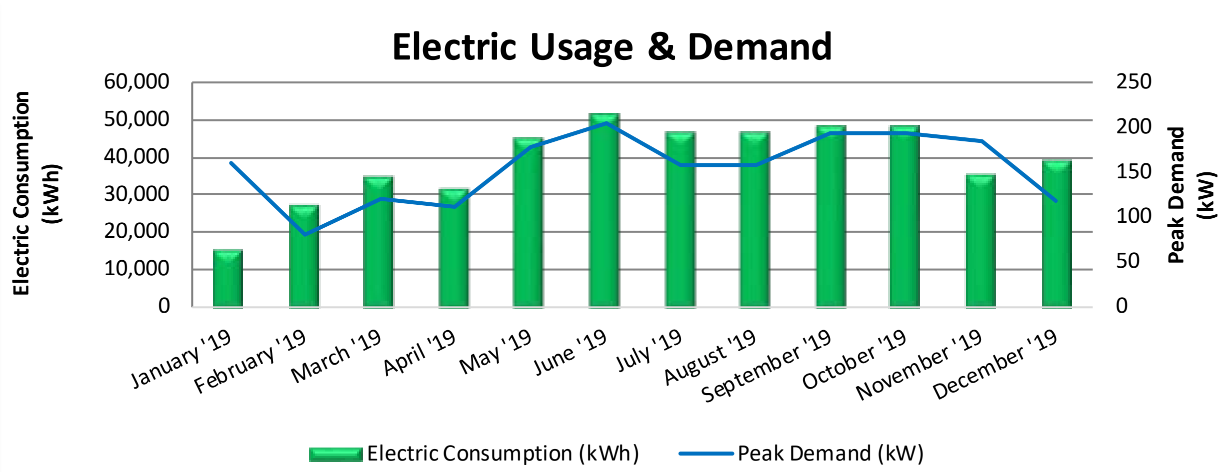


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class General Lighting and Power (GLP), with electric production provided by East Coast Power & Gas, a third-party supplier.



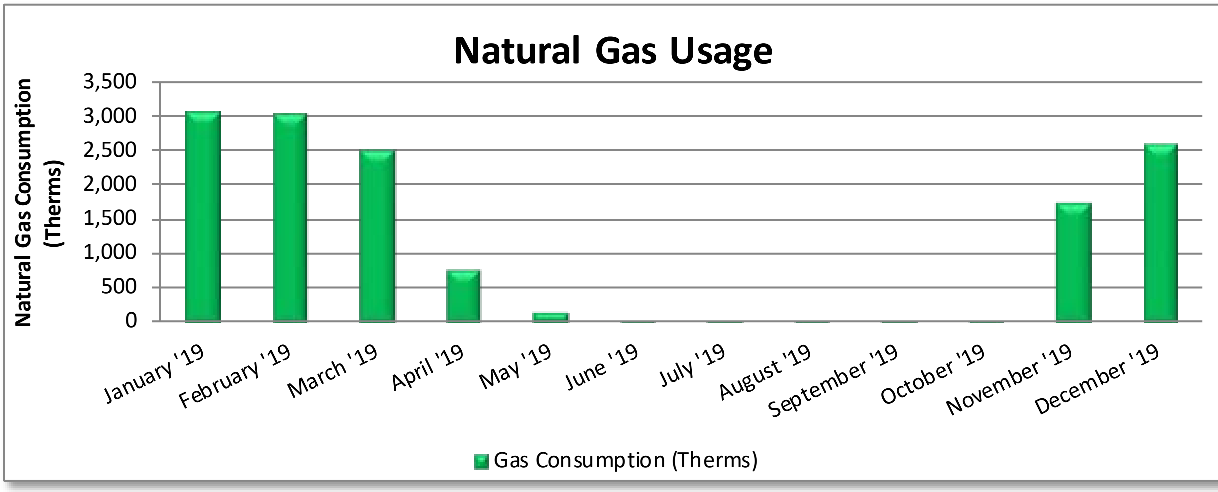
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
1/25/19	30	15,760	161	$632	$2,466
2/26/19	32	27,472	81	$319	$3,517
3/27/19	29	34,743	120	$471	$4,514
4/26/19	30	31,296	111	$436	$4,108
5/28/19	32	44,930	179	$703	$6,123
6/26/19	29	50,981	204	$2,809	$8,705
7/26/19	30	46,563	157	$2,027	$7,423
8/26/19	31	46,563	157	$2,027	$7,423
9/25/19	30	48,029	193	$1,711	$5,833
10/25/19	30	48,029	193	$1,711	$5,833
11/22/19	28	35,186	185	$728	$4,988
12/26/19	34	38,855	118	$465	$5,169
Totals	**365**	**468,405**	**204**	**$14,037**	**$66,102**
Annual	**365**	**468,405**	**204**	**$14,037**	**$66,102**

Notes:

- Peak demand of 204 kW occurred in June '19.
- Average demand over the past 12 months was 155 kW.
- The average electric cost over the past 12 months was $0.141/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class Large Volume Gas (LVG), with natural gas supply provided by East Coast Power & Gas, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
1/25/19	30	3,056	$2,637
2/26/19	32	3,012	$2,757
3/27/19	29	2,485	$2,302
4/26/19	30	768	$544
5/26/19	30	157	$221
6/26/19	31	9	$142
7/26/19	30	9	$142
8/26/19	31	3	$139
9/25/19	30	43	$164
10/24/19	29	43	$164
11/22/19	29	1,743	$1,624
12/26/19	34	2,568	$2,147
Totals	**365**	**13,898**	**$12,983**
Annual	**365**	**13,898**	**$12,983**

Notes:

- The average gas cost for the past 12 months is $0.934/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	36

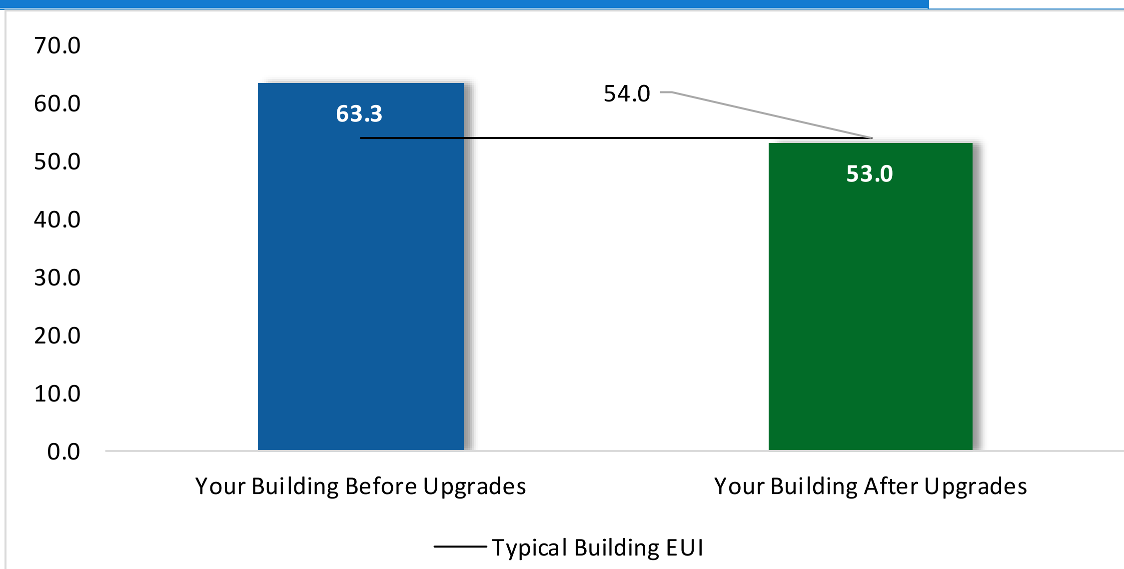


Figure 6 - Energy Use Intensity Comparison[3]

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. A number of factors can cause a building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**77,624**	**14.1**	**-14**	**$10,819**	**$25,276**	**$12,148**	**$13,128**	**1.2**	**76,470**
ECM 1	Install LED Fixtures	Yes	5,549	0.0	0	$783	$4,322	$1,400	$2,922	3.7	5,588
ECM 2	Retrofit Fixtures with LED Lamps	Yes	72,074	14.1	-14	$10,036	$20,955	$10,748	$10,207	1.0	70,882
Lighting Control Measures			**17,849**	**3.6**	**-4**	**$2,484**	**$13,085**	**$5,415**	**$7,670**	**3.1**	**17,537**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	15,032	3.0	-3	$2,092	$10,160	$2,590	$7,570	3.6	14,769
ECM 4	Install High/Low Lighting Controls	Yes	2,816	0.6	-1	$392	$2,925	$2,825	$100	0.3	2,767
Variable Frequency Drive (VFD) Measures			**11,426**	**2.6**	**0**	**$1,612**	**$10,598**	**$2,200**	**$8,398**	**5.2**	**11,506**
ECM 5	Install VFDs on Constant Volume (CV) Fans	Yes	11,426	2.6	0	$1,612	$10,598	$2,200	$8,398	5.2	11,506
Unitary HVAC Measures			**334**	**0.1**	**0**	**$47**	**$5,043**	**$80**	**$4,963**	**105.2**	**337**
ECM 6	Install High Efficiency Air Conditioning Units	No	260	0.1	0	$37	$703	$0	$703	19.2	262
ECM 7	Install High Efficiency PTAC/PTHP	No	74	0.0	0	$10	$4,340	$80	$4,260	406.4	75
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**107**	**$999**	**$60,659**	**$10,194**	**$50,465**	**50.5**	**12,518**
ECM 8	Install High Efficiency Hot Water Boilers	No	0	0.0	107	$999	$60,659	$10,194	$50,465	50.5	12,518
HVAC System Improvements			**780**	**0.0**	**0**	**$110**	**$2,719**	**$0**	**$2,719**	**24.7**	**785**
ECM 9	Implement Demand Control Ventilation (DCV)	No	780	0.0	0	$110	$2,719	$0	$2,719	24.7	785
Domestic Water Heating Upgrade			**278**	**0.0**	**29**	**$306**	**$17,671**	**$1,879**	**$15,792**	**51.6**	**3,628**
ECM 10	Install High Efficiency Gas-Fired Water Heater	Yes	0	0.0	12	$116	$17,542	$1,750	$15,792	135.7	1,459
ECM 11	Install Low-Flow DHW Devices	Yes	278	0.0	16	$190	$129	$129	$0	0.0	2,169
Food Service & Refrigeration Measures			**343**	**0.0**	**0**	**$48**	**$230**	**$0**	**$230**	**4.8**	**345**
ECM 12	Vending Machine Control	Yes	343	0.0	0	$48	$230	$0	$230	4.8	345
TOTALS			**108,633**	**20.4**	**117**	**$16,426**	**$135,282**	**$31,916**	**$103,366**	**6.3**	**123,125**

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

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

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**77,624**	**14.1**	**-14**	**$10,819**	**$25,276**	**$12,148**	**$13,128**	**1.2**	**76,470**
ECM 1	Install LED Fixtures	5,549	0.0	0	$783	$4,322	$1,400	$2,922	3.7	5,588
ECM 2	Retrofit Fixtures with LED Lamps	72,074	14.1	-14	$10,036	$20,955	$10,748	$10,207	1.0	70,882
Lighting Control Measures		**17,849**	**3.6**	**-4**	**$2,484**	**$13,085**	**$5,415**	**$7,670**	**3.1**	**17,537**
ECM 3	Install Occupancy Sensor Lighting Controls	15,032	3.0	-3	$2,092	$10,160	$2,590	$7,570	3.6	14,769
ECM 4	Install High/Low Lighting Controls	2,816	0.6	-1	$392	$2,925	$2,825	$100	0.3	2,767
Variable Frequency Drive (VFD) Measures		**11,426**	**2.6**	**0**	**$1,612**	**$10,598**	**$2,200**	**$8,398**	**5.2**	**11,506**
ECM 5	Install VFDs on Constant Volume (CV) Fans	11,426	2.6	0	$1,612	$10,598	$2,200	$8,398	5.2	11,506
Domestic Water Heating Upgrade		**278**	**0.0**	**29**	**$306**	**$17,671**	**$1,879**	**$15,792**	**51.6**	**3,628**
ECM 10	Install High Efficiency Gas-Fired Water Heater	0	0.0	12	$116	$17,542	$1,750	$15,792	135.7	1,459
ECM 11	Install Low-Flow DHW Devices	278	0.0	16	$190	$129	$129	$0	0.0	2,169
Food Service & Refrigeration Measures		**343**	**0.0**	**0**	**$48**	**$230**	**$0**	**$230**	**4.8**	**345**
ECM 12	Vending Machine Control	343	0.0	0	$48	$230	$0	$230	4.8	345
TOTALS		**107,519**	**20.3**	**10**	**$15,270**	**$66,861**	**$21,642**	**$45,219**	**3.0**	**109,485**

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

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

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**77,624**	**14.1**	**-14**	**$10,819**	**$25,276**	**$12,148**	**$13,128**	**1.2**	**76,470**
ECM 1	Install LED Fixtures	5,549	0.0	0	$783	$4,322	$1,400	$2,922	3.7	5,588
ECM 2	Retrofit Fixtures with LED Lamps	72,074	14.1	-14	$10,036	$20,955	$10,748	$10,207	1.0	70,882

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

ECM 1: Install LED Fixtures

Replace existing fixtures containing HID and incandescent lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofit with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

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

Affected building areas: exterior high-pressure sodium fixtures.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

Affected building areas: all areas with fluorescent fixtures with T8 and T5 tubes.

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		**17,849**	**3.6**	**-4**	**$2,484**	**$13,085**	**$5,415**	**$7,670**	**3.1**	**17,537**
ECM 3	Install Occupancy Sensor Lighting Controls	15,032	3.0	-3	$2,092	$10,160	$2,590	$7,570	3.6	14,769
ECM 4	Install High/Low Lighting Controls	2,816	0.6	-1	$392	$2,925	$2,825	$100	0.3	2,767

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 3: 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, gymnasium, restrooms, break room, cafeteria, kitchen, and storage rooms.

ECM 4: Install High/Low Lighting Controls

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

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

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

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

Affected building areas: hallways and stairwells

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

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**11,426**	**2.6**	**0**	**$1,612**	**$10,598**	**$2,200**	**$8,398**	**5.2**	**11,506**
ECM 5	Install VFDs on Constant Volume (CV) Fans	11,426	2.6	0	$1,612	$10,598	$2,200	$8,398	5.2	11,506

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 5: Install VFDs on Constant Volume (CV) Fans

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

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

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

Affected air handlers: rooftop supply fans serving the new wing, office area, and gym.

4.4 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		**334**	**0.1**	**0**	**$47**	**$5,043**	**$80**	**$4,963**	**105.2**	**337**
ECM 6	Install High Efficiency Air Conditioning Units	260	0.1	0	$37	$703	$0	$703	19.2	262
ECM 7	Install High Efficiency PTAC/PTHP	74	0.0	0	$10	$4,340	$80	$4,260	406.4	75

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

ECM 6: Install High Efficiency Air Conditioning Units

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

Affected units: window AC, Room 117

ECM 7: Install High Efficiency PTAC/PTHP

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

Affected units: Principal's office package terminal AC

4.5 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**	**107**	**$999**	**$60,659**	**$10,194**	**$50,465**	**50.5**	**12,518**
ECM 8	Install High Efficiency Hot Water Boilers	0	0.0	107	$999	$60,659	$10,194	$50,465	50.5	12,518

ECM 8: Install High Efficiency Hot Water Boilers

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

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 at this facility. 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 have reached 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.

4.6 HVAC Improvements

#	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)
HVAC System Improvements		**780**	**0.0**	**0**	**$110**	**$2,719**	**$0**	**$2,719**	**24.7**	**785**
ECM 9	Implement Demand Control Ventilation (DCV)	780	0.0	0	$110	$2,719	$0	$2,719	24.7	785

ECM 9: Implement Demand Control Ventilation (DCV)

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

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

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

Affected building areas: gymnasium/multipurpose room.

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		**278**	**0.0**	**29**	**$306**	**$17,671**	**$1,879**	**$15,792**	**51.6**	**3,628**
ECM 10	Install High Efficiency Gas-Fired Water Heater	0	0.0	12	$116	$17,542	$1,750	$15,792	135.7	1,459
ECM 11	Install Low-Flow DHW Devices	278	0.0	16	$190	$129	$129	$0	0.0	2,169

ECM 10: Install High Efficiency Gas-Fired Water Heater

We evaluated replacing the existing tank water heater with a high efficiency condensing tank water heater. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

ECM 11: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

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

Additional cost savings may result from reduced water usage.

4.8 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**343**	**0.0**	**0**	**$48**	**$230**	**$0**	**$230**	**4.8**	**345**
ECM 12	Vending Machine Control	343	0.0	0	$48	$230	$0	$230	4.8	345

ECM 12: Vending Machine Control

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

4.9 Measures for Future Consideration

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

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

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

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

Installation of an Energy Management System

Most larger facilities have some type of energy management system (EMS) which provides for centralized, remote control and monitoring of HVAC equipment and sometimes lighting or other building systems. An EMS utilizes a system of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems that adjust HVAC system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatic controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

Often smaller facilities are not equipped with central controls. For many small sites, it has been less costly to install distributed local controls, such as programmable thermostats and timeclocks, rather than centralized DDC. Local controls do a reasonably good job of scheduling equipment and maintaining operating conditions by relying on controls integral to HVAC units, such as logic for compressor staging, to manage the equipment operating algorithms.

Even for smaller sites, inefficiencies arise when temperature sensors and thermostat schedules are not maintained, when there are separate systems for heating and cooling, and especially when equipment is added, or the facility is reconfigured or repurposed.

Based on our survey, it appears that the installation of an EMS at your site could increase the efficiency of your building HVAC system operation.

A controls upgrade would enable automated equipment “start” and “stop” times, temperature setpoints, lockouts and deadbands to be programmed remotely using a graphic interface. Controls can be configured to optimize ventilation and outside air intake by adjusting economizer position, damper function and fan speed. Existing chilled and hot water distribution system controls are typically “tied in”, including associated pumps and valves. Coordinated control of HVAC systems is dependent on a network of sensors and status points. A comprehensive building control system provides monitoring and control for all HVAC systems so operators can adjust system programming for optimal comfort and energy savings.

It is recommended that an HVAC engineer or contractor who specializes in energy management systems be contacted for a detailed evaluation and implementation costs. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

5 ENERGY EFFICIENT BEST PRACTICES

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

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

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

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[5]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Doors and Windows

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

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.

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

Lighting Controls

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

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Fans to Reduce Cooling Load

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

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.

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.

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.

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.

Optimize HVAC Equipment Schedules

Energy Management Systems (EMS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The EMS monitors and reports operational status, schedules equipment 'start' and 'stop' times, locks out equipment operation based on outside air or space temperature, and often optimizes damper and valve operation based on complex algorithms. These EMS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your EMS scheduling capabilities. Regularly monitor HVAC equipment operating schedules and match them to building operating hours in order to eliminate unnecessary equipment operation and save energy. Monitoring should be performed often at sites with frequently changing usage patterns – daily in some cases. We recommend using the 'Optimal Start' feature of the EMS, if available, to optimize the building warmup sequence. Most EMS scheduling programs provide for "Holiday" schedules which can be used during reduced use or shutdown periods. Finally, many systems are equipped with a one-time override function which can be used to provide additional space conditioning due to a one-time, special event. When available this override feature should be used rather than changing the base operating schedule.

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.

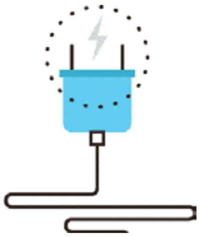
Refrigeration Equipment Maintenance

Preventative maintenance keeps commercial refrigeration equipment running reliably and efficiently. Commercial refrigerators and freezers are mission-critical equipment that can cost a fortune when they go down. Even when they appear to be working properly, refrigeration units can be consuming too much energy. Have walk-in refrigeration and freezer and other commercial systems serviced at least annually. This practice will allow systems to perform to their highest capabilities and will help identify system issues if they exist.

Maintaining your commercial refrigeration equipment can save between 5 and 10 percent on energy costs. When condenser coils are dirty, your commercial refrigerators and freezers work harder to maintain the temperature inside. Worn gaskets, hinges, door handles or faulty seals cause cold air to leak from the unit, forcing the unit to run longer and use more electricity.

Regular cleaning and maintenance also help your commercial refrigeration equipment to last longer.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[6]. Your local utility may offer incentives or rebates for this equipment.

Computer Power Management Software

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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense® website[7] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[8] 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.

[6] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

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

[8] 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.

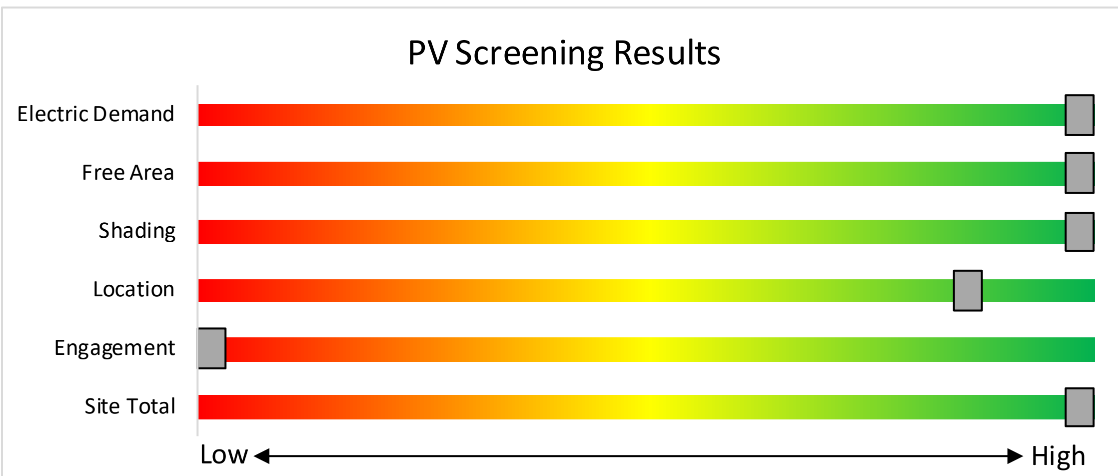
6.1 Solar Photovoltaic

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	155	kW DC STC
Electric Generation	184,662	kWh/yr
Displaced Cost	$26,060	/yr
Installed Cost	$443,300	

Figure 9 - Photovoltaic Screening

Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installation.

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

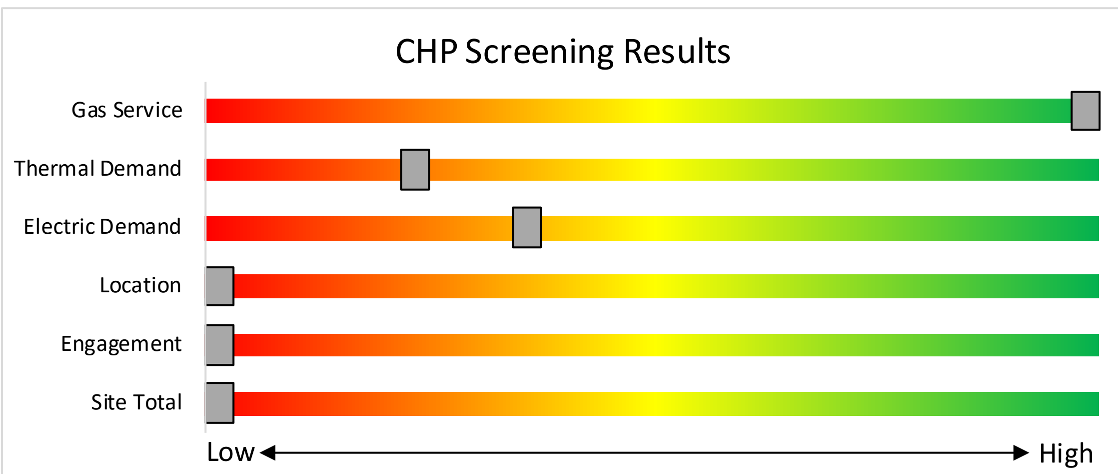


Figure 10 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

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

7.1 SmartStart

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

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

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

Incentives

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

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

How to Participate

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

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

7.2 Direct Install

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

Incentives

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

How to Participate

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

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

7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15 percent source energy savings, and lighting cannot make up the majority of the savings.

P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

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

Incentives

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

How to Participate

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

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

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

7.4 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

7.5 Energy Savings Improvement Program

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

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

How to Participate

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

(1) Use an energy services company or "ESCO."

(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.

(3) Use a hybrid approach of the two options described above where the ESCO is used for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

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

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

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

7.6 Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installations. NJBPU calculates the value of a Transition Renewable Energy Certificate (TREC) by multiplying the base compensation rate ($152/MWh) by the project's assigned factor (i.e. $152 x 0.85 = $129.20/MWh). The TREC factors are defined based on the chart below:

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

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey TRECs.

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

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

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

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

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

8 Project Development

Energy conservation measures (ECMs) have been identified for your site and their energy and economic analyses are provided within this LGEA report. 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 includes the review of multiple bids for project work, incorporate potential operational & maintenance (O&M) cost savings and maximize your incentive potential.

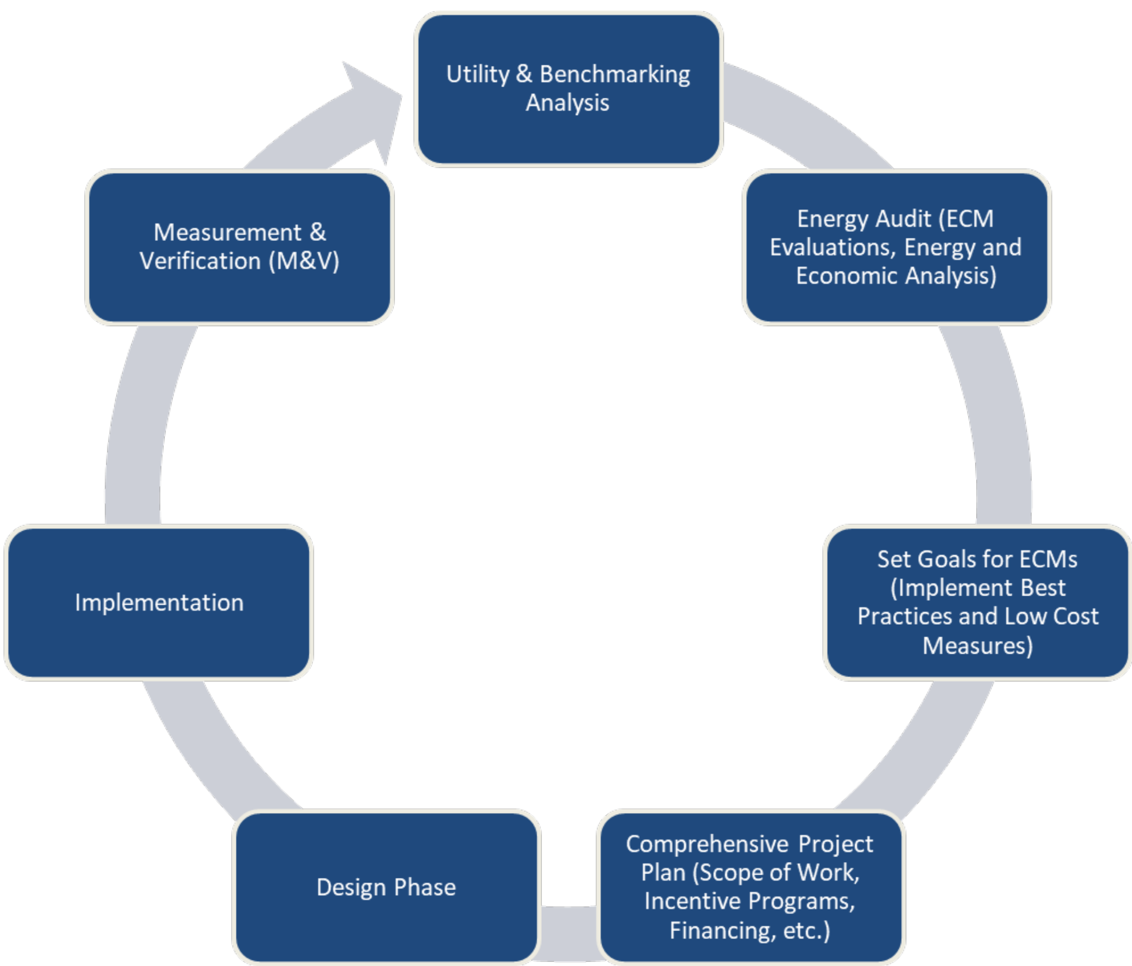


Figure 11 – Project Development Cycle

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[9].

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third-party supplier for natural gas commodity.

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[10].

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

[10] 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
100	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,274	2, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,259	0.0	77	0	$11	$33	$12	1.9
100	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	2,117	0	$295	$781	$350	1.5
100	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.0	151	0	$21	$37	$20	0.8
101	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
101	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
101	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.0	227	0	$32	$55	$30	0.8
102	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
103	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
103	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
103	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.0	227	0	$32	$55	$30	0.8
104	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
106	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
106	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,274	2, 3	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,259	0.1	266	0	$37	$73	$40	0.9
107	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
107	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
107	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,274	2, 3	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,259	0.1	266	0	$37	$73	$40	0.9
112 Lobby	1	U-Bend Fluorescent - T8: U T8 (32W) - 1L	Wall Switch	S	39	3,274	2	Relamp	No	1	LED - Linear Tubes: (1) U-Lamp	Wall Switch	17	3,274	0.0	81	0	$11	$36	$10	2.3
115	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.3	1,663	0	$231	$672	$290	1.6
116	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.3	1,663	0	$231	$672	$290	1.6
117	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.3	1,512	0	$210	$635	$270	1.7
118	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.4	1,814	0	$253	$708	$310	1.6
119	1	Incandescent: (1) 60W A21 Screw-In Lamp	Wall Switch	S	60	3,274	2	Relamp	No	1	LED Lamps: A21 Lamps	Wall Switch	9	3,274	0.0	184	0	$26	$35	$2	1.3
119	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.5	2,495	-1	$347	$872	$400	1.4
120	1	Incandescent: (1) 60W A21 Screw-In Lamp	Wall Switch	S	60	3,274	2	Relamp	No	1	LED Lamps: A21 Lamps	Wall Switch	9	3,274	0.0	184	0	$26	$35	$2	1.3
120	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.5	2,495	-1	$347	$872	$400	1.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	**Fixture Quantity**	**Fixture Description**	**Control System**	**Light Level**	**Watts per Fixture**	**Annual Operating Hours**	**ECM #**	**Fixture Recommendation**	**Add Controls?**	**Fixture Quantity**	**Fixture Description**	**Control System**	**Watts per Fixture**	**Annual Operating Hours**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Break Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.3	1,361	0	$189	$599	$250	1.8
Cafeteria	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,274	2, 3	Relamp	Yes	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,259	0.9	4,262	-1	$593	$1,708	$780	1.6
Closet	1	LED Lamps: (1) 9W A21 Screw-In Lamp	Wall Switch	S	9	1,000		None	No	1	LED Lamps: (1) 9W A21 Screw-In Lamp	Wall Switch	9	1,000	0.0	0	0	$0	$0	$0	0.0
Electrical Room 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,274	0.0	119	0	$17	$37	$20	1.0
Hallway	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 4	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,259	0.8	3,856	-1	$537	$1,606	$1,185	0.8
Hallway 2	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,259	0.3	1,361	0	$189	$554	$405	0.8
Hallway 3	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
Hallway 3	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,259	0.5	2,722	-1	$379	$1,107	$810	0.8
Isolation Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,274	0.0	238	0	$33	$73	$40	1.0
Kitchen 1	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
Kitchen 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.1	454	0	$63	$380	$130	4.0
Main Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.1	454	0	$63	$380	$130	4.0
Main Vestibule	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
Main Vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.1	454	0	$63	$380	$130	4.0
Mechanical 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,274	0.1	475	0	$66	$146	$80	1.0
Mechanical 1	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,274	0.1	594	0	$83	$183	$100	1.0
Nurse Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,274	0.0	178	0	$25	$55	$30	1.0
Nurse Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.2	1,134	0	$158	$544	$220	2.1
Principal Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.2	907	0	$126	$489	$190	2.4
Restroom - Female 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.1	605	0	$84	$416	$150	3.2
Restroom - Female New Wing	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.1	454	0	$63	$380	$130	4.0
Restroom - Male 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.1	454	0	$63	$380	$130	4.0

	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
Restroom - Male 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,274	2	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,274	0.0	202	0	$28	$73	$40	1.2
Restroom - Unisex 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,274	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,274	0.0	58	0	$8	$33	$12	2.6
Restroom - Unisex 2	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,274	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,274	0.0	58	0	$8	$33	$12	2.6
Stairs 1	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,259	0.1	454	0	$63	$335	$270	1.0
Stairs 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,274	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,259	0.1	533	0	$74	$371	$220	2.0
Stairs 2	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
Stairs 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,259	0.1	605	0	$84	$371	$305	0.8
Stairs 3	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
Stairs 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,259	0.1	605	0	$84	$371	$305	0.8
Storage MPR	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,000	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.0	18	0	$2	$33	$12	8.4
Vestibule	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
Vestibule	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,274	0.0	178	0	$25	$55	$30	1.0
111A New Wing	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
111A New Wing	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.4	1,814	0	$253	$708	$310	1.6
123	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.5	2,722	-1	$379	$927	$430	1.3
201	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.3	1,663	0	$231	$672	$290	1.6
202	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.3	1,663	0	$231	$672	$290	1.6
204	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.3	1,663	0	$231	$672	$290	1.6
208	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.5	2,495	-1	$347	$872	$400	1.4
209	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.5	2,495	-1	$347	$872	$400	1.4
Exterior	6	High-Pressure Sodium: (1) 175W Lamp	Photocell		175	4,380	1	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	53	4,380	0.0	3,219	0	$454	$2,293	$600	3.7
Exterior	4	High-Pressure Sodium: (1) 70W Lamp	Photocell		95	4,380	1	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	29	4,380	0.0	1,165	0	$164	$1,014	$400	3.7
Exterior	2	High-Pressure Sodium: (1) 70W Lamp	Timeclock		95	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	29	4,380	0.0	583	0	$82	$507	$200	3.7
Exterior	2	High-Pressure Sodium: (1) 70W Lamp	Photocell		95	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	29	4,380	0.0	583	0	$82	$507	$200	3.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	**Fixture Quantity**	**Fixture Description**	**Control System**	**Light Level**	**Watts per Fixture**	**Annual Operating Hours**	**ECM #**	**Fixture Recommendation**	**Add Controls?**	**Fixture Quantity**	**Fixture Description**	**Control System**	**Watts per Fixture**	**Annual Operating Hours**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Exterior	5	Incandescent: (1) 60W A21 Screw-In Lamp	Wall Switch		60	4,380	2	Relamp	No	5	LED Lamps: A21 Lamps	Wall Switch	9	4,380	0.0	1,117	0	$158	$176	$10	1.1
Exterior	3	Incandescent: (2) 75W PAR30 Screw-In Lamps	Timeclock		150	4,380	2	Relamp	No	3	LED Lamps: PAR30 Lamps	Timeclock	23	4,380	0.0	1,675	0	$236	$139	$36	0.4
Exterior	4	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell		14	4,380		None	No	4	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell	14	4,380	0.0	0	0	$0	$0	$0	0.0
Guidance Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.1	605	0	$84	$416	$150	3.2
Hallway 2nd Floor	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway 2nd Floor	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 4	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,259	0.6	2,948	-1	$410	$1,387	$1,065	0.8
Multipurpose New Wing	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
Multipurpose New Wing	30	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	S	234	3,274	2, 3	Relamp	Yes	30	LED - Linear Tubes: (4) 4' T5HO (25W) Lamps	Occupancy Sensor	102	2,259	3.5	17,676	-4	$2,460	$3,608	$1,340	0.9
New Wing Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,000	0.0	54	0	$8	$55	$30	3.3
Restroom - female 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.1	605	0	$84	$416	$150	3.2
Restroom - Male 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,259	0.1	605	0	$84	$416	$150	3.2
Restroom - Male 5 New Wing	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,274	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,259	0.1	454	0	$63	$380	$130	4.0
Restroom - Unisex 4	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,274	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,274	0.0	119	0	$17	$37	$20	1.0
Storage 205	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$20	3.3
Storage MPR 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.3	416	0	$58	$599	$180	7.2

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
Mechanical 1	Whole Building	2	Combustion Air Fan	0.5	78.2%	No	Marathon Electric	DQA 56C34D2098F	W	4,000		No	78.2%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Whole Building	2	Exhaust Fan	0.3	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 1	Whole Building	2	Heating Hot Water Pump	5.0	89.5%	Yes	Weg	00518ET	W	4,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 1	Whole Building	2	DHW Circulation Pump	0.8	81.8%	No	Unknown	Unknown	W	8,760		No	81.8%	No		0.0	0	0	$0	$0	$0	0.0
100	100	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
101	101	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
102	102	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
103	103	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
104	104	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
106	106	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
107	107	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
115	115	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
116	116	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
117	117	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
118	118	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
119	119	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
120	120	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
Cafeteria	Cafeteria	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
201	201	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
202	202	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	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
204	204	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
208	208	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
209	209	1	Supply Fan	0.1	68.5%	No	Unknown	Unknown	W	4,000		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	New wing	1	Supply Fan	2.0	86.5%	No	Trane	Unknown	W	4,000	5	No	86.5%	Yes	1	0.6	2,587	0	$365	$3,261	$200	8.4
Roof	Office Area	1	Supply Fan	2.0	86.5%	No	Rheem	RKKA-A036JK12E	W	4,000	5	No	86.5%	Yes	1	0.6	2,587	0	$365	$3,261	$200	8.4
Roof	Gym	1	Supply Fan	5.0	89.5%	No	Trane	TCD151C30RBB	W	4,000	5	No	89.5%	Yes	1	1.4	6,251	0	$882	$4,076	$1,800	2.6

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
Exterior	100 cu7	1	Split-System	3.00		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	101 cu8	1	Split-System	3.00		13.00		Trane	M2AC3030B1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	102 cu6	1	Split-System	3.00		13.00		Trane	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	103 cu 9	1	Split-System	3.00		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	104 cu5	1	Split-System	3.00		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	106 cu4	1	Split-System	3.50		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	202 cu18	1	Split-System	3.50		13.00		Trane	2TTB3042A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu1 119	1	Split-System	3.00		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu10	1	Split-System	2.97		13.00		Thermal Zone	TZAB-336-2N	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu11 201	1	Split-System	3.50		13.00		Ameristar	M2AC3042B1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu12 118	1	Split-System	3.00		13.00		Ameristar	M2AC3030B1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu13 120	1	Split-System	3.00		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu14 116	1	Split-System	3.00		13.00		Trane	2TTB3036A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu15 204	1	Split-System	3.50		13.00		Trane	2TTB3042A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu16 208	1	Split-System	2.50		13.00		Trane	2TTB3030A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu17 209	1	Split-System	2.50		13.00		Trane	2TTB3030A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu19 cafeteria	1	Split-System	4.00		13.00		Goodman	GSC130481CC	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu2 117	1	Split-System	1.50		13.00		Trane	2TTB3018A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu20 cafeteria	1	Split-System	4.00		13.00		Trane	2TTB3048A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior	Cu3 115	1	Split-System	3.50		13.00		Trane	2TTB3042A1000AA	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (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 (kBtu/hr)	Cooling Mode Efficiency (SEER/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
Roof	Nurses Office	1	Split-System	2.00		13.00		Trane	2TTB3024A1000 AA	W		No							0.0	0	0	$0	$0	$0	0.0
Principal Office	Principal Office	1	Packaged Terminal AC	1.00		10.00		Trane	HWK 01	B	7	Yes	1	Packaged Terminal AC	1.00		10.50		0.0	74	0	$10	$4,340	$80	406.4
Guidance Office	Guidance Office	1	Packaged Terminal AC	1.00		10.00		Trane	HWK 02	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	New wing	1	Package Unit	3.00		10.00		Trane	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Gym	1	Package Unit	12.58		11.30		Trane	TCD151C30RBB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Main Office Area	1	Package Unit	3.00	97.00	10.00	80 AFUE	Rheem	RKKA-A036JK12E	B		No							0.0	0	0	$0	$0	$0	0.0
117	117	1	Window AC	1.00		10.00		Unknown	Unknown	B	6	Yes	1	Window AC	1.00		12.00		0.1	260	0	$37	$703	$0	19.2
118	118	1	Window AC	1.00		13.00		Unknown	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Main Office	Main Office	1	Window AC	1.00		13.00		Unknown	Unknown	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
Mechanical 1	Entire Building	2	Non-Condensing Hot Water Boiler	1,699	HB Smith	28A-7	W	8	Yes	2	Non-Condensing Hot Water Boiler	1,699	85.00%	Et	0.0	0	107	$999	$60,659	$10,194	50.5

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Gym	Gym	9	2.00	12.58	0.00	0.00	0.0	780	0	$110	$2,719	$0	24.7

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
Mechanical 1	Entire Building	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	D80T2503NA	B	10	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	93.00%	UEF	0.0	0	12	$116	$17,542	$1,750	135.7
New Wing Closet	New Wing with Gymnasium and Restrooms	1	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	M240S6DS5	B		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommendation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Throughout Builing	11	17	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	16	$151	$122	$122	0.0
New wing multipurpose room	11	1	Faucet Aerator (Lavatory)	2.20	0.50	0.0	278	0	$39	$7	$7	0.0

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
Cafeteria	1	Freezer Chest	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Cafeteria	1	Refrigerator Chest	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	1	Stand-Up Freezer, Solid Door (≤15 cu. ft.)	Electrolux	FFU1464FW1	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
Cafeteria	1	Insulated Food Holding Cabinet (Full Size)	Unknown	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Convection Oven (Full Size)	Unknown	Unknown	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
Mechanical 1	1	Clothes Dryer	5,000	No	Various	Various
Mechanical 1	1	Clothes Washer	900	No	Various	Various
Break Room	1	Coffee Machine	900	No	Various	Various
Classrooms	27	Desktop Computer	1,500	No	Various	Various
Classrooms	34	Ceiling Fans	100	No	Various	Various
Break Room	2	Microwave	1,000	No	Various	Various
Classrooms	16	Laptop Cart	640	No	Various	Various
Break Room	1	Paper Shredder	150	No	Various	Various
Main Office and 123 class	2	Printer (Medium/Small)	20	No	Various	Various
Classrooms	6	Printer/Copier (Large)	600	No	Various	Various
Classrooms	19	Projector	200	No	Various	Various

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Break room	1	Non-Refrigerated	12	Yes	0.0	343	0	$48	$230	$0	4.8

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Glenview Avenue Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 47,167
Built: 1955

For Year Ending: November 30, 2019
Date Generated: November 18, 2020

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Glenview Avenue Elementary School 1700 Sycamore Street Haddon Heights, New Jersey 08035	Haddon Heights School District 316-A Seventh Avenue Haddon Heights, NJ 08035 (856) 547-1412	Stephen Burns 316-A Seventh Avenue Haddon Heights, NJ 08035 (856) 547-1412 burnss@hhsd.k12.nj.us

Property ID: 12352991

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
62 kBtu/ft²

Source EUI
122.5 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	1,377,723 (47%)
Electric - Grid (kBtu)	1,546,504 (53%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	54
National Median Source EUI (kBtu/ft²)	106.7
% Diff from National Median Source EUI	15%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	221

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.