Local Government Energy Audit Report

Franklin Elementary School

April 19, 2019

Prepared for:

Union Township School District
1550 Lindy Terrace
Union, NJ 07083

Prepared by:

TRC Energy Services
900 Route 9 North
Woodbridge, NJ 07095

Disclaimer

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

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

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

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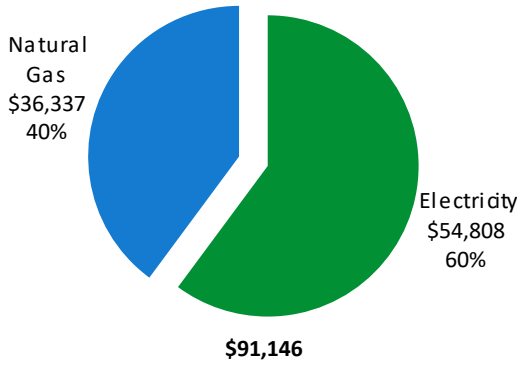
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Franklin 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 Energy Services (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 help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $91,146 Electricity: 317,112 kWh Natural Gas: 32,770 Therms	
ENERGY STAR® Benchmarking Score	53 *(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.

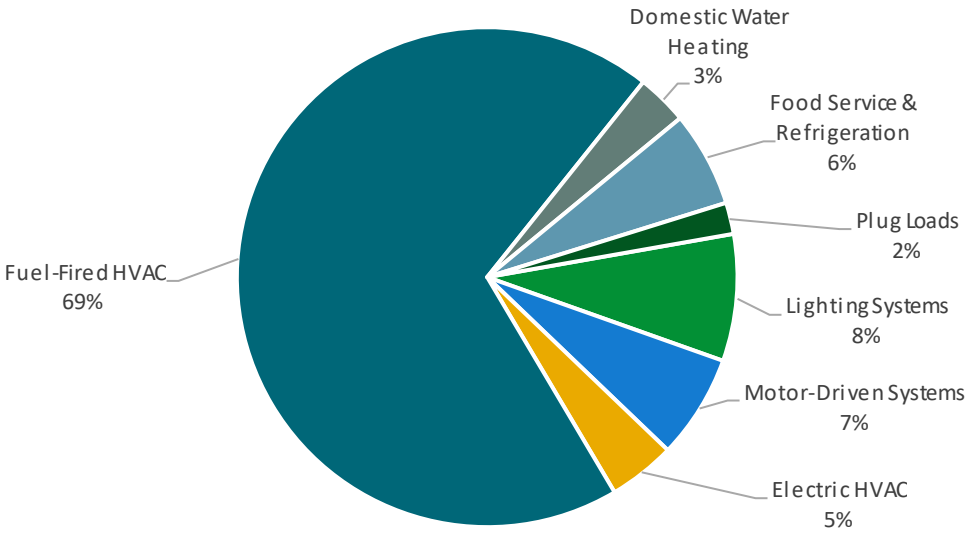


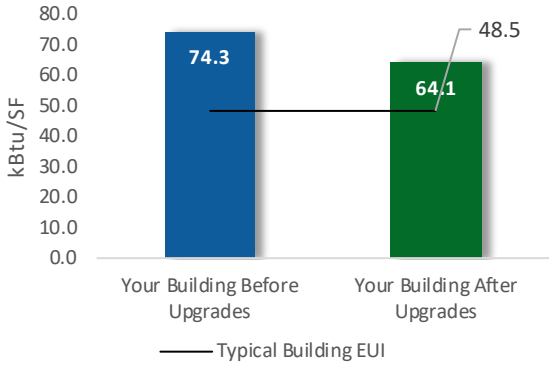
Figure 1 - Energy Use by System

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.

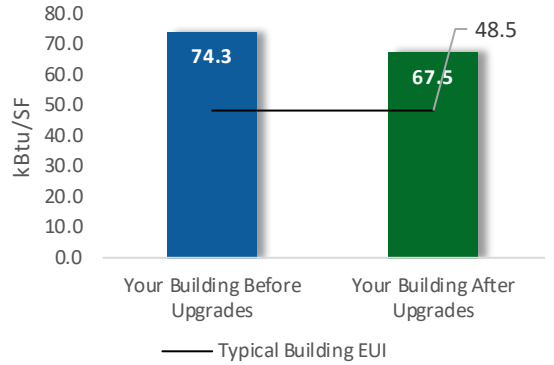
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$382,108
Potential Rebates & Incentives[1]	$28,827
Annual Cost Savings	$24,032
Annual Energy Savings	Electricity: 128,565 kWh Natural Gas: 1,634 Therms
Greenhouse Gas Emission Savings	74 Tons
Simple Payback	14.7 Years
Site Energy Savings (all utilities)	14%



Scenario 2: Cost Effective Package[2]

Installation Cost	$112,557
Potential Rebates & Incentives	$13,430
Annual Cost Savings	$18,984
Annual Energy Savings	Electricity: 107,871 kWh Natural Gas: 306 Therms
Greenhouse Gas Emission Savings	56 Tons
Simple Payback	5.2 Years
Site Energy Savings (all utilities)	9%



On-site Generation Potential

Photovoltaic	Medium
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**67,130**	**21.8**	**-13**	**$11,455**	**$171,823**	**$42,520**	**$8,985**	**$33,535**	**2.9**	**66,041**
ECM 1	Install LED Fixtures	9,670	2.6	-1	$1,657	$24,854	$17,419	$2,850	$14,569	8.8	9,586
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	88	0.0	0	$15	$225	$65	$6	$59	3.9	86
ECM 3	Retrofit Fixtures with LED Lamps	57,372	19.1	-12	$9,783	$146,744	$25,036	$6,129	$18,907	1.9	56,368
Lighting Control Measures		**11,436**	**3.7**	**-2**	**$1,950**	**$15,601**	**$16,624**	**$1,895**	**$14,729**	**7.6**	**11,236**
ECM 4	Install Occupancy Sensor Lighting Controls	9,761	3.2	-2	$1,664	$13,315	$14,024	$1,895	$12,129	7.3	9,590
ECM 5	Install High/Low Lighting Controls	1,676	0.5	0	$286	$2,286	$2,600	$0	$2,600	9.1	1,646
Motor Upgrades		**8,821**	**2.9**	**0**	**$1,525**	**$22,868**	**$29,946**	**$0**	**$29,946**	**19.6**	**8,882**
ECM 6	Premium Efficiency Motors	8,821	2.9	0	$1,525	$22,868	$29,946	$0	$29,946	19.6	8,882
Variable Frequency Drive (VFD) Measures		**7,722**	**2.9**	**0**	**$1,335**	**$20,020**	**$6,552**	**$800**	**$5,752**	**4.3**	**7,776**
ECM 7	Install VFDs on Constant Volume (CV) Fans	7,722	2.9	0	$1,335	$20,020	$6,552	$800	$5,752	4.3	7,776
Electric Unitary HVAC Measures		**20,304**	**32.2**	**0**	**$3,509**	**$52,638**	**$157,499**	**$9,492**	**$148,007**	**42.2**	**20,446**
	Install High Efficiency Air Conditioning Units	20,304	32.2	0	$3,509	$52,638	$157,499	$9,492	$148,007	42.2	20,446
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**114**	**$1,268**	**$25,359**	**$97,303**	**$5,235**	**$92,068**	**72.6**	**13,389**
	Install High Efficiency Steam Boilers	0	0.0	114	$1,268	$25,359	$97,303	$5,235	$92,068	72.6	13,389
HVAC System Improvements		**390**	**0.0**	**26**	**$360**	**$4,232**	**$3,026**	**$0**	**$3,026**	**8.4**	**3,485**
	Implement Demand Control Ventilation (DCV)	390	0.0	0	$67	$1,010	$2,719	$0	$2,719	40.4	392
ECM 8	Install Pipe Insulation	0	0.0	26	$293	$3,222	$308	$0	$308	1.1	3,093
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$286**	**$3,186**	**$4,962**	**$170**	**$4,792**	**16.8**	**3,021**
	Install High Efficiency Gas-Fired Water Heater	0	0.0	6	$65	$976	$4,912	$170	$4,742	72.8	687
ECM 9	Install Low-Flow DHW Devices	0	0.0	20	$221	$2,210	$50	$0	$50	0.2	2,333
Food Service & Refrigeration Measures		**12,763**	**1.5**	**13**	**$2,345**	**$26,187**	**$23,677**	**$2,250**	**$21,427**	**9.1**	**14,319**
	Food Service Equipment Replacement	0	0.0	13	$139	$1,667	$7,119	$500	$6,619	47.7	1,467
ECM 10	Replace Refrigeration Equipment	11,151	1.3	0	$1,927	$23,128	$16,328	$1,750	$14,578	7.6	11,229
ECM 11	Vending Machine Control	1,612	0.2	0	$279	$1,393	$230	$0	$230	0.8	1,623
TOTALS		**128,565**	**65.0**	**163**	**$24,032**	**$341,914**	**$382,108**	**$28,827**	**$353,281**	**14.7**	**148,595**

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

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

Figure 2 – Evaluated Energy Improvements

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 Fluorescent Fixtures with LED Lamps and Drivers	x	x	
ECM 3	Retrofit Fixtures with LED Lamps	x	x	
ECM 4	Install Occupancy Sensor Lighting Controls	x	x	
ECM 5	Install High/Low Lighting Controls		x	
ECM 6	Premium Efficiency Motors		x	
ECM 7	Install VFDs on Constant Volume (CV) HVAC	x	x	
ECM 8	Install Pipe Insulation		x	
ECM 9	Install Low-Flow Domestic Hot Water Devices		x	
ECM 10	Replace Refrigeration Equipment	x	x	
ECM 11	Vending Machine Control		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 that SmartStart, up to 70% of the cost of selected measures. Direct Install contractors will assess and verify individual measure eligibility and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

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

More Options from Around the State

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

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

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

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

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce their 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 Franklin 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 Energy Services (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 September 14, 2018, TRC performed an energy audit at Franklin Elementary School located in Union, NJ. TRC met with Dwaine Dadney to review the facility operations and help focus our investigation on specific energy-using systems.

Franklin Elementary School is a 3-story, 58,635 square foot building built in 1931. Spaces include: classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, offices, a commercial kitchen and basement mechanical space.

Recent improvements in the facility include new exterior doors and a flat roof.

Facility concerns include: Roof leakage, windows in poor condition. The site staff have also complained about inefficiencies in the cooling system.

2.2 Building Occupancy

The building is in operation 10 months out of the year. General operation is 6:30 AM to 10:00 PM Monday through Friday. The school is cleaned after hours between 6:00 PM and 10:00 PM. The building is occupied by 431 students and about 74 staff. The typical schedule is presented in the table below.

Building Occupancy Schedule		
Building Name	**Weekday/Weekend**	**Operating Schedule**
Franklin Elementary School - General Hours of Operation	Weekday	6:30 AM - 10:00 PM
	Weekend	Closed
Classe's Hours of Operation	Weekday	8:45 AM - 2:50 PM
	Weekend	

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a brick facade. The building has both pitched and flat roof sections. The new flat roof has a gravel layer which is in good condition, however, the pitched roof with asphalt shingles was observed to be leaking into a classroom.

Most of the windows are double glazed, observed to be in poor condition. The facility exterior doors are new and in good condition.

Building Envelope

2.4 Lighting Systems

In classrooms, offices, most hallways and restrooms, the interior lighting system uses 32-Watt linear fluorescent T8 lamps, LED linear tubes, compact fluorescent lamps (CFL) and some incandescent lamp fixtures. One of the restrooms also has 2-foot 40-Watt T12 fixtures. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Linear fluorescent and LED fixture types include 2- 3- or 4-lamp, 2- or 4-foot long troffers while the compact fluorescent lamp fixtures are either recessed or surface mounted. There are also some 2-foot fixtures with U-bend tube lamps in the first-floor hallways.

Most of the fixtures excluding those with T12 lamps are in good condition, and the spaces are sufficiently lit. The lighting fixtures in the spaces are controlled using wall switches.

The exit lights at the facility are all 2-Watt LED fixtures.

Surface mounted and recessed exterior lighting fixtures at the entrance have LED screw-in lamps that are 11-Watts and 9-Watts respectively. Wall packs include 55-Watt and 155-Watt LED fixtures and some 150-Watt metal halide fixtures. All of the exterior lights are on a time clock.

Typical Interior Lighting System

Exterior Lights & Timer

2.5 Air Handling Systems

Unit Ventilators

The facility has 30 unit ventilators with supply fan motors, pneumatically controlled outside air dampers and fan coil valves that operate with a pneumatic control system to provide heat. This system is original to the building and appears to be in fair operating condition.

Air Conditioners

Main office, nurse's office, custodian office, teachers room, and gymnasium are cooled using window air conditioning (AC) units. All of these units have a capacity of 1.5 ton with EER ranging from 9.5 to 10.8.

Most classrooms, library, and library annex are cooled using split AC units with capacities that range from 3 to 3.5 tons, with an average EER value of 11. Most of these units are old and have been evaluated for replacement. The split AC unit work in conjunction with fan coils located above the ceiling. Space temperatures are controlled using programmable thermostats.

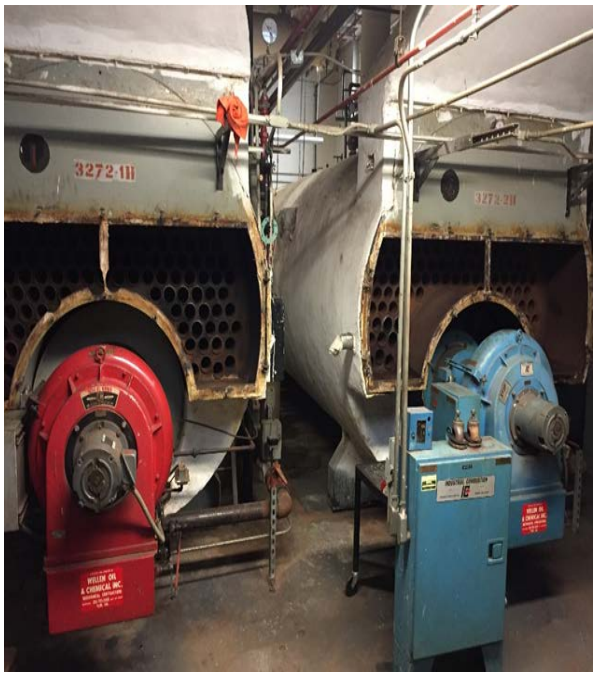
Auditorium cooling is provided by two 20 ton Trane split AC units. These units were installed in 2004 and have also been evaluated for replacement.

During the audit, some rooms were said to reach temperatures as high as 87°F in summer, and occupants registered their complaints regarding this discomfort.

Air Conditioning System

2.6 Steam Heating Systems

The steam system consists of two gas-fired 2,617 MBh output, forced draft boilers. The boilers have an estimated combustion efficiency of 78%. Each boiler has a 5 hp forced draft fan with discharge dampers to control the volume of combustion air. There are two 0.75 hp boiler feed water pumps. Steam is distributed to the unit ventilators in classrooms and radiators in other spaces. The boilers operate in a lead/lag configuration, but both boilers may be required during cold weather. The boilers are 60 years old and have passed their useful service life. The heating system is controlled through pneumatic control system using compressed air. Pneumatic thermostats are located in spaces for heating temperature control. One air compressor with dual 5 hp motors and one 1 hp backup air compressors provide compress air to the building.



Pacific Steel Steam Boilers

2.7 Domestic Hot Water

Hot water is produced by two gas fired domestic hot water heaters. The A. O. Smith unit serving the kitchen has an input capacity of 199 MBh, a tank capacity of 100 gallons, and is 80% efficient. This unit is beyond the useful life of the equipment and has been evaluated for replacement.

A Teledyne Laars unit serves the rest of the school and has an input capacity of 199 MBh. The unit has a tank capacity of 119 gallons and is 83% efficient. This unit is within the useful life and in good condition.

The domestic hot water pipes were observed to be non-insulated and the insulation is in fair condition.

Domestic Hot Water System

2.8 Food Service Equipment

The kitchen has a mixture of gas and electric equipment used to prepare lunches for students. Most cooking is done using a convection oven and a gas-fired cooking range. Bulk prepared foods are held in several holding cabinets. Some equipment is old and in fair condition.

The dishwasher is an ENERGY STAR® high temperature door-type unit equipped with an electric booster.

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

From Top Clockwise: Gas-fired Range, Dishwasher, Electric Food Warner, Convection Oven

2.9 Refrigeration

The kitchen has several stand-up refrigerators and freezers with either solid or glass doors and a couple of refrigerator chests. There is also an energy efficient stand-up solid door freezer. Most of the equipment however is old and have been evaluated for replacement.

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

Refrigeration System

2.10 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 2.03% percent of total building energy use. This is lower than a typical building.

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

There are approximately 150 computer work stations throughout the facility. Plug loads throughout the building include general café and office equipment.

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

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

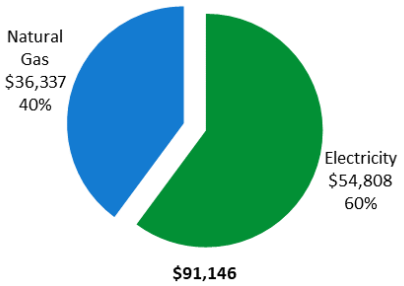
2.11 Water-Using Systems

There are several restrooms at this facility. A sampling of restrooms found that some faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.2 gallons per flush (gpf), and the urinals are rated at 2 gpf.

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	317,112	$54,808
Natural Gas	32,770	$36,337
Total (MMBtu & $)	**4,359.0**	**$91,146**



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.

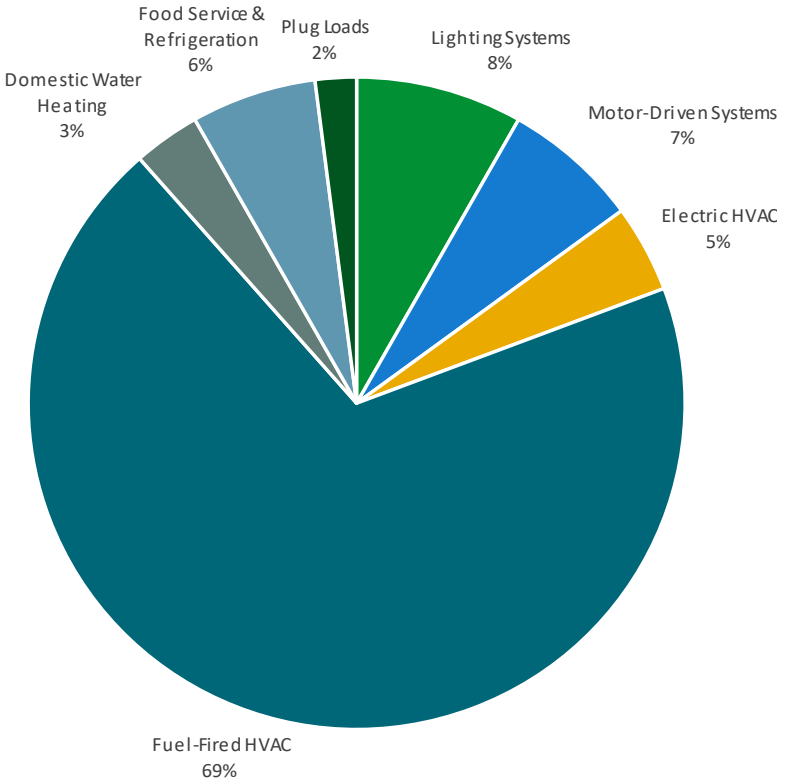
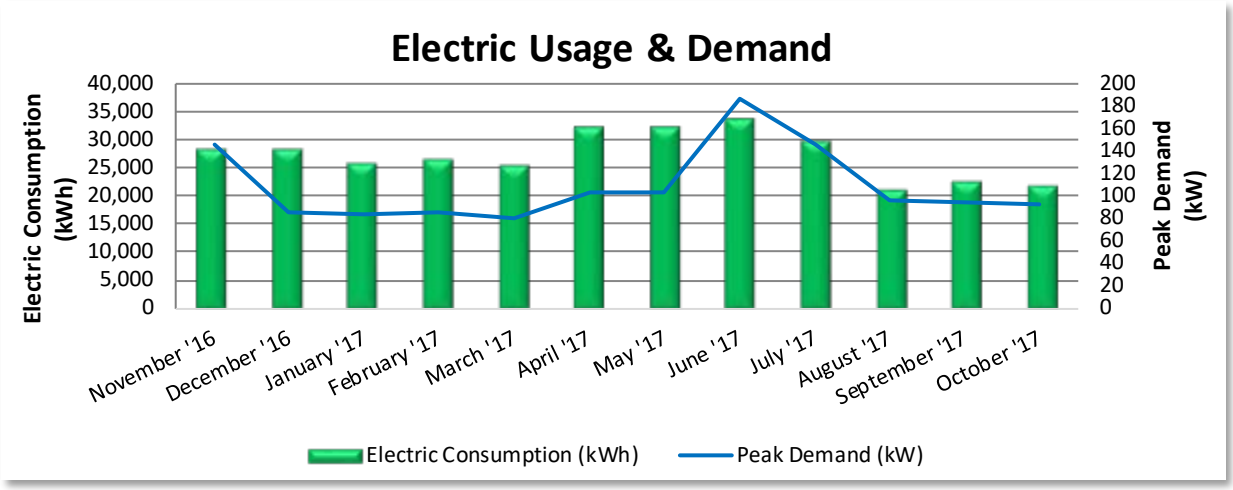


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class LPLS, with electric production provided by South Jersey Energy Company, a third-party supplier.



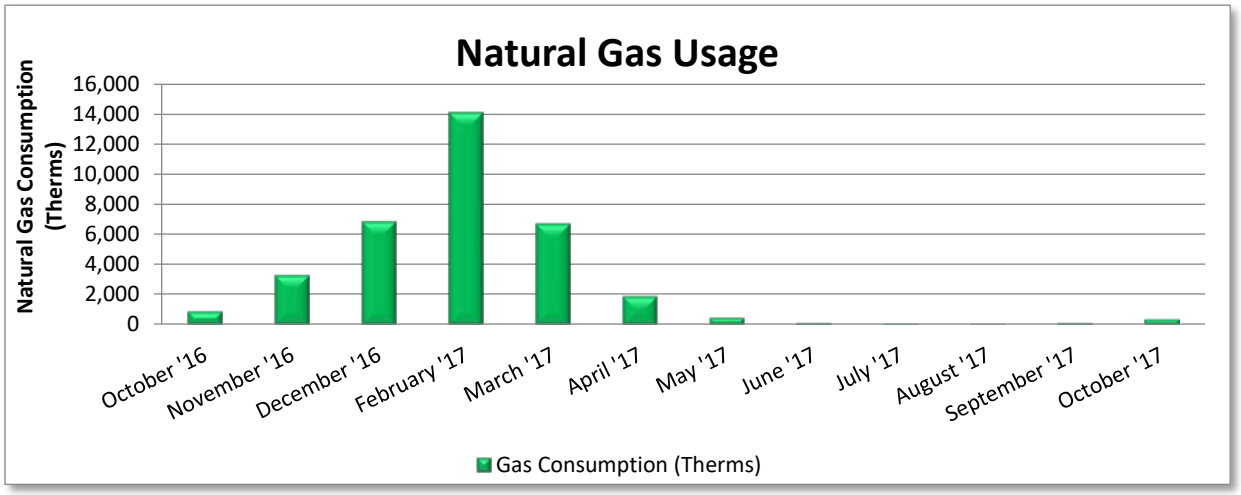
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
11/15/16	30	28,000	146	$544	$4,782
12/16/16	31	28,000	86	$320	$4,583
1/19/17	34	25,800	84	$313	$4,286
2/17/17	29	26,400	86	$320	$4,377
3/20/17	31	25,400	80	$300	$4,314
4/18/17	29	31,900	104	$426	$5,273
5/31/17	43	31,900	104	$426	$5,273
6/29/17	29	33,600	186	$701	$6,561
7/28/17	29	29,600	146	$550	$5,596
8/29/17	32	21,000	96	$362	$3,982
9/28/17	30	22,400	94	$359	$4,136
10/26/17	28	21,800	92	$329	$3,147
Totals	**375**	**325,800**	**186**	**$4,949**	**$56,310**
Annual	**365**	**317,112**	**186**	**$4,817**	**$54,808**

Notes:

- Peak demand of 186 kW occurred in June '17.
- The average electric cost over the past 12 months was $0.173/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

Elizabethtown Gas delivers natural gas under rate class 231, with natural gas supply provided by Hudson Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
11/1/16	30	917	$1,679
12/1/16	30	3,344	$4,557
1/1/17	31	6,904	$9,128
2/27/17	57	14,148	$11,710
3/28/17	29	6,748	$5,611
4/27/17	30	1,925	$1,978
5/30/17	33	497	$931
6/28/17	29	123	$658
7/31/17	33	81	$706
8/29/17	29	75	$630
9/28/17	30	134	$673
10/30/17	32	389	$861
Totals	**393**	**35,284**	**$39,125**
Annual	**365**	**32,770**	**$36,337**

Notes:

- The average gas cost for the past 12 months is $1.109/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	53

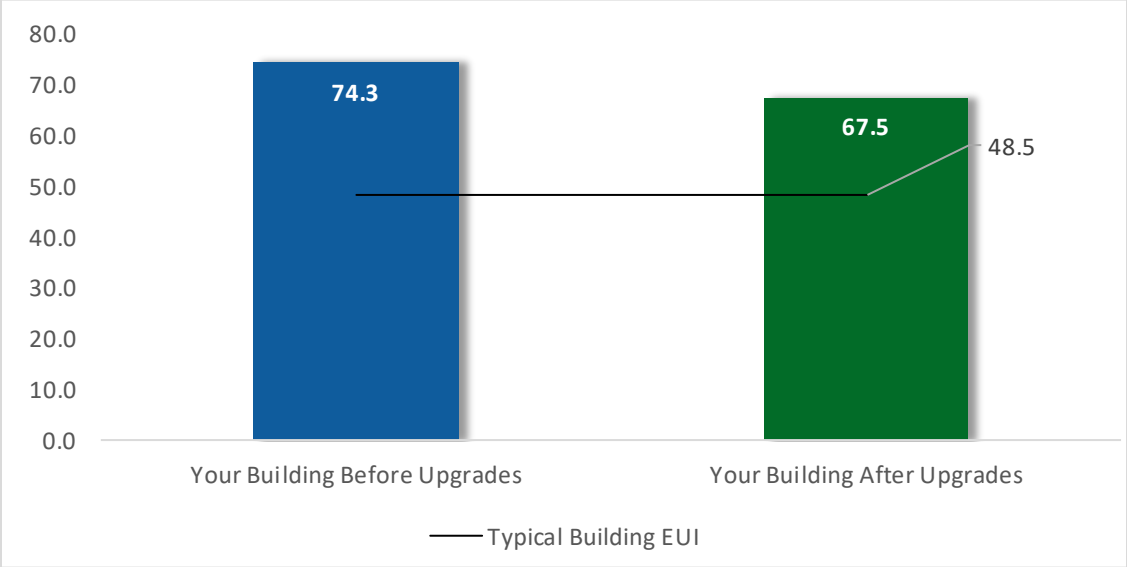


Figure 6 - Energy Use Intensity Comparison

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.

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[3].

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

4 ENERGY CONSERVATION MEASURES

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

Calculations of energy use and savings are based on the current version of 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.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**67,130**	**21.8**	**-13**	**$11,455**	**$42,520**	**$8,985**	**$33,535**	**2.9**	**66,041**
ECM 1	Install LED Fixtures	9,670	2.6	-1	$1,657	$17,419	$2,850	$14,569	8.8	9,586
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	88	0.0	0	$15	$65	$6	$59	3.9	86
ECM 3	Retrofit Fixtures with LED Lamps	57,372	19.1	-12	$9,783	$25,036	$6,129	$18,907	1.9	56,368
Lighting Control Measures		**11,436**	**3.7**	**-2**	**$1,950**	**$16,624**	**$1,895**	**$14,729**	**7.6**	**11,236**
ECM 4	Install Occupancy Sensor Lighting Controls	9,761	3.2	-2	$1,664	$14,024	$1,895	$12,129	7.3	9,590
ECM 5	Install High/Low Lighting Controls	1,676	0.5	0	$286	$2,600	$0	$2,600	9.1	1,646
Motor Upgrades		**8,821**	**2.9**	**0**	**$1,525**	**$29,946**	**$0**	**$29,946**	**19.6**	**8,882**
ECM 6	Premium Efficiency Motors	8,821	2.9	0	$1,525	$29,946	$0	$29,946	19.6	8,882
Variable Frequency Drive (VFD) Measures		**7,722**	**2.9**	**0**	**$1,335**	**$6,552**	**$800**	**$5,752**	**4.3**	**7,776**
ECM 7	Install VFDs on Constant Volume (CV) Fans	7,722	2.9	0	$1,335	$6,552	$800	$5,752	4.3	7,776
Electric Unitary HVAC Measures		**20,304**	**32.2**	**0**	**$3,509**	**$157,499**	**$9,492**	**$148,007**	**42.2**	**20,446**
	Install High Efficiency Air Conditioning Units	20,304	32.2	0	$3,509	$157,499	$9,492	$148,007	42.2	20,446
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**114**	**$1,268**	**$97,303**	**$5,235**	**$92,068**	**72.6**	**13,389**
	Install High Efficiency Steam Boilers	0	0.0	114	$1,268	$97,303	$5,235	$92,068	72.6	13,389
HVAC System Improvements		**390**	**0.0**	**26**	**$360**	**$3,026**	**$0**	**$3,026**	**8.4**	**3,485**
	Implement Demand Control Ventilation (DCV)	390	0.0	0	$67	$2,719	$0	$2,719	40.4	392
ECM 8	Install Pipe Insulation	0	0.0	26	$293	$308	$0	$308	1.1	3,093
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$286**	**$4,962**	**$170**	**$4,792**	**16.8**	**3,021**
	Install High Efficiency Gas-Fired Water Heater	0	0.0	6	$65	$4,912	$170	$4,742	72.8	687
ECM 9	Install Low-Flow DHW Devices	0	0.0	20	$221	$50	$0	$50	0.2	2,333
Food Service & Refrigeration Measures		**12,763**	**1.5**	**13**	**$2,345**	**$23,677**	**$2,250**	**$21,427**	**9.1**	**14,319**
	Food Service Equipment Replacement	0	0.0	13	$139	$7,119	$500	$6,619	47.7	1,467
ECM 10	Replace Refrigeration Equipment	11,151	1.3	0	$1,927	$16,328	$1,750	$14,578	7.6	11,229
ECM 11	Vending Machine Control	1,612	0.2	0	$279	$230	$0	$230	0.8	1,623
TOTALS		**128,565**	**65.0**	**163**	**$24,032**	**$382,108**	**$28,827**	**$353,281**	**14.7**	**148,595**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteri

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

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**67,130**	**21.8**	**-13**	**$11,455**	**$42,520**	**$8,985**	**$33,535**	**2.9**	**66,041**
ECM 1	Install LED Fixtures	9,670	2.6	-1	$1,657	$17,419	$2,850	$14,569	8.8	9,586
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	88	0.0	0	$15	$65	$6	$59	3.9	86
ECM 3	Retrofit Fixtures with LED Lamps	57,372	19.1	-12	$9,783	$25,036	$6,129	$18,907	1.9	56,368
Lighting Control Measures		**11,436**	**3.7**	**-2**	**$1,950**	**$16,624**	**$1,895**	**$14,729**	**7.6**	**11,236**
ECM 4	Install Occupancy Sensor Lighting Controls	9,761	3.2	-2	$1,664	$14,024	$1,895	$12,129	7.3	9,590
ECM 5	Install High/Low Lighting Controls	1,676	0.5	0	$286	$2,600	$0	$2,600	9.1	1,646
Motor Upgrades		**8,821**	**2.9**	**0**	**$1,525**	**$29,946**	**$0**	**$29,946**	**19.6**	**8,882**
ECM 6	Premium Efficiency Motors	8,821	2.9	0	$1,525	$29,946	$0	$29,946	19.6	8,882
Variable Frequency Drive (VFD) Measures		**7,722**	**2.9**	**0**	**$1,335**	**$6,552**	**$800**	**$5,752**	**4.3**	**7,776**
ECM 7	Install VFDs on Constant Volume (CV) Fans	7,722	2.9	0	$1,335	$6,552	$800	$5,752	4.3	7,776
HVAC System Improvements		**0**	**0.0**	**26**	**$293**	**$308**	**$0**	**$308**	**1.1**	**3,093**
ECM 8	Install Pipe Insulation	0	0.0	26	$293	$308	$0	$308	1.1	3,093
Domestic Water Heating Upgrade		**0**	**0.0**	**20**	**$221**	**$50**	**$0**	**$50**	**0.2**	**2,333**
ECM 9	Install Low-Flow DHW Devices	0	0.0	20	$221	$50	$0	$50	0.2	2,333
Food Service & Refrigeration Measures		**12,763**	**1.5**	**0**	**$2,206**	**$16,558**	**$1,750**	**$14,808**	**6.7**	**12,852**
ECM 10	Replace Refrigeration Equipment	11,151	1.3	0	$1,927	$16,328	$1,750	$14,578	7.6	11,229
ECM 11	Vending Machine Control	1,612	0.2	0	$279	$230	$0	$230	0.8	1,623
TOTALS		**107,871**	**32.8**	**31**	**$18,984**	**$112,557**	**$13,430**	**$99,127**	**5.2**	**112,214**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteri

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

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**67,130**	**21.8**	**-13**	**$11,455**	**$42,520**	**$8,985**	**$33,535**	**2.9**	**66,041**
ECM 1	Install LED Fixtures	9,670	2.6	-1	$1,657	$17,419	$2,850	$14,569	8.8	9,586
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	88	0.0	0	$15	$65	$6	$59	3.9	86
ECM 3	Retrofit Fixtures with LED Lamps	57,372	19.1	-12	$9,783	$25,036	$6,129	$18,907	1.9	56,368

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 150-Watt and 250-Watt metal halide 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 an 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: Gymnasium, cafeteria and exterior fixtures

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit T12 fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

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

Affected building areas: Restroom

ECM 3: Retrofit Fixtures with LED Lamps

Replace T8 fluorescent, CFL, or incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

Affected building areas: All areas with fluorescent fixtures with T8 tubes, incandescent, and CFL lamps

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**11,436**	**3.7**	**-2**	**$1,950**	**$16,624**	**$1,895**	**$14,729**	**7.6**	**11,236**
ECM 4	Install Occupancy Sensor Lighting Controls	9,761	3.2	-2	$1,664	$14,024	$1,895	$12,129	7.3	9,590
ECM 5	Install High/Low Lighting Controls	1,676	0.5	0	$286	$2,600	$0	$2,600	9.1	1,646

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

ECM 4: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected building areas: Offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms

ECM 5: Install High/Low Lighting Controls

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

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

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

Affected building areas: Hallways

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**8,821**	**2.9**	**0**	**$1,525**	**$29,946**	**$0**	**$29,946**	**19.6**	**8,882**
ECM 6	Premium Efficiency Motors	8,821	2.9	0	$1,525	$29,946	$0	$29,946	19.6	8,882

ECM 6: Premium Efficiency Motors

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

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Boiler room	Boiler feed water pump	2	Boiler Feed Water Pump	0.8	
Boiler room	Air combustor	2	Combustion Air Fan	5.0	
Boiler room	Air compressor	1	Air Compressor	5.0	
Boiler room	Sump pump	1	Process Pump	1.0	
Cafeteria	Cafeteria	3	Ventilation Fan	0.3	
Kitchen	Kitchen	2	Ventilation Fan	0.3	
School	Booster pump	2	Process Pump	0.1	
Classrooms	Classrooms	30	Supply Fan	0.3	
Attic floor	Auditorium	2	Supply Fan	5.0	
Attic floor	Ceiling	30	Supply Fan	0.5	

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

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**7,722**	**2.9**	**0**	**$1,335**	**$6,552**	**$800**	**$5,752**	**4.3**	**7,776**
ECM 7	Install VFDs on Constant Volume (CV) Fans	7,722	2.9	0	$1,335	$6,552	$800	$5,752	4.3	7,776

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 motor — unless the existing motor meets or exceeds IHP 2014 standards — to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

ECM 7: Install VFDs on Constant Volume (CV) Fans

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

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

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating.

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

Affected air handlers: Auditorium

4.5 Electric Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**20,304**	**32.2**	**0**	**$3,509**	**$157,499**	**$9,492**	**$148,007**	**42.2**	**20,446**
	Install High Efficiency Air Conditioning Units	20,304	32.2	0	$3,509	$157,499	$9,492	$148,007	42.2	20,446

Install High Efficiency Air Conditioning Units

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

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 AC units (split and window AC) are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

4.6 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**114**	**$1,268**	**$97,303**	**$5,235**	**$92,068**	**72.6**	**13,389**
	Install High Efficiency Steam Boilers	0	0.0	114	$1,268	$97,303	$5,235	$92,068	72.6	13,389

Install High Efficiency Steam Boilers

We evaluated replacing older inefficient steam boilers with high efficiency steam 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 based on energy savings and may not be justifiable based simply on energy considerations. However, the boilers have passed 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.

4.7 HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**390**	**0.0**	**26**	**$360**	**$3,026**	**$0**	**$3,026**	**8.4**	**3,485**
	Implement Demand Control Ventilation (DCV)	390	0.0	0	$67	$2,719	$0	$2,719	40.4	392
ECM 8	Install Pipe Insulation	0	0.0	26	$293	$308	$0	$308	1.1	3,093

ECM 8: Implement Demand Control Ventilation (DCV)

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

Standard ventilation systems often provide outside air based on a space's estimated maximum occupancy but not actual occupancy. During low occupancy periods, the space may then be over ventilated. This wastes energy through excessive fan motor usage as well as 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, system air flow, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

Affected building areas: Auditorium

ECM 9: Install Pipe Insulation

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

4.8 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$286**	**$4,962**	**$170**	**$4,792**	**16.8**	**3,021**
	Install High Efficiency Gas-Fired Water Heater	0	0.0	6	$65	$4,912	$170	$4,742	72.8	687
ECM 9	Install Low-Flow DHW Devices	0	0.0	20	$221	$50	$0	$50	0.2	2,333

Install High Efficiency Gas-Fired Water Heater

We evaluated replacing the existing tank water heater with a high efficiency 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.

Replacing the water heater has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the heater has passed the end of its normal useful life and appears in poor condition. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the heater is eventually replaced, consider purchasing water heater that exceed the minimum efficiency required by building codes.

ECM 10: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm

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

4.9 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**12,763**	**1.5**	**13**	**$2,345**	**$23,677**	**$2,250**	**$21,427**	**9.1**	**14,319**
	Food Service Equipment Replacement	0	0.0	13	$139	$7,119	$500	$6,619	47.7	1,467
ECM 10	Replace Refrigeration Equipment	11,151	1.3	0	$1,927	$16,328	$1,750	$14,578	7.6	11,229
ECM 11	Vending Machine Control	1,612	0.2	0	$279	$230	$0	$230	0.8	1,623

Food Service Equipment Replacement

Buildings that use a lot of food service equipment are often among the most energy intensive commercial buildings. Replace existing food service equipment with new high efficiency equipment. Consider replacing the following equipment with high efficiency or ENERGY STAR labeled versions:

Location	Quantity	Equipment Type	Manufacturer	Model
Kitchen	1	Gas Convection Oven (Half Size)	2 stage	

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

Replace Refrigeration Equipment

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

ECM 11: Vending Machine Control

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

5 ENERGY EFFICIENT BEST PRACTICES

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

Energy Tracking with ENERGY STAR® Portfolio Manager®

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

Motor Maintenance

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Boiler Maintenance

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

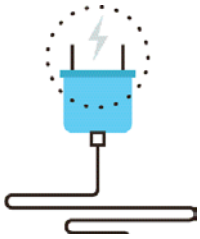
[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Water Heater Maintenance

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

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

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[5]. Your local utility may offer incentives or rebates for this equipment.

Water Conservation

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

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

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. Any reduction in water

[5] 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.

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

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

use does however ultimately reduce grid-level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users.

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

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

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 reduction, 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 a **medium** potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the medium 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.

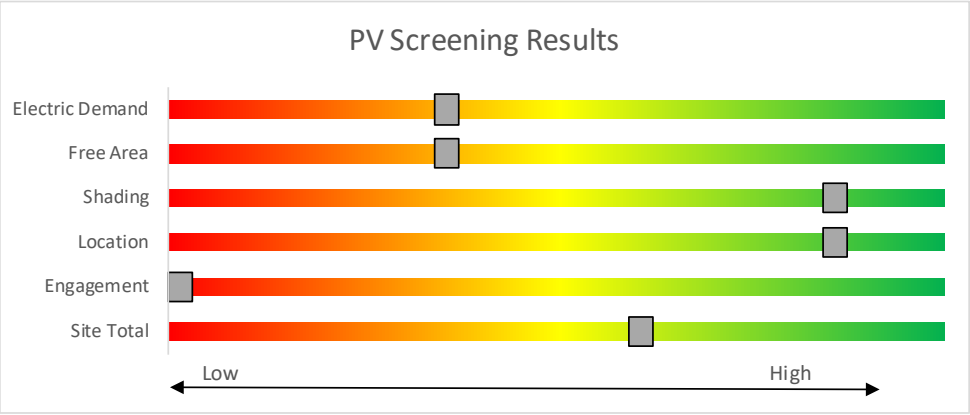


Figure 9 - Photovoltaic Screening

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

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

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

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

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

6.2 Combined Heat and Power

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

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

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

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has **low** 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.

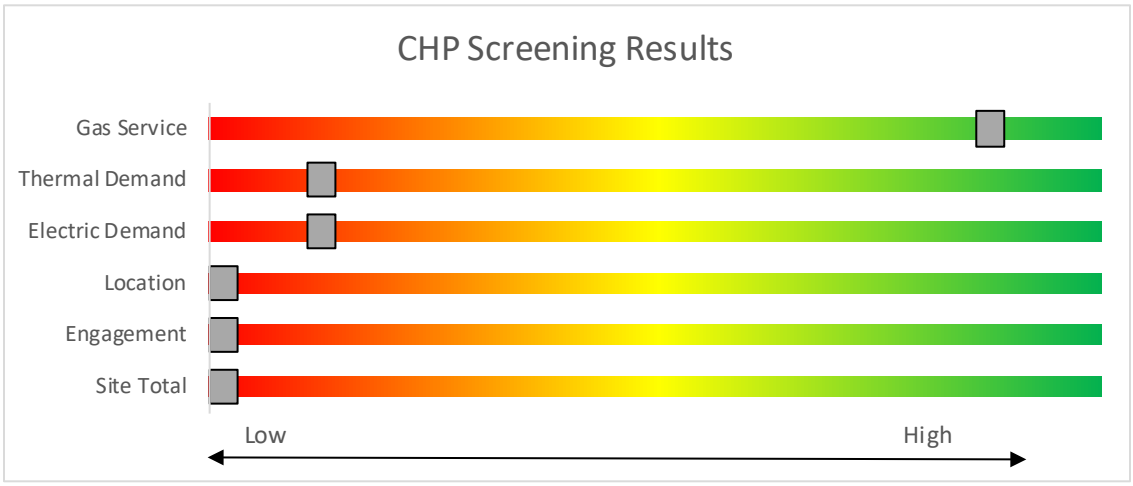


Figure 10 - Combined Heat and Power Screening

7 PROJECT FUNDING AND INCENTIVES

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

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

7.1 SmartStart

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

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

Equipment with Prescriptive Incentives Currently Available:

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

Incentives

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

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

How to Participate

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

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

7.2 Direct Install

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

Incentives

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

How to Participate

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

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

7.3 Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

7.4 SREC Registration Program

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

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

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

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

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

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

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

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

8.2 Retail Natural Gas Supply Options

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

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

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

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

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Attic room	2	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	S	40	800		None	No	2	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	40	800	0.0	0	0	$0	$0	$0	0.0
Boiler room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	800	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.1	174	0	$30	$219	$60	5.4
Boiler room	2	Incandescent: Screw-in 2 Lamps	Wall Switch	S	65	800	3	Relamp	No	2	LED Screw-In Lamps: Screw-in 2 lamps	Wall Switch	10	800	0.1	97	0	$17	$69	$4	3.9
Boiler room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Restroom	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,420	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	18	2,420	0.0	21	0	$4	$54	$0	15.4
Restroom	1	Linear Fluorescent - T12: 2' T12 (20W) - 2L	Wall Switch	S	50	2,420	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,420	0.0	88	0	$15	$65	$6	3.9
Basement storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	800	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	800	0.0	31	0	$5	$37	$10	5.0
Custodian office	3	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,420	3, 4	Relamp	Yes	3	LED Screw-In Lamps: 4 pin - 2 lamps	Occupancy Sensor	18	1,670	0.0	107	0	$18	$279	$20	14.2
Custodian office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	88	0	$15	$37	$10	1.8
Basement	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,420	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,420	0.0	93	0	$16	$37	$10	1.7
Basement	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,420	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	18	2,420	0.0	21	0	$4	$54	$0	15.4
Basement	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
Room B	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.7	2,683	-1	$457	$1,146	$275	1.9
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	800	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.0	58	0	$10	$73	$20	5.4
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	88	0	$15	$37	$10	1.8
Room A	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	88	0	$15	$37	$10	1.8
Stairwell	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,420	3	Relamp	No	12	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,420	0.2	559	0	$95	$219	$60	1.7
Stairwell	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
1st floor hallway	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
1st floor hallway	41	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 5	Relamp	Yes	41	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,670	1.2	4,583	-1	$781	$2,897	$410	3.2
1st floor hallway	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 5	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,670	0.0	104	0	$18	$72	$10	3.5
Stairwell 4	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.1	439	0	$75	$183	$50	1.8
Stairwell 4	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
Room 11	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 12	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Room 12	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,420	3, 4	Relamp	Yes	2	LED Screw-In Lamps: 4 pin - 2 lamps	Occupancy Sensor	18	1,670	0.0	72	0	$12	$109	$0	8.9
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	88	0	$15	$37	$10	1.8
Closet	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	800	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	800	0.0	10	0	$2	$54	$0	32.9
Room 10	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Room 9	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Stairwell 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.1	351	0	$60	$146	$40	1.8
Stairwell 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
Room 7	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Room 8	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	88	0	$15	$37	$10	1.8
Boys restroom	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	2,420		None	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,420	0.0	0	0	$0	$0	$0	0.0
Room 6	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Storage closet	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	800	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	800	0.0	10	0	$2	$54	$0	32.9
CST room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.1	335	0	$57	$226	$50	3.1
Music room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	176	0	$30	$73	$20	1.8
Supply closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	800	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	800	0.0	29	0	$5	$37	$10	5.4
Room 5	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Main entrance	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,420	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,420	0.2	596	0	$102	$292	$80	2.1
Main entrance	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 office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.1	447	0	$76	$416	$75	4.5
Main office	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,420	3, 4	Relamp	Yes	1	LED Screw-In Lamps: 4 pin - 2 lamps	Occupancy Sensor	15	1,670	0.0	42	0	$7	$54	$0	7.7
Main office	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,420	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,670	0.0	113	0	$19	$65	$12	2.7
Hallway display	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,420	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,420	0.0	93	0	$16	$37	$10	1.7
Stairwell 2	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,420	3	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,420	0.1	373	0	$64	$146	$40	1.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Stairwell 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
Girls restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,420	0.0	176	0	$30	$73	$20	1.8
Room 4	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,420	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,670	0.4	1,341	0	$229	$708	$155	2.4
Restroom	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,420	3	Relamp	No	2	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	2,420	0.0	59	0	$10	$109	$0	10.9
Nurse's office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,815	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,815	0.2	447	0	$76	$292	$80	2.8
Nurse's office	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	1,815	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	1,815	0.0	22	0	$4	$54	$0	14.5
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,815	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,815	0.0	35	0	$6	$18	$5	2.2
Closet	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	800	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	800	0.0	10	0	$2	$54	$0	32.9
Room 3	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Teachers room	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,815	0.0	66	0	$11	$37	$10	2.4
Restroom	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,815		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,815	0.0	0	0	$0	$0	$0	0.0
Teachers room	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	1,815	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	1,815	0.0	22	0	$4	$54	$0	14.5
Room 1	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 2	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
2nd floor hallway	1	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	S	63	1,815	3, 5	Relamp	Yes	1	LED - Linear Tubes: (4) 2' Lamps	High/Low Control	34	1,252	0.0	79	0	$13	$65	$12	3.9
2nd floor hallway	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd floor hallway	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 5	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,252	1.1	3,018	-1	$515	$2,515	$360	4.2
Room 13	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 14	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Closet - Computer lab	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	800	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	800	0.0	10	0	$2	$54	$0	32.9
Room 15	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 15	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	1,815	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	1,815	0.0	22	0	$4	$54	$0	14.5
Room 16	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 17	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2

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Room 18	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 19	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.1	335	0	$57	$416	$75	6.0
Room 19	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	1,815	3, 4	Relamp	Yes	1	LED Screw-In Lamps: 4 pin - 2 lamps	Occupancy Sensor	15	1,252	0.0	31	0	$5	$54	$0	10.2
Girls restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.1	335	0	$57	$416	$75	6.0
Library	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Library	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library Annex	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.5	1,509	0	$257	$927	$215	2.8
Library Annex	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
Room 20	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Speech room	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,815	3, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,252	0.1	263	0	$45	$380	$65	7.0
CST room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,815	0.0	132	0	$22	$73	$20	2.4
Room 21	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Boys restroom	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,815		None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,815	0.0	0	0	$0	$0	$0	0.0
Room 22	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 23	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 24	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 25	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Closet	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	800	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	800	0.0	10	0	$2	$54	$0	32.9
Room 27	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Room 26	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.4	1,006	0	$172	$708	$155	3.2
Cafeteria	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.8	2,180	0	$372	$1,489	$330	3.1
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
Storage room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	800	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	552	0.1	148	0	$25	$262	$40	8.8
Kitchen	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,815	0.4	1,054	0	$180	$584	$160	2.4
Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,252	0.1	251	0	$43	$380	$65	7.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Gym	15	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	1,815	1, 4	Fixture Replacement	Yes	15	LED - Fixtures: High-Bay	Occupancy Sensor	89	1,252	2.5	7,006	-1	$1,195	$14,923	$2,775	10.2
Gym	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
Restroom	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	1,815	3	Relamp	No	1	LED Screw-In Lamps: 4 pin - 2 lamps	Wall Switch	15	1,815	0.0	22	0	$4	$54	$0	14.5
Storage room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	800	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	552	0.1	166	0	$28	$280	$45	8.3
Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,815	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,815	0.0	66	0	$11	$37	$10	2.4
Auditorium stage	96	Incandescent: Screw-in 1 lamp	Wall Switch	S	65	1,815	3	Relamp	No	96	LED Screw-In Lamps: Screw-in 1 lamp	Wall Switch	10	1,815	3.8	10,589	-2	$1,806	$1,654	$96	0.9
Auditorium stage	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
Auditorium	10	LED Screw-In Lamps: Screw-in 4 lamps	Wall Switch	S	44	1,815		None	No	10	LED Screw-In Lamps: Screw-in 4 lamps	Wall Switch	44	1,815	0.0	0	0	$0	$0	$0	0.0
Auditorium	5	Halogen Incandescent: Spot light -1 lamp	Wall Switch	S	250	1,815	3	Relamp	No	5	LED Screw-In Lamps: Spot light - 1 lamp	Wall Switch	15	1,815	0.8	2,346	0	$400	$151	$5	0.4
Auditorium	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
Front entrance	2	LED Screw-In Lamps: Screw-in 1 lamp	Wall Switch	S	11	1,815		None	No	2	LED Screw-In Lamps: Screw-in 1 lamp	Wall Switch	11	1,815	0.0	0	0	$0	$0	$0	0.0
Wall pack	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		55	4,368		None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	55	4,368	0.0	0	0	$0	$0	$0	0.0
Wall pack	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		9	4,368		None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	9	4,368	0.0	0	0	$0	$0	$0	0.0
Recessed	8	LED Screw-In Lamps: Screw-in 1 lamp	Timeclock		9	4,368		None	No	8	LED Screw-In Lamps: Screw-in 1 lamp	Timeclock	9	4,368	0.0	0	0	$0	$0	$0	0.0
Wall pack	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		155	4,368		None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	155	4,368	0.0	0	0	$0	$0	$0	0.0
Wall pack	6	Metal Halide: (1) 150W Lamp	Timeclock		190	4,368	1	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	57	4,368	0.4	3,486	0	$602	$5,796	$600	8.6

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Auditorium	2	Exhaust Fan	0.2	60.0%	No	W	2,471		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Classroom	1	Exhaust Fan	0.2	60.0%	No	W	2,471		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Attic room	1	Exhaust Fan	0.2	60.0%	No	W	2,471		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Hallway	1	Exhaust Fan	0.3	60.0%	No	W	2,471		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler room	Boiler feed water pump	2	Boiler Feed Water Pump	0.8	70.0%	No	B	1,373	6	Yes	81.1%	No		0.1	225	0	$39	$826	$0	21.2
Boiler room	Air combustor	2	Combustion Air Fan	5.0	82.5%	No	B	1,373	6	Yes	86.5%	No		0.2	430	0	$74	$1,422	$0	19.1
Boiler room	Air compressor	1	Air Compressor	5.0	82.5%	No	B	575	6	Yes	89.5%	No		0.2	152	0	$26	$800	$0	30.4
Boiler room	Sump pump	1	Process Pump	1.0	85.5%	No	B	800	6	Yes	85.5%	No		0.0	0	0	$0	$474	$0	0.0
Cafeteria	Cafeteria	3	Ventilation Fan	0.3	60.0%	No	B	2,471	6	Yes	73.4%	No		0.1	421	0	$73	$1,153	$0	15.9
Kitchen	Kitchen	2	Ventilation Fan	0.3	60.0%	No	B	2,471	6	Yes	73.4%	No		0.1	280	0	$48	$769	$0	15.9
School	Booster pump	2	Process Pump	0.1	60.0%	No	B	2,471	6	Yes	60.0%	No		0.0	0	0	$0	$799	$0	0.0
Classrooms	Classrooms	30	Supply Fan	0.3	60.0%	No	B	2,471	6	Yes	73.4%	No		1.3	4,206	0	$727	$11,533	$0	15.9
Attic floor	Auditorium	2	Supply Fan	5.0	89.5%	No	B	2,471	6, 7	Yes	89.5%	Yes	2	2.9	7,722	0	$1,335	$8,152	$800	5.5
Attic floor	Ceiling	30	Supply Fan	0.5	70.0%	No	B	2,471	6	Yes	78.2%	No		0.9	3,106	0	$537	$10,568	$0	19.7

Electric HVAC Inventory & Recommendations

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 1	Room 1	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.6	359	0	$62	$4,489	$276	67.9
Roof	Library Annex	1	Split-System AC	3.50		N		No							0.0	0	0	$0	$0	$0	0.0
Roof	Auditorium	2	Split-System AC	20.00		B	NR	Yes	1	Split-System AC	20.00		10.50		13.3	8,388	0	$1,450	$23,815	$1,580	15.3
Roof	Room 21	1	Split-System AC	3.50		B	NR	Yes	1	Split-System AC	3.50		14.00		0.8	525	0	$91	$5,237	$322	54.2
Roof	Room 24	1	Split-System AC	3.50		B	NR	Yes	1	Split-System AC	3.50		14.00		0.8	525	0	$91	$5,237	$322	54.2
Roof	Room 22	1	Split-System AC	3.50		B	NR	Yes	1	Split-System AC	3.50		14.00		0.8	525	0	$91	$5,237	$322	54.2
Roof	Office	1	Split-System AC	3.50		B	NR	Yes	1	Split-System AC	3.50		14.00		0.8	525	0	$91	$5,237	$322	54.2
Roof	Room 6	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 7	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 8	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 9	1	Split-System AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Room 10	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 12	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 11	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 23	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 25	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2
Roof	Room 27	1	Split-System AC	3.00		B	NR	Yes	1	Split-System AC	3.00		14.00		0.7	450	0	$78	$4,489	$276	54.2

Fuel Heating Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	All school	2	Forced Draft Steam Boiler	######	B	NR	Yes	2	Forced Draft Steam Boiler	######	81.00%	Et	0.0	0	114	$1,268	$97,303	$5,235	72.6

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Auditorium	Auditorium	NR	2.00	20.00			0.0	390	0	$67	$2,719	$0	40.4

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Domestic Hot Water System	8	15	1.50	0.0	0	10	$111	$132	$0	1.2
Boiler Room	Domestic Hot Water System	8	20	2.00	0.0	0	16	$182	$176	$0	1.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	School	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Kitchen	1	Storage Tank Water Heater (> 50 Gal)	B	NR	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	93.00%	Et	0.0	0	6	$65	$4,912	$170	72.8

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	9	7	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	20	$221	$50	$0	0.2

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	3	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	No	10	Yes	0.7	5,704	0	$986	$7,416	$900	6.6
Cafeteria	2	Refrigerator Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0
Cafeteria	2	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	No	10	Yes	0.4	3,803	0	$657	$4,944	$600	6.6
Cafeteria	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Cafeteria	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	10	Yes	0.1	822	0	$142	$1,984	$125	13.1
Cafeteria	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	10	Yes	0.1	822	0	$142	$1,984	$125	13.1

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Convection Oven (Half Size)	No	NR	Yes	0.0	0	13	$139	$7,119	$500	47.7
Kitchen	1	Insulated Food Holding Cabinet (3/4 Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	None	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Franklin ES	150	Desktop computer	145.0	Yes
Franklin ES	4	Toaster	1,200.0	Yes
Franklin ES	3	TV	120.0	Yes
Franklin ES	14	Microwave	900.0	Yes
Franklin ES	3	Refrigerator	220.0	Yes
Franklin ES	12	Printer	60.0	Yes
Franklin ES	25	Small refrigerator	80.0	Yes
Franklin ES	5	Copy machine	200.0	Yes
Franklin ES	1	Water cooler	500.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Teachers' room	1	Refrigerated	11	Yes	0.2	1,612	0	$279	$230	$0	0.8

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]

Franklin School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 58,635
Built: 1931

For Year Ending: September 30, 2017
Date Generated: November 29, 2018

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
Franklin School 1550 Lindy Terrace Union, New Jersey 07083	_____ , (___)___-_____	___ _____ , (___)___-_____ _____

Property ID: 6455066

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
78 kBtu/ft²

Source EUI
114.1 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	1,078,552 (24%)
Natural Gas (kBtu)	3,494,416 (76%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	80.8
National Median Source EUI (kBtu/ft²)	118.2
% Diff from National Median Source EUI	-4%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	295

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

___ _____
,
(___)___-_____
_____

Professional Engineer Stamp (if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate financial savings. 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	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
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.
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 energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system 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.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.