Local Government Energy Audit Report

Franklin Elementary School

August 28, 2023

Prepared for:

Roxbury Township Public Schools

8 Meeker St.

Succasunna, New Jersey 07876

Prepared by:

TRC

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Disclaimer

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

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

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

Incentive values provided in this report are estimated based on previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

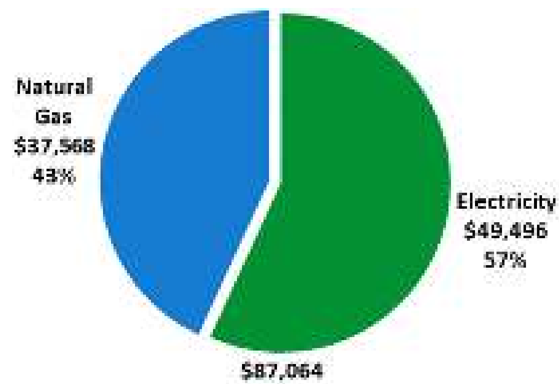
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

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 conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $87,064 Electricity: 456,900 kWh Natural Gas: 28,571 Therms	
ENERGY STAR® Benchmarking Score	11 *(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.

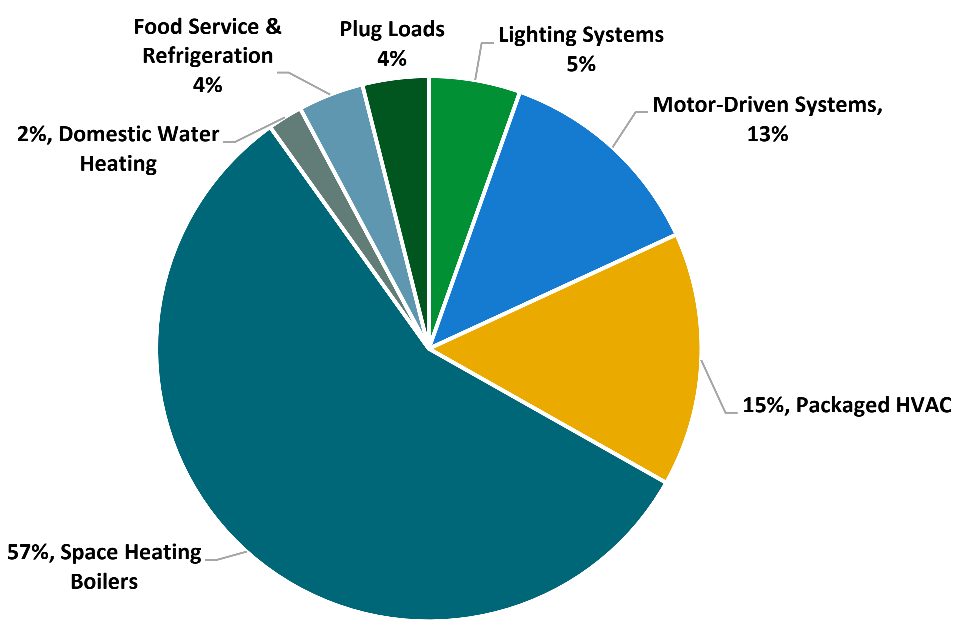


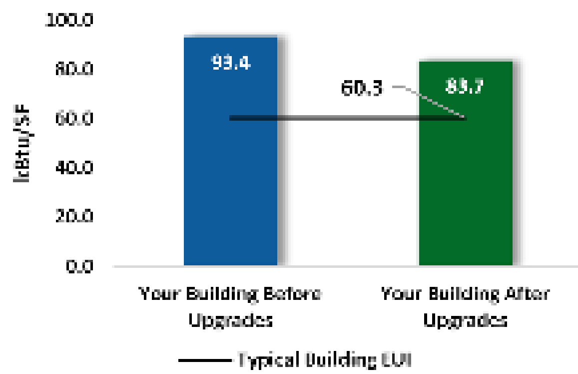
Figure 1 - Energy Use by System

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.

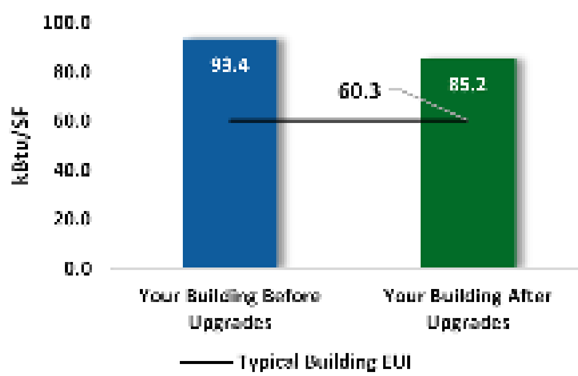
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$263,921
Potential Rebates & Incentives[1]	$16,145
Annual Cost Savings	$12,272
Annual Energy Savings	Electricity: 98,042 kWh Natural Gas: 1,256 Therms
Greenhouse Gas Emission Savings	57 Tons
Simple Payback	20.2 Years
Site Energy Savings (All Utilities)	10%



Scenario 2: Cost Effective Package[2]

Installation Cost	$65,623
Potential Rebates & Incentives	$7,790
Annual Cost Savings	$10,336
Annual Energy Savings	Electricity: 82,582 kWh Natural Gas: 1,057 Therms
Greenhouse Gas Emission Savings	48 Tons
Simple Payback	5.6 Years
Site Energy Savings (all utilities)	9%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**116**	**0.0**	**0**	**$12**	**$121**	**$16**	**$105**	**8.6**	**114**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	116	0.0	0	$12	$121	$16	$105	8.6	114
Lighting Control Measures			**7,966**	**1.4**	**-2**	**$841**	**$5,550**	**$735**	**$4,815**	**5.7**	**7,826**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	7,966	1.4	-2	$841	$5,550	$735	$4,815	5.7	7,826
Variable Frequency Drive (VFD) Measures			**65,587**	**15.2**	**10**	**$7,242**	**$51,673**	**$6,875**	**$44,798**	**6.2**	**67,267**
ECM 3	Install VFDs on Constant Volume (CV) Fans	Yes	54,276	13.0	0	$5,880	$34,393	$4,600	$29,793	5.1	54,656
ECM 4	Install VFDs on Heating Water Pumps	Yes	7,414	2.2	0	$803	$13,393	$2,200	$11,193	13.9	7,466
ECM 5	Install VFDs on Kitchen Hood Fan Motors	Yes	3,897	0.0	10	$559	$3,887	$75	$3,812	6.8	5,145
Unitary HVAC Measures			**11,114**	**8.5**	**0**	**$1,204**	**$173,960**	**$8,280**	**$165,680**	**137.6**	**11,192**
ECM 6	Install High Efficiency Air Conditioning Units	No	11,114	8.5	0	$1,204	$173,960	$8,280	$165,680	137.6	11,192
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**3**	**$44**	**$7,710**	**$0**	**$7,710**	**175.7**	**391**
ECM 7	Install High Efficiency Unit Heaters	No	0	0.0	3	$44	$7,710	$0	$7,710	175.7	391
HVAC System Improvements			**3,620**	**0.0**	**17**	**$610**	**$14,954**	**$0**	**$14,954**	**24.5**	**5,584**
ECM 8	Implement Demand Control Ventilation (DCV)	No	3,620	0.0	17	$610	$14,954	$0	$14,954	24.5	5,584
Domestic Water Heating Upgrade			**0**	**0.0**	**13**	**$172**	**$172**	**$84**	**$88**	**0.5**	**1,536**
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	13	$172	$172	$84	$88	0.5	1,536
Food Service & Refrigeration Measures			**1,251**	**0.1**	**0**	**$135**	**$2,281**	**$155**	**$2,126**	**15.7**	**1,259**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	524	0.1	0	$57	$607	$80	$527	9.3	528
ECM 11	Refrigeration Controls	No	726	0.0	0	$79	$1,674	$75	$1,599	20.3	731
Custom Measures			**8,389**	**0.0**	**84**	**$2,011**	**$7,500**	**$0**	**$7,500**	**3.7**	**18,261**
ECM 12	Retro-Commissioning Study	Yes	8,389	0.0	84	$2,011	$7,500	$0	$7,500	3.7	18,261
TOTALS (COST EFFECTIVE MEASURES)			**82,582**	**16.7**	**106**	**$10,336**	**$65,623**	**$7,790**	**$57,833**	**5.6**	**95,531**
TOTALS (ALL MEASURES)			**98,042**	**25.3**	**126**	**$12,272**	**$263,921**	**$16,145**	**$247,776**	**20.2**	**113,429**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

Utility-run energy efficiency programs and 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.

Options from Your Utility Company

Prescriptive and Custom Rebates

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 Prescriptive and Custom Rebates 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 may be required for some incentives. Contact your utility company for more details prior to project installation.

Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized contractor. This program can provide incentives up to 70% or 80% of the cost of selected measures. A Direct Install contractor will assess and verify individual measure eligibility and perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Engineered Solutions

The Engineered Solutions program provides tailored energy-efficiency assistance and turnkey engineering.
services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. The program provides all professional services from audit, design, construction administration, to commissioning and measurement and verification for custom whole-building energy-efficiency projects. Engineered Solutions 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.

For more details on these programs please contact your utility provider.

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

For more details on these programs please visit New Jersey's Clean Energy Program website .

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.

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 March 15, 2023, TRC performed an energy audit at Franklin Elementary School located in Succasunna, New Jersey. TRC met with Chris Banes to review the facility operations and help focus our investigation on specific energy-using systems.

Franklin Elementary School is a public school that caters to students from K-4. The facility is a school building that includes typical educational, administrative, assembly, and recreation spaces. The school is a one story, 47,260 square foot building built in 1956 and expanded in 2004 to accommodate additional spaces. Spaces include classrooms, gymnasium, restrooms, storage rooms, closets, all purpose room, kitchen, media center, offices, corridors, lobbies, and mechanical spaces.

Most of the facility’s lighting systems consist of LED linear tubes, while additional lighting includes LED lamps, LED fixtures, incandescent bulbs, compact fluorescent lamps (CFL), and linear fluorescent T8 tubes. The elementary school is heated by three condensing boilers and cooled by split-systems, packaged units, roof top units (RTUs), and window air conditioning (AC) units.

Recent Improvements and Facility Concerns

The facility has replaced most of its existing fluorescent lamps and fixtures with LED technology. The site began the process of replacing outdated unit vents.

2.2 Building Occupancy

The elementary school operates on a 10-month schedule. During a typical weekday, the elementary school are occupied by approximately 305 students and 54 staff. There are some after school programs. There are no weekend activities. The elementary school is shut down around 11:00 PM after the cleaning process.

It should be noted that the energy and economic analysis for the facilities is based on the use of the building during the utility billing period, and that results will vary based on changes to building use patterns.

Building Name	Weekday/Weekend	Operating Schedule
Franklin Elementary School - General Operating Hours	Weekday	6:30 AM - 11:00 PM
	Weekend	Closed
Franklin Elementary School - Classes Hours	Weekday	8:40 AM - 3:15 PM
	After School Program	3:30 PM - 6:30 PM

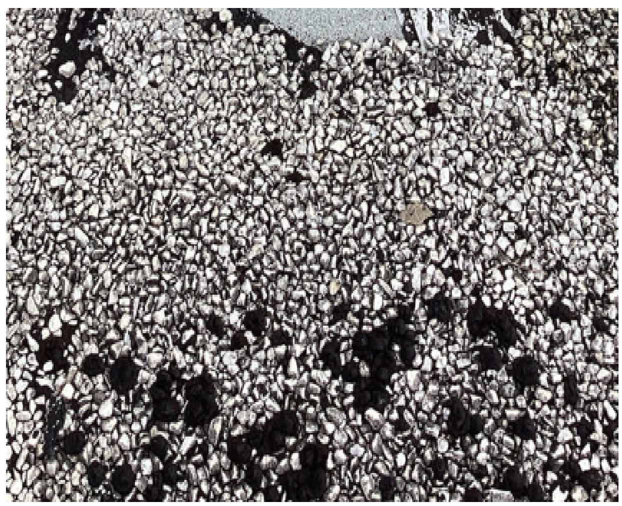
Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete masonry units (CMU) block over structural steel with a brick façade, with gypsum drywall painted CMU interior finish. The level of exterior wall insulation is unknown. The roof is flat and covered with gravel.

Most of the windows are double pane and have aluminum frames with a thermal break. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors are mostly FRP (fiberglass-reinforced polymers) rated doors and are in good condition. Most of the exterior doors are brand new, only a handful needs to be replaced. Degraded window and door seals increase drafts and outside air infiltration.

Building Walls



Flat Roof wit Gravel Finish

Double Pane Windows

Exterior Doors

2.4 Lighting Systems

The primary interior lighting system uses LED linear tubes and LED fixtures. Additionally, there are some compact fluorescent lamps (CFL), linear T8 fluorescent tubes, incandescent bulbs, and LED lamps. Fixture types include 2-lamp,3-lamp, or 4 lamp, 2-foot or 4-foot-long troffer, recessed, and surface mounted fixtures. Typically, T8 fluorescent lamps use electronic ballasts.

Spaces including the gymnasium, classrooms 1 through 10, main office, and all-purpose room are lit with LED fixtures. Spaces such as classrooms 16 through 24, restrooms, all-purpose storage room, hallways A and B, offices, media center, and a few classrooms are illuminated with LED linear tubes. There are linear fluorescent T8 lamps in the kitchen, CFLs in the media center office, incandescent bulbs in the faculty restroom, and LED screw-in lamps in the rest rooms in classrooms 1 through 9. All exit signs are LED.

Most fixtures are in good condition. Interior lighting levels were generally sufficient. Most lighting fixtures in the classrooms, restrooms, closets, kitchen, and media center are controlled by occupancy sensors, while wall switch control the remaining classrooms, hallway, restrooms, and offices.

Exterior fixtures consist of LED wall pack fixtures and a handful of wall packs with LED screw-ins bulbs. They are controlled by timeclock.

LED Linear Tubes

Linear T8 Fluorescent Lamps

LED Fixture

2-Foot-Long LED Lamps

LED Fixture

LED Screw-in

Incandescent Screw-in

CFL PL Lamps

LED Exit Sign



LED Wall Packs & Wall Pack w/ LED Screw-in Bulb

Wall Mounted Occupancy Sensor

Ceiling Mounted Occupancy Sensor

Wall Switch

2.5 Air Handling Systems

Unit Ventilators

Franklin Elementary School unit ventilators and cabinet heaters are equipped with supply fan motors and fan coil valves connected to the hot water distribution system. They provide heating and ventilation to classrooms and other spaces. The units are original to the building and have been updated to good operating condition. The units are controlled by the building automation system (BAS).

Classrooms 12A and B, 14 A and B, and 22 through 24, and media center are cooled by vertical Airedale fan coil units with DX coils with and output capacity of approximately 4 tons. They are connected to the hot water distribution system for heating. They are in good condition and controlled by the BAS.

Unit Ventilator

BAS Screen Shot – Unit Ventilators

Fan Coil Unit

Unitary Electric HVAC Equipment

Spaces including classrooms 1 through 4, main office, faculty room, server room, and media center are air conditioned by nine split system AC units that vary in size between 1 tons and 3 tons. Five units appear in fair condition and have been evaluated for replacement. The units are controlled by programmable thermostats.

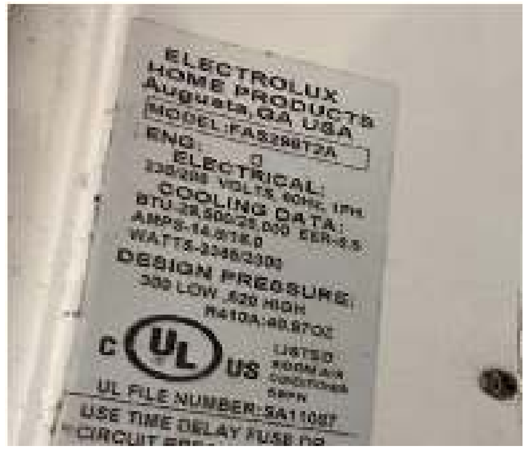
The principle and nurses' office are cooled and heated by a ductless mini-split heat pump with a 3-ton cooling capacity and a 34 MBh heating capacity. The unit appears to be in good condition and is controlled by programmable thermostats.

Classrooms 8 and 9 are cooled by a 2.4 ton and 1.5-ton window Acs, respectively. The 2.4 tons unit is in fair condition and has been evaluated for replacement.

Mini Split Heat Pump – Evaporator

Mini Split Heat Pump –Outdoor Condensing Unit

Exterior Condensing Unit

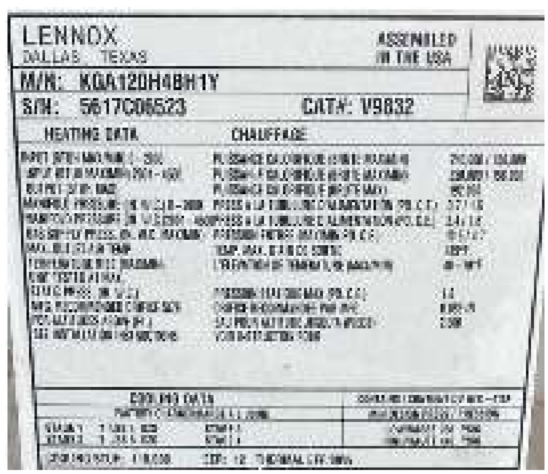


Window AC

Packaged Units

The kitchen and media center are conditioned by two packaged rooftop units (RTUs) equipped with economizers connected to ducted distribution systems. They provide cooling through direct expansion (DX) coils and are equipped with gas-fired sections for heating. These units cooling capacity are 10 tons with a heating capacity of 192 MBh. All the units are constant volume systems equipped with supply fans.

The RTUs appear in fair condition. They are controlled by the BAS.



Rooftop Unit

Air Handling Units (AHUs)

The gymnasium and all-purpose room are conditioned by air handling units (AHU-1 and AHU-2). The units are equipped with supply and return fan motors and a refrigerant coil for cooling. The refrigerant coils are connected to outdoor 45-ton condensing units. AHU-1 is equipped with hot water heating coil while AHU-2 is equipped with a 384 MBh gas-fired section. AHU-1 is physically located in the attic, while the all-purpose AHU-2 is located on the roof. The supply fan motors and return fan motors are 10 hp and 7.5 hp, respectively. The AHUs are all constant volume units. They are in fair condition. They are controlled by the BAS.

The two, 45-ton outdoor condensing units appear in fair condition and have been evaluated for replacement.

Air distribution is provided to supply air registers by ducts concealed in the ceilings.

AHU-1- Gymnasium

AHU-2-All Purpose Room

10 hp Supply Fan Motor

Outdoor Condensing Unit

2.6 Building Exhaust Air Systems

Franklin Elementary School restrooms, storage closets, media center, and other areas are exhausted by motor driven exhaust fans. The kitchen has exhaust fan which serves the kitchen hood. Equipment is in good condition, controlled by BAS or manual switches, depending on the system.

Exhaust Fans

2.7 Heating Hot Water Systems

Franklin Elementary School has three AERCO 2,850 MBh output capacity condensing hot water boilers serving the building's heating load. The burners are fully modulating with a nominal efficiency of 95%. The boilers are configured in an automated sequence, and they all run together to modulate the load and stage based on the outside air temperature. Installed in 2018, the boilers are in good condition. The hydronic distribution system is a two-pipe heating-only system. Two, 10 hp and three, 3 hp variable speed pumps distribute heating hot water to AHUs, hydronic baseboards, and hydronic unit heaters.

The boilers and the hot water loop are controlled by the BAS. The building occupied heating setpoint is 72°F, and the unoccupied heating setpoint is 62°F.

Condensing Boilers

3 hp Hot Water Pumps with VFDs

3 hp Hot Water Pump Tag

2.8 Building Automation System (BAS)

A Trane tracer ensemble Version 6.3 controls the HVAC equipment, AHUs, RTUs, and exhaust fans for Franklin Elementary school. The BAS provides equipment scheduling control, monitors and controls space temperatures, ventilation, supply air temperatures, humidity, and hot water loop temperatures.

Main Screen – BAS Controls

2.9 Domestic Hot Water

Domestic hot water is produced by two, 100 gallon, 199 MBh non-condensing storage tank water heaters. water heaters with a thermal efficiency of 80%. Located in the boiler room, these heaters serve all the facility's domestic hot water needs. At the time of the audit both the tank temperature and operating setpoint temperature were 140°F. The heaters are in good condition. Two fractional horsepower pumps circulate water to the end users.

The domestic hot water pipes are insulated, and the insulation is in fair condition.

Gas-Fired Water Heaters

2.10 Food Service Equipment

The kitchen has all gas equipment that is used to prepare breakfast and lunch for students. Most cooking is done using a gas-fired oven. Bulk prepared foods are held in one ENERGY STAR electric holding cabinet. Most of the equipment is not high efficiency and is in fair condition.

The dishwasher is a non-ENERGY STAR high temperature, rack type unit. A 12.30-kW booster is connected.

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



Gas Fired Oven, Gas Convection Oven, & Insulated Food Cabinet

2.11 Refrigeration

The kitchen has three stand-up refrigerators with solid doors. There are two refrigerator chests. Most equipment is standard efficiency and in fair condition.

The walk-in medium temperature freezer located in the kitchen has two fan evaporators.

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



Stand-up Refrigerators

Walk-in Freezer

Refrigerator Temperature

Evaporator Fans

Refrigerator Chest

2.12 Plug Load and Vending Machines

The location is doing a great job managing the electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are approximately 40 computer workstations throughout the facility. Plug loads include general cafe and office equipment. There are typical classroom loads such as smartboards, projectors, scanner/copier, small printer, microwaves, mini-fridges, and televisions.

There are several residential-style refrigerators, and these vary in condition and efficiency.

Scanner/Copier

Residential-Style Refrigerator

2.13 Water-Using Systems

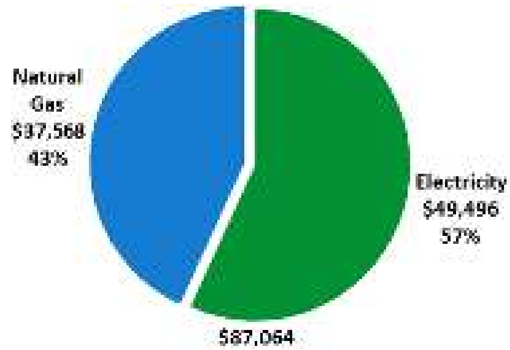
There are several restrooms with sinks, toilets and/or urinals. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Some restrooms have low flow devices.

Lavatory Sinks

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	456,900 kWh	$49,496
Natural Gas	28,571 Therms	$37,568
Total		**$87,064**



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

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

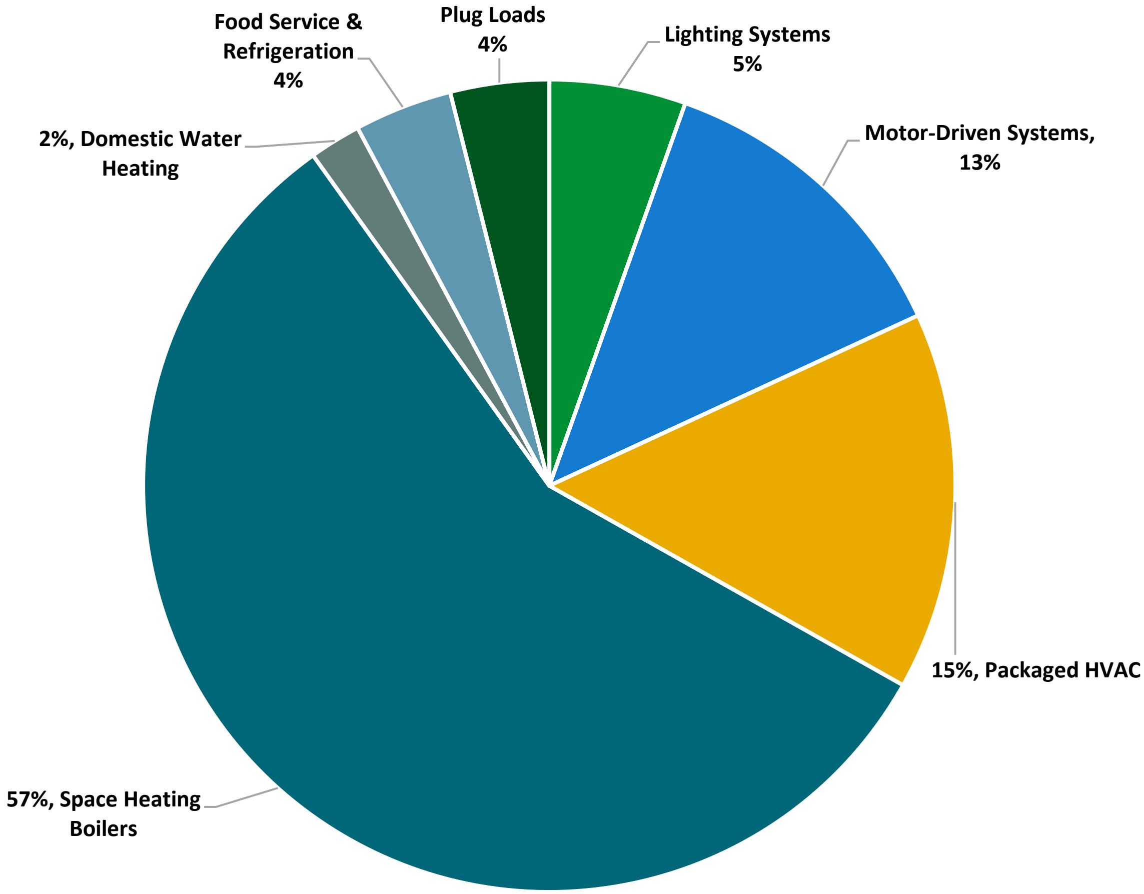
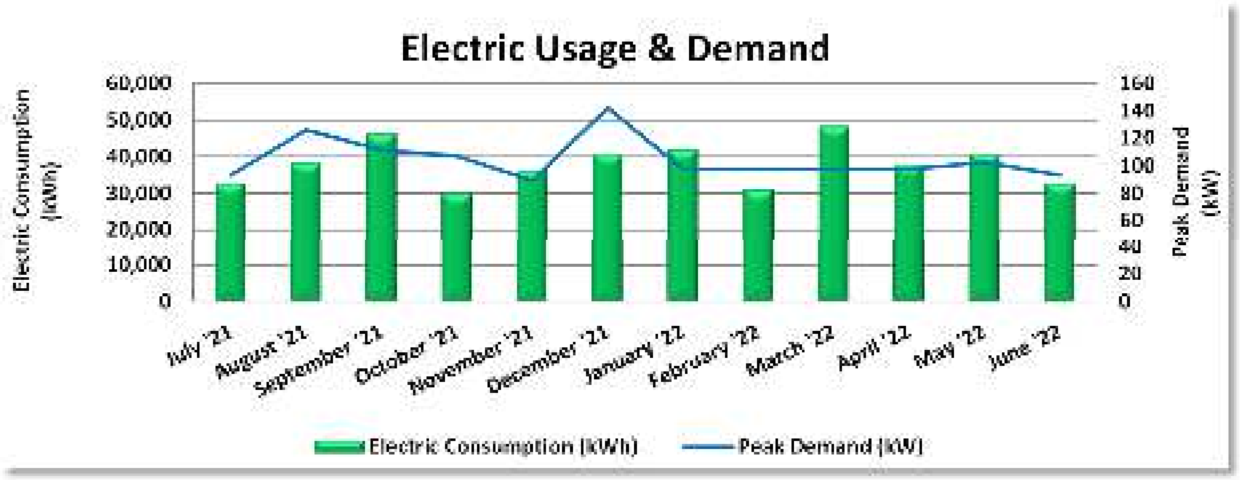


Figure 4 - Energy Balance

3.1 Electricity

JCP&L delivers electricity under rate class General Service Secondary 3 Phase JC_GS3_01D, with electric production provided by Freepoint Energy, a third-party supplier.



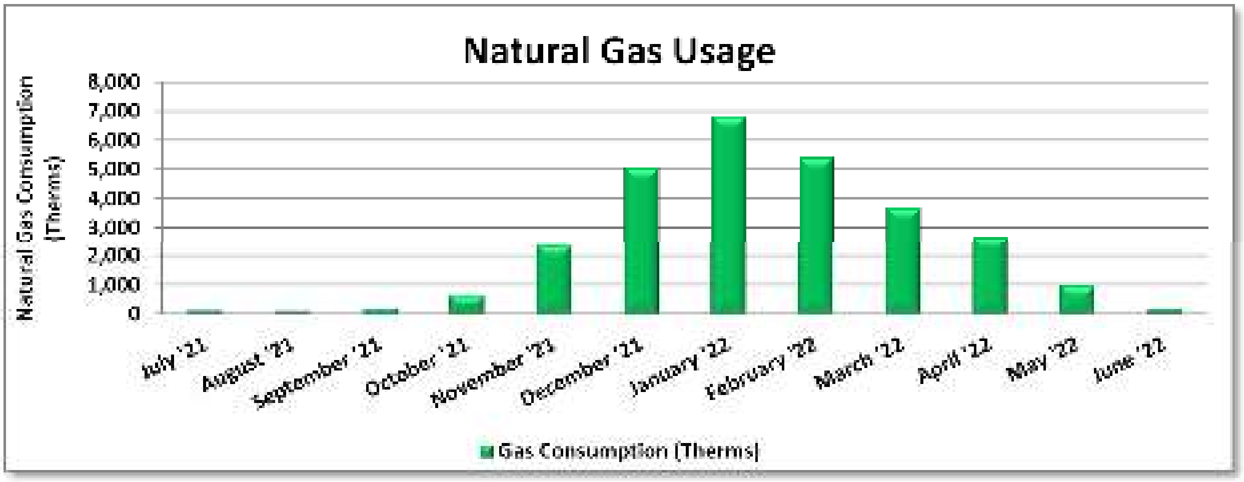
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/22/21	30	32,700	93	$615	$3,747
8/22/21	31	38,400	126	$830	$4,135
9/22/21	31	46,200	112	$735	$4,710
10/22/21	30	30,000	107	$706	$3,262
11/22/21	31	36,300	89	$589	$3,799
12/22/21	30	40,800	142	$937	$4,605
1/22/22	31	42,000	98	$643	$4,380
2/22/22	31	30,900	98	$643	$3,527
3/22/22	28	48,300	98	$643	$5,082
4/22/22	31	37,800	98	$646	$4,014
5/22/22	30	40,800	103	$676	$4,488
6/22/22	31	32,700	93	$615	$3,747
Totals	**365**	**456,900**	**142**	**$8,277**	**$49,496**
Annual	**365**	**456,900**	**142**	**$8,277**	**$49,496**

Notes:

- Peak demand of 142 kW occurred in December '21.
- Average demand over the past 12 months was 105 kW.
- The average electric cost over the past 12 months was $0.108/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

NJ Natural Gas delivers natural gas under rate class GSL, with natural gas supply provided by UGI, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
7/27/21	32	139	$649
8/25/21	29	128	$639
9/24/21	30	186	$797
10/26/21	32	676	$1,272
11/19/21	24	2,381	$2,799
12/23/21	34	5,063	$5,916
1/26/22	34	6,814	$7,818
2/22/22	27	5,410	$6,385
3/23/22	29	3,688	$4,611
4/22/22	30	2,667	$3,550
5/24/22	32	1,007	$1,838
6/22/22	29	178	$984
Totals	**362**	**28,336**	**$37,260**
Annual	**365**	**28,571**	**$37,568**

Notes:

- The average gas cost for the past 12 months is $1.315/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	11

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

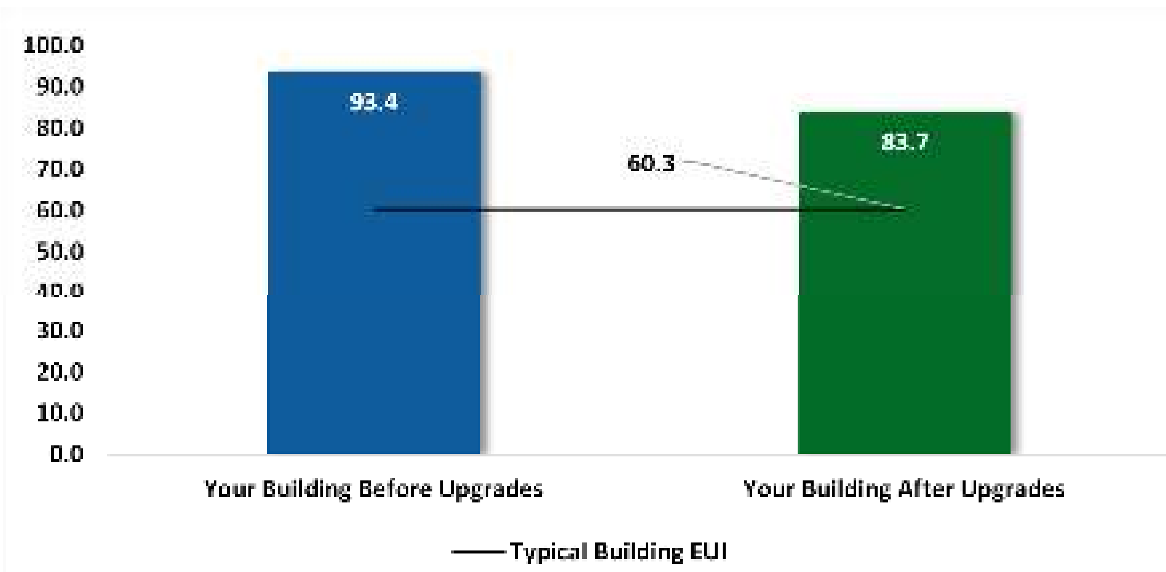


Figure 5 - Energy Use Intensity Comparison[3]

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

Financial incentives in this report are based on the previously run state rebate program SmartStart, which has been retired. Now, all investor-owned gas and electric utility companies are offering complementary energy efficiency programs directly to their customers. Some measures and proposed upgrades may be eligible for higher incentives than those shown below. The incentives in the summary tables should be used for high-level planning purposes. To verify incentives, reach out to your utility provider or visit the NJCEP website for more information.

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**116**	**0.0**	**0**	**$12**	**$121**	**$16**	**$105**	**8.6**	**114**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	116	0.0	0	$12	$121	$16	$105	8.6	114
Lighting Control Measures			**7,966**	**1.4**	**-2**	**$841**	**$5,550**	**$735**	**$4,815**	**5.7**	**7,826**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	7,966	1.4	-2	$841	$5,550	$735	$4,815	5.7	7,826
Variable Frequency Drive (VFD) Measures			**65,587**	**15.2**	**10**	**$7,242**	**$51,673**	**$6,875**	**$44,798**	**6.2**	**67,267**
ECM 3	Install VFDs on Constant Volume (CV) Fans	Yes	54,276	13.0	0	$5,880	$34,393	$4,600	$29,793	5.1	54,656
ECM 4	Install VFDs on Heating Water Pumps	Yes	7,414	2.2	0	$803	$13,393	$2,200	$11,193	13.9	7,466
ECM 5	Install VFDs on Kitchen Hood Fan Motors	Yes	3,897	0.0	10	$559	$3,887	$75	$3,812	6.8	5,145
Unitary HVAC Measures			**11,114**	**8.5**	**0**	**$1,204**	**$173,960**	**$8,280**	**$165,680**	**137.6**	**11,192**
ECM 6	Install High Efficiency Air Conditioning Units	No	11,114	8.5	0	$1,204	$173,960	$8,280	$165,680	137.6	11,192
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**3**	**$44**	**$7,710**	**$0**	**$7,710**	**175.7**	**391**
ECM 7	Install High Efficiency Unit Heaters	No	0	0.0	3	$44	$7,710	$0	$7,710	175.7	391
HVAC System Improvements			**3,620**	**0.0**	**17**	**$610**	**$14,954**	**$0**	**$14,954**	**24.5**	**5,584**
ECM 8	Implement Demand Control Ventilation (DCV)	No	3,620	0.0	17	$610	$14,954	$0	$14,954	24.5	5,584
Domestic Water Heating Upgrade			**0**	**0.0**	**13**	**$172**	**$172**	**$84**	**$88**	**0.5**	**1,536**
ECM 9	Install Low-Flow DHW Devices	Yes	0	0.0	13	$172	$172	$84	$88	0.5	1,536
Food Service & Refrigeration Measures			**1,251**	**0.1**	**0**	**$135**	**$2,281**	**$155**	**$2,126**	**15.7**	**1,259**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	524	0.1	0	$57	$607	$80	$527	9.3	528
ECM 11	Refrigeration Controls	No	726	0.0	0	$79	$1,674	$75	$1,599	20.3	731
Custom Measures			**8,389**	**0.0**	**84**	**$2,011**	**$7,500**	**$0**	**$7,500**	**3.7**	**18,261**
ECM 12	Retro-Commissioning Study	Yes	8,389	0.0	84	$2,011	$7,500	$0	$7,500	3.7	18,261
TOTALS			**98,042**	**25.3**	**126**	**$12,272**	**$263,921**	**$16,145**	**$247,776**	**20.2**	**113,429**

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

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**116**	**0.0**	**0**	**$12**	**$121**	**$16**	**$105**	**8.6**	**114**
ECM 1	Retrofit Fixtures with LED Lamps	116	0.0	0	$12	$121	$16	$105	8.6	114
Lighting Control Measures		**7,966**	**1.4**	**-2**	**$841**	**$5,550**	**$735**	**$4,815**	**5.7**	**7,826**
ECM 2	Install Occupancy Sensor Lighting Controls	7,966	1.4	-2	$841	$5,550	$735	$4,815	5.7	7,826
Variable Frequency Drive (VFD) Measures		**65,587**	**15.2**	**10**	**$7,242**	**$51,673**	**$6,875**	**$44,798**	**6.2**	**67,267**
ECM 3	Install VFDs on Constant Volume (CV) Fans	54,276	13.0	0	$5,880	$34,393	$4,600	$29,793	5.1	54,656
ECM 4	Install VFDs on Heating Water Pumps	7,414	2.2	0	$803	$13,393	$2,200	$11,193	13.9	7,466
ECM 5	Install VFDs on Kitchen Hood Fan Motors	3,897	0.0	10	$559	$3,887	$75	$3,812	6.8	5,145
Domestic Water Heating Upgrade		**0**	**0.0**	**13**	**$172**	**$172**	**$84**	**$88**	**0.5**	**1,536**
ECM 9	Install Low-Flow DHW Devices	0	0.0	13	$172	$172	$84	$88	0.5	1,536
Food Service & Refrigeration Measures		**524**	**0.1**	**0**	**$57**	**$607**	**$80**	**$527**	**9.3**	**528**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	524	0.1	0	$57	$607	$80	$527	9.3	528
Custom Measures		**8,389**	**0.0**	**84**	**$2,011**	**$7,500**	**$0**	**$7,500**	**3.7**	**18,261**
ECM 12	Retro-Commissioning Study	8,389	0.0	84	$2,011	$7,500	$0	$7,500	3.7	18,261
TOTALS		**82,582**	**16.7**	**106**	**$10,336**	**$65,623**	**$7,790**	**$57,833**	**5.6**	**95,531**

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

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

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**116**	**0.0**	**0**	**$12**	**$121**	**$16**	**$105**	**8.6**	**114**
ECM 1	Retrofit Fixtures with LED Lamps	116	0.0	0	$12	$121	$16	$105	8.6	114

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

ECM 1: Retrofit Fixtures with LED Lamps

Replace existing fluorescent T8, CFLs, and incandescent with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

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

Affected Building Areas: faculty restroom, kitchen, and media center office

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**7,966**	**1.4**	**-2**	**$841**	**$5,550**	**$735**	**$4,815**	**5.7**	**7,826**
ECM 2	Install Occupancy Sensor Lighting Controls	7,966	1.4	-2	$841	$5,550	$735	$4,815	5.7	7,826

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

ECM 2: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: offices, classrooms, hallways A and B, gymnasium, restrooms, storage rooms, boiler room, and all-purpose room

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**65,587**	**15.2**	**10**	**$7,242**	**$51,673**	**$6,875**	**$44,798**	**6.2**	**67,267**
ECM 3	Install VFDs on Constant Volume (CV) Fans	54,276	13.0	0	$5,880	$34,393	$4,600	$29,793	5.1	54,656
ECM 4	Install VFDs on Heating Water Pumps	7,414	2.2	0	$803	$13,393	$2,200	$11,193	13.9	7,466
ECM 5	Install VFDs on Kitchen Hood Fan Motors	3,897	0.0	10	$559	$3,887	$75	$3,812	6.8	5,145

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

ECM 3: 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. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

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

Affected Air Handlers: AHUs, RTUs, and kitchen hood fan motor

ECM 4: Install VFDs on Heating Water Pumps

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

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

Affected Pumps: boiler room HW pumps 1 and 2

ECM 5: Install VFDs on Kitchen Hood Fan Motors

Install VFDs and sensors to control the kitchen hood fan motor(s). The air flow of the hood is varied based on two key inputs: temperature and smoke/cooking fumes. The VFD controls the amount of exhaust (and kitchen make-up air) based on temperature—the lower the temperature the lower the flow. If the optic sensor is triggered by smoke or cooking fumes, the speed of the fan ramps up to 100%.

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

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**11,114**	**8.5**	**0**	**$1,204**	**$173,960**	**$8,280**	**$165,680**	**137.6**	**11,192**
ECM 6	Install High Efficiency Air Conditioning Units	11,114	8.5	0	$1,204	$173,960	$8,280	$165,680	137.6	11,192

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

ECM 6: Install High Efficiency Air Conditioning Units

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

Affected Units: 45-ton condensing units, five split systems, and one window AC

4.5 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**3**	**$44**	**$7,710**	**$0**	**$7,710**	**175.7**	**391**
ECM 7	Install High Efficiency Unit Heaters	0	0.0	3	$44	$7,710	$0	$7,710	175.7	391

ECM 7: Install High Efficiency Unit Heaters

We evaluated replacing the gas-fired section of AHU-2 with high efficiency gas-fired unit heaters. Improved combustion technology and heat exchanger design optimize the heat recovery from the combustion gases, which can significantly improve unit heater efficiency. Savings result from improved system efficiency.

Note: these units produce acidic condensate that require proper drainage.

A heating upgrade option that might work in some circumstances would be to replace forced air heating equipment with low-intensity infrared heating units with an enclosed flame, rather than an open flame on a ceramic or metal surface. The most optimal installed system would include modulating high-efficiency infrared heaters, designed for the space and with appropriate controls to vary the capacity based on the space heating needs.

Forced air furnaces heat all of the air in the space served, which is inefficient for large volume spaces with relatively few occupants, areas with high ceilings, or areas with high outside air infiltration. Infrared heaters heat objects and surfaces directly, including the occupants of the space, rather than heating large volumes of air. Infrared heaters also heat the floor, which then re-radiates the heat. As a result, infrared heaters are more effective and efficient at maintaining occupant comfort at significantly lower cost for certain space types.

4.6 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**3,620**	**0.0**	**17**	**$610**	**$14,954**	**$0**	**$14,954**	**24.5**	**5,584**
ECM 8	Implement Demand Control Ventilation (DCV)	3,620	0.0	17	$610	$14,954	$0	$14,954	24.5	5,584

ECM 8: Implement Demand Control Ventilation (DCV)

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

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

Energy savings associated with DCV are based on hours of operation, space occupancy, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning. Implementation of this measure is dependent upon having a building automation system (BAS) or other smart building control system connected to the space conditioning equipment serving the noted areas.

Affected Building Areas: gymnasium, media center, and all-purpose room

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**13**	**$172**	**$172**	**$84**	**$88**	**0.5**	**1,536**
ECM 9	Install Low-Flow DHW Devices	0	0.0	13	$172	$172	$84	$88	0.5	1,536

ECM 9: Install Low-Flow DHW Devices

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

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

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

4.8 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**1,251**	**0.1**	**0**	**$135**	**$2,281**	**$155**	**$2,126**	**15.7**	**1,259**
ECM 10	Refrigerator/Freezer Case Electrically Commutated Motors	524	0.1	0	$57	$607	$80	$527	9.3	528
ECM 11	Refrigeration Controls	726	0.0	0	$79	$1,674	$75	$1,599	20.3	731

ECM 10: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in medium temperature freezer. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 11: Refrigeration Controls

Install additional controls to optimize the operation of walk-in coolers and freezers.

Many walk-in coolers and freezers have continuously operating electric heaters on the doors to prevent condensation formation. This measure adds a control system feature to shut off the door heaters when the humidity level is low enough that condensation will not occur if the heaters are off. This is done by measuring the ambient humidity and temperature of the store, comparing that to the dewpoint, and using pulse width modulation to control the anti-sweat door heaters.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, which reduces annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric de-frost mechanism.

Many walk-in coolers and freezers have evaporator fans that run continuously. The measure adds a control system feature to automatically shut off evaporator fans when not needed.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

4.9 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**8,389**	**0.0**	**84**	**$2,011**	**$7,500**	**$0**	**$7,500**	**3.7**	**18,261**
ECM 12	Retro-Commissioning Study	8,389	0.0	84	$2,011	$7,500	$0	$7,500	3.7	18,261

ECM 12: Retro-Commissioning Study

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

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

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

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

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

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in HVAC control improvements. Based on industry standards and previous project experience, the potential energy savings may be up to 15% of existing HVAC energy use. We estimate the cost of retro-commissioning studies and control improvements of $0.50 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to perform the study. For the purposes of this report, we have conservatively estimated savings to be 3.0% of the HVAC energy consumption baseline.

5 Energy Efficient Best Practices

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

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

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

Energy Tracking with ENERGY STAR Portfolio Manager

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

Weatherization

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

Doors and Windows

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

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

Lighting Maintenance

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

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

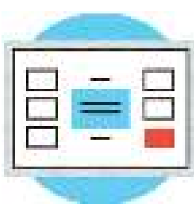
Lighting Controls

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

Motor Maintenance

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

Thermostat Schedules and Temperature Resets



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

Economizer Maintenance

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

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

AC System Evaporator/Condenser Coil Cleaning

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

Boiler Maintenance

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

Label HVAC Equipment

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

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

Optimize HVAC Equipment Schedules

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

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

Refrigeration Equipment Maintenance

Preventative maintenance keeps commercial refrigeration equipment running reliably and efficiently. Commercial refrigerators and freezers are mission-critical equipment that can cost a fortune when they go down. Even when they appear to be working properly, refrigeration units can be consuming too much energy. Have walk-in refrigeration and freezer and other commercial systems serviced at least annually.

This practice will allow systems to perform to their highest capabilities and will help identify system issues if they exist.

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

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

Water Conservation

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

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

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

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

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.

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

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

6 On-site Generation

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

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

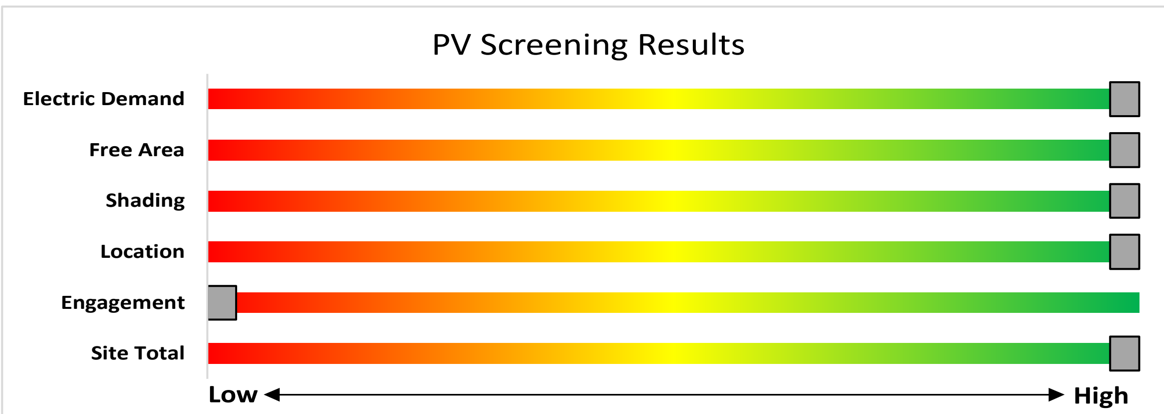
6.1 Solar Photovoltaic

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

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

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

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



Potential	High	
System Potential	105	kW DC STC
Electric Generation	125,094	kWh/yr
Displaced Cost	$13,550	/yr
Installed Cost	$273,000	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

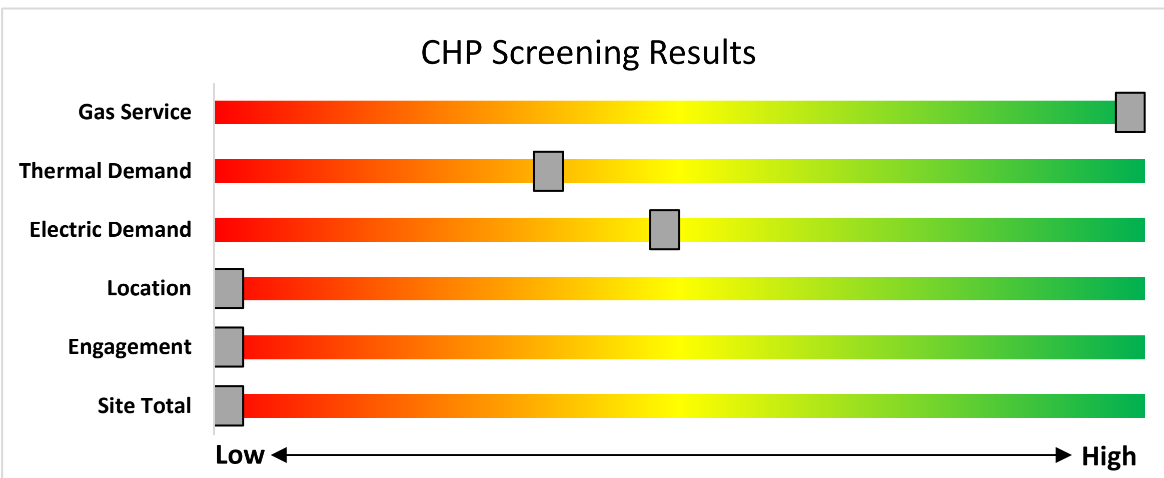


Figure 9 - Combined Heat and Power Screening

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

7 Electric Vehicles (EV)

All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or tailpipe emissions.

EVs are typically more expensive than similar conventional and hybrid vehicles, although some cost can be recovered through fuel savings, federal tax credit, or state incentives.

7.1 Electric Vehicle Charging

EV charging stations provide a means for electric vehicle operators to recharge their batteries at a facility. While many EV drivers charge at home, others do not have access to regular home charging, and the ability to charge at work or in public locations is critical to making EVs practical for more drivers. Charging can also be used for electric fleet vehicles, which can reduce fuel and maintenance costs for fleets that replace gas or diesel vehicles with EVs.

EV charging comes in three main types. For this assessment, the screening considers addition of Level 2 charging, which is most common at workplaces and other public locations. Depending on the site type and usage, other levels of charging power may be more appropriate.

The preliminary assessment of EV charging at the facility shows that there is medium potential for adding EV chargers to the facility's parking, based on potential costs of installation and other site factors.

The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

The type and size of the parking area impact the costs and feasibility of adding EV charging. Parking structure installations can be less costly than surface lot installations as power may be readily available, and equipment and wiring can be surface mounted. Parking lot installations often require trenching through concrete or asphalt surface. Large parking areas provide greater flexibility in charger siting than smaller lots.

The location and capacity of facility electric panels also impact charger installation costs. A Level 2 charger generally requires a dedicated 208-240V, 40 Amp circuit. The electric panel nearest the planned installation may not have available capacity and may need to be upgraded to serve new EV charging loads. Alternatively, chargers could be powered from a more distant panel. The distance from the panel to the location of charging stations ties directly to costs, as conduits, cables, and potential trenching costs all increase on a per-foot basis. The more charging stations planned, the more likely it is that additional electrical capacity will be needed.

Other factors to consider when planning for EV charging at a facility include who the intended users are, how long they park vehicles at the site, and whether they will need to pay for the electricity they use.

The graphic below displays the results of the EV charging assessment conducted as part of this audit. The position of each slider indicates the impact each factor has on the feasibility of installing EV charging at the site.

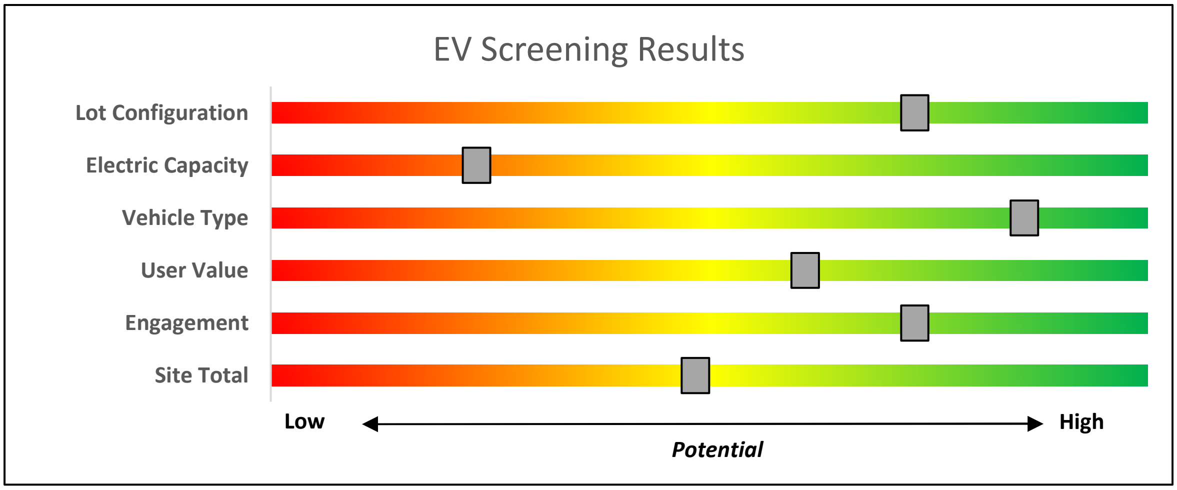


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

New Jersey is leading the way on electric vehicle (EV) adoption on the East Coast. There are several programs designed to encourage EV adoption in New Jersey, which is crucial to reaching a 100% clean energy future.

NJCEP offers a variety of EV programs for vehicles, charging stations, and fleets. Certain EV charging stations that receive electric utility service from Atlantic City Electric Company (ACE) or Public Service Electric & Gas Company (PSE&G), may be eligible for additional electric vehicle charging incentives directly from the utility. Projects may be eligible for both the incentives offered by this BPU program and incentives offered by ACE or PSE&G, up to 90% of the combined charger purchase and installation costs. Please check ACE or PSE&G program eligibility requirements before purchasing EV charging equipment, as additional conditions on types of eligible chargers may apply for utility incentives.

Both Jersey Central Power & Light (JCP&L) and Rockland Electric (RECO) have filed proposals for EV charging programs. BPU staff is currently reviewing those proposals.

For more information and to keep up to date on all EV programs please visit https://www.njcleanenergy.com/commercial-industrial/programs/electric-vehicle-programs

8 Project Funding and Incentives

Ready to improve your building's performance? New Jersey's Clean Energy Programs and Utility Energy Efficiency Programs can help. Pick the program that works best for you. This section provides an overview of currently available incentive programs in.

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

The Prescriptive and Custom rebate program through your utility provider 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.

Equipment Examples

Lighting
Lighting Controls
HVAC Equipment
Refrigeration
Gas Heating
Gas Cooling
Commercial Kitchen Equipment
Food Service Equipment
Variable Frequency Drives
Electronically Commutate Motors
Variable Frequency Drives
Plug Loads Controls
Washers and Dryers
Agricultural
Water Heating

The Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type. The Custom program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives.

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 or less 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.

How to Participate

To participate in Direct Install, you will work with a participating contractor. 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 Direct Install program, subject to program rules and eligibility, while the remaining percent of the cost is paid to the contractor by the customer.

Engineered Solutions

The Engineered Solutions Program provides tailored energy-efficiency assistance and services to municipalities, universities, schools, hospitals and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. Customers receive expert guided services, including investment-grade energy auditing, engineering design, installation assistance, construction administration, commissioning, and measurement and verification (M&V) services to support the implementation of cost-effective and comprehensive efficiency projects. Engineered Solutions is generally a good option for medium to large sized facilities with a peak demand over 200 kW looking to implement as many measures as possible under a single project to achieve deep energy savings. Engineered Solutions has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program. Incentives for this program are based on project scope and energy savings achieved.

For more information on any of these programs, contact your local utility provider or visit https://www.njcleanenergy.com/transition.

8.2 New Jersey's Clean Energy Programs

Save money while saving the planet! New Jersey's Clean Energy Program is a statewide program that offers incentives, programs, and services that benefit New Jersey residents, businesses, educational, non-profit, and government entities to help them save energy, money, and the environment.

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

The ADI Program online portal is now open to new registrations.

Competitive Solar Incentive Program

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

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 Project Development

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

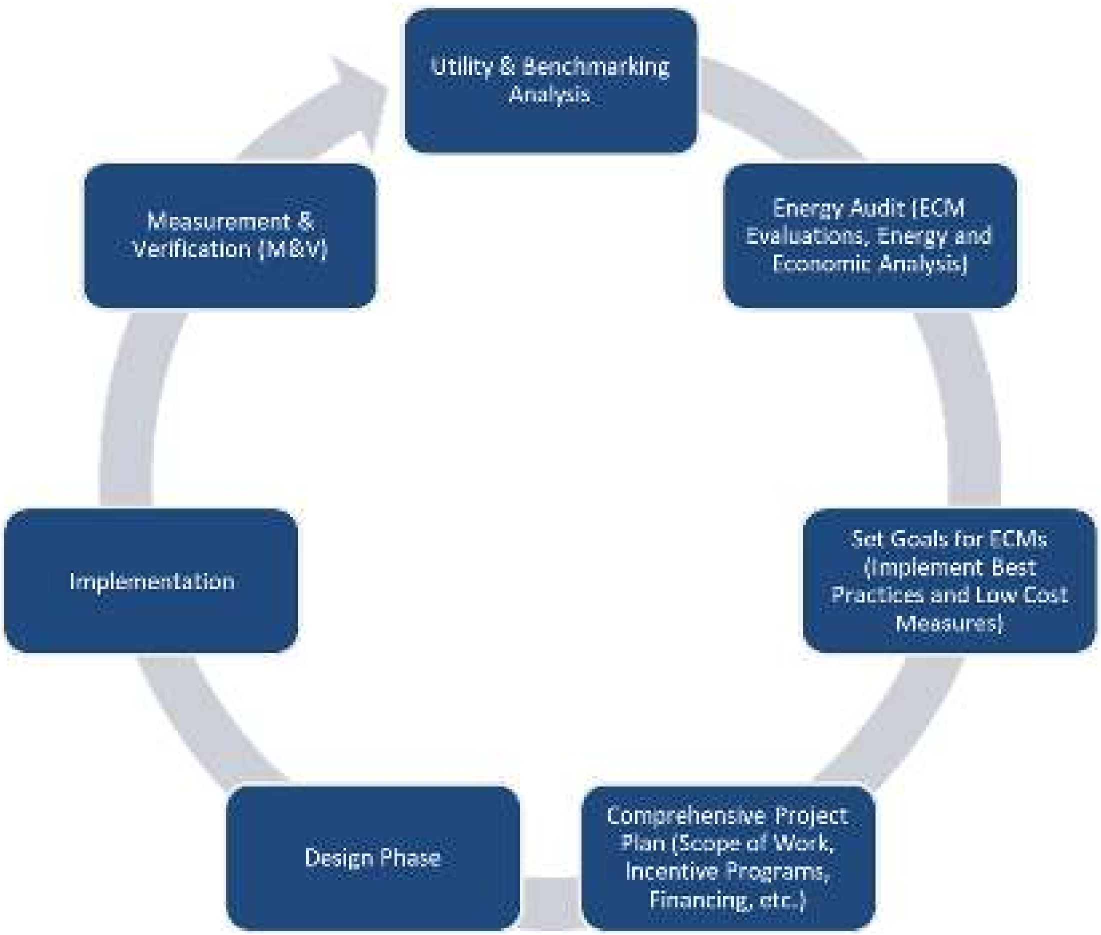


Figure 11 – Project Development Cycle

10 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

10.1 Retail Electric Supply Options

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

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

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

10.2 Retail Natural Gas Supply Options

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

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

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

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

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
All Purpose Room	4	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	4	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
All Purpose Room	3	LED - Fixtures: Ceiling Mount	Wall Switch	S	40	3,630		None	No	3	LED - Fixtures: Ceiling Mount	Wall Switch	40	3,630	0.0	0	0	$0	$0	$0	0.0
All Purpose Room	12	LED - Fixtures: Linear Strip	Wall Switch	S	64	3,630	2	None	Yes	12	LED - Fixtures: Linear Strip	Occupancy Sensor	64	2,505	0.2	945	0	$100	$440	$70	3.7
All Purpose Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,630	0.0	0	0	$0	$0	$0	0.0
All Purpose Room Storage	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630	2	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,505	0.0	179	0	$19	$116	$0	6.1
Attic	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630		None	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,630	0.0	0	0	$0	$0	$0	0.0
Boiler Room	2	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	2	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Boiler Room	5	LED - Fixtures: Ambient 1x4 Fixture	Wall Switch	S	38	3,630	2	None	Yes	5	LED - Fixtures: Ambient 1x4 Fixture	Occupancy Sensor	38	2,505	0.0	235	0	$25	$270	$35	9.5
Boiler Room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,630	0.0	0	0	$0	$0	$0	0.0
Boys Restroom #1	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,630	0.0	0	0	$0	$0	$0	0.0
Boys Restroom #1	2	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	S	72	3,630	2	None	Yes	2	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	2,505	0.0	178	0	$19	$116	$20	5.1
Boys Restroom #2	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 1	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 1	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 1 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 10	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 10	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 11	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 11	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 12 B	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	58	3,006		None	No	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 12A	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	58	3,006		None	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 13	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 13	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 14 A	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	58	3,006		None	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 14 B	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	58	3,006		None	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,006	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 14 C	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 15	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 15	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 16	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 16	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 17	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 17	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 18	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 18	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 19	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 19	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 2	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 2	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 2 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	S	19	3,006		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	19	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 20	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 20	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 21	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	3,006		None	No	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 21	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 22	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,006		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 23	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,006		None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 24	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,006		None	No	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 3	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	27	3,006		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	27	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 3	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 3 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 4	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 4 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 5	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 5 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 6	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 6 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 7	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 7 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 8	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 8 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Classroom 9	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	3,006		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	3,006	0.0	0	0	$0	$0	$0	0.0
Classroom 9 Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Custodial Closet	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630	2	None	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,505	0.0	36	0	$4	$116	$0	30.6
Custodian Office	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,630	2	None	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,505	0.0	36	0	$4	$116	$20	25.3
Electrical Room	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	S	19	3,006		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	19	3,006	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack # 4	2	LED Lamps: (2) 13W A19 Screw-In Lamps	Timeclock		26	2,600		None	No	2	LED Lamps: (2) 13W A19 Screw-In Lamps	Timeclock	26	2,600	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack # 1	14	LED - Fixtures: Wall Pack	Timeclock		13	2,600		None	No	14	LED - Fixtures: Wall Pack	Timeclock	13	2,600	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack # 3	1	LED - Fixtures: Wall Pack	Timeclock		27	2,600		None	No	1	LED - Fixtures: Wall Pack	Timeclock	27	2,600	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack # 2	18	LED - Fixtures: Wall Pack	Timeclock		60	2,600		None	No	18	LED - Fixtures: Wall Pack	Timeclock	60	2,600	0.0	0	0	$0	$0	$0	0.0
Faculty Restroom	2	Incandescent: (1) 75W A19 Screw-In Lamp	Wall Switch	S	75	3,630	1, 2	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	75	2,505	0.0	186	0	$20	$150	$22	6.6
Faculty Restroom	4	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	S	19	3,006		None	No	4	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	19	3,006	0.0	0	0	$0	$0	$0	0.0
Faculty Restroom	4	LED - Fixtures: Ambient 1x4 Fixture	Wall Switch	S	38	3,630	2	None	Yes	4	LED - Fixtures: Ambient 1x4 Fixture	Occupancy Sensor	38	2,505	0.0	188	0	$20	$270	$35	11.8
Faculty Restroom	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Girls Restroom #1	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,630	0.0	0	0	$0	$0	$0	0.0
Girls Restroom #1	2	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	S	72	3,630	2	None	Yes	2	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	2,505	0.0	178	0	$19	$116	$20	5.1
Girls Restroom #2	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Gymnasium	4	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	4	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Gymnasium	18	LED - Fixtures: Linear Strip	Wall Switch	S	64	3,630	2	None	Yes	18	LED - Fixtures: Linear Strip	Occupancy Sensor	64	2,505	0.3	1,417	0	$150	$440	$70	2.5
Gymnasium	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Gymnasium	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,006		None	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,006	0.0	0	0	$0	$0	$0	0.0
Gymnasium Main Electric Closet	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Gymnasium Vestibule	1	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	1	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Gymnasium Vestibule	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0
Hallway A	2	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	2	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway A	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	4,380	2	None	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,022	0.1	780	0	$82	$540	$70	5.7
Hallway A - Restroom	2	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	S	19	4,380		None	No	2	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Occupancy Sensor	19	4,380	0.0	0	0	$0	$0	$0	0.0
Hallway A display	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	4,380		None	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,380	0.0	0	0	$0	$0	$0	0.0
Hallway B	8	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	8	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway B	32	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	4,380	2	None	Yes	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,022	0.2	1,386	0	$146	$810	$105	4.8
Kitchen	2	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	2	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Kitchen	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,006		None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,006	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	64	3,006	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	116	0	$12	$37	$10	2.2
Kitchen - Restroom	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,630		None	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,630	0.0	0	0	$0	$0	$0	0.0
Main Office	1	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	1	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Main Office	12	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	32	3,630	2	None	Yes	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	2,505	0.1	475	0	$50	$270	$35	4.7
Media Center	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	S	58	3,006		None	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,006	0.0	0	0	$0	$0	$0	0.0
Media Center Closet	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630	2	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,505	0.0	72	0	$8	$116	$0	15.3
Media Center Office	2	Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps	Wall Switch	S	26	3,630	1, 2	Relamp	Yes	2	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	26	2,505	0.0	64	0	$7	$166	$24	20.9
Media Center Office	2	Exit Signs: 2 W - LED Lamp	None		2	8,760		None	No	2	Exit Signs: 2 W - LED Lamp	None	2	8,760	0.0	0	0	$0	$0	$0	0.0
Media Center Office	36	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630	2	None	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,505	0.2	1,292	0	$136	$810	$105	5.2
Media Center Office	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630	2	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,505	0.0	72	0	$8	$116	$20	12.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Media Center Office	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,630	2	None	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,505	0.0	84	0	$9	$270	$35	26.4
Nurse's Office	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,630	2	None	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,505	0.0	90	0	$9	$270	$35	24.8
Nurse's Office	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,630	2	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,505	0.0	72	0	$8	$116	$20	12.7
Nurse's Office Restroom	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	S	19	3,630		None	No	1	LED Lamps: (2) 9.5W A19 Screw-In Lamps	Wall Switch	19	3,630	0.0	0	0	$0	$0	$0	0.0
Teacher Restroom	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,006		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,006	0.0	0	0	$0	$0	$0	0.0

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	**Motor Quantity**	**Motor Application**	**HP Per Motor**	**Full Load Efficiency**	**VFD Control?**	**Manufacturer**	**Model**	**Remaining Useful Life**	**Annual Operating Hours**	**ECM #**	**Install High Efficiency Motors?**	**Full Load Efficiency**	**Install VFDs?**	**Number of VFDs**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Roof	Custodian Storage Closet	1	Exhaust Fan	0.1	65.0%	No	TC Ventco	CRDD-080A	W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Media Center	1	Exhaust Fan	0.1	65.0%	No	TC Ventco	GRV-090B	W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Restroom	1	Exhaust Fan	0.3	65.0%	No	TC Ventco	BCRD-100C	W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Restrooms	4	Exhaust Fan	0.5	65.0%	No			W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Classrooms	6	Exhaust Fan	0.5	65.0%	No	CENTURY	P56AG57A01	W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Classroom	1	Exhaust Fan	0.3	65.0%	No			W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Classroom 14	1	Exhaust Fan	0.3	65.0%	No			W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Nurse's Office	1	Exhaust Fan	0.2	65.0%	No			W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	HW Pump - Classrooms 5 through 9	1	Heating Hot Water Pump	0.3	65.0%	No			W	1,120		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	HW Pumps - Pump 1 & 2	2	Heating Hot Water Pump	10.0	89.0%	No			W	1,120	4	No	91.7%	Yes	2	2.2	7,414	0	$803	$13,393	$2,200	13.9
Boiler Room	HW Pumps - Pump 1, 2, & 3	3	Heating Hot Water Pump	3.0	89.5%	Yes	BALDOR	EM3211T-G	W	1,120		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Various Classrooms	Unit Ventilators	20	Supply Fan	0.2	65.0%	No			W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2 - Kitchen	1	Supply Fan	3.0	65.0%	No			W	3,630	3	No	89.5%	Yes	1	1.3	6,996	0	$758	$4,555	$200	5.7
Boiler Room	DHW Circulation Pump	2	DHW Circulation Pump	0.1	65.0%	No	GRUNDFOS		W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic	AHU 1 - Gym	1	Supply Fan	10.0	89.5%	No	BALDOR	M3313T-8	W	3,630	3	No	91.7%	Yes	1	3.0	11,836	0	$1,282	$6,697	$1,100	4.4
Attic	AHU 1 - Gym	1	Return Fan	7.5	91.7%	No			W	3,630	3	No	91.7%	Yes	1	2.2	8,306	0	$900	$5,945	$1,000	5.5
Roof	AHU 2 - All Purpose Room	1	Supply Fan	10.0	89.5%	No			W	3,630	3	No	91.7%	Yes	1	3.0	11,836	0	$1,282	$6,697	$1,100	4.4
Roof	AHU 2 - All Purpose Room	1	Return Fan	7.5	91.7%	No			W	3,630	3	No	91.7%	Yes	1	2.2	8,306	0	$900	$5,945	$1,000	5.5
Classroom 12A & B	Classroom 12A & B	1	Supply Fan	0.5	65.0%	No	Airdale		W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 14A & B	Classroom 14A & B	1	Supply Fan	0.5	65.0%	No	Airdale		W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	**Motor Quantity**	**Motor Application**	**HP Per Motor**	**Full Load Efficiency**	**VFD Control?**	**Manufacturer**	**Model**	**Remaining Useful Life**	**Annual Operating Hours**	**ECM #**	**Install High Efficiency Motors?**	**Full Load Efficiency**	**Install VFDs?**	**Number of VFDs**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Classroom 22	Classroom 22	1	Supply Fan	0.5	65.0%	No	Airdale		W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 23	Classroom 23	1	Supply Fan	0.5	65.0%	No	Airdale		W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 24	Classroom 24	1	Supply Fan	0.5	65.0%	No	Airdale		W	3,630		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1 - Media Center	1	Supply Fan	3.0	65.0%	No			W	3,630	3	No	89.5%	Yes	1	1.3	6,996	0	$758	$4,555	$200	5.7
Wall Mounted	Kitchen	1	Kitchen Hood Exhaust Fan	1.5	84.0%	No			W	5,250	5	No	86.5%	Yes	1	0.0	3,897	10	$559	$3,887	$75	6.8

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	**System Quantity**	**System Type**	**Cooling Capacity per Unit (Tons)**	**Heating Capacity per Unit (MBh)**	**Cooling Mode Efficiency (SEER/IEER/ EER)**	**Heating Mode Efficiency**	**Manufacturer**	**Model**	**Remaining Useful Life**	**ECM #**	**Install High Efficiency System?**	**System Quantity**	**System Type**	**Cooling Capacity per Unit (Tons)**	**Heating Capacity per Unit (MBh)**	**Cooling Mode Efficiency (SEER/IEER/ EER)**	**Heating Mode Efficiency**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Exterior Grounds	Classroom 1	1	Split-System	2.00		12.35		Thermal Zone	TZAL-324-2N	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Grounds	Classroom 2	1	Split-System	3.00		11.15		Thermal Zone	TZAL-336-CC	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Grounds	Classroom 3	1	Split-System	3.00		11.15		Thermal Zone	TZAL-336-CC	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Grounds	Classroom 4	1	Split-System	2.00		12.35		Thermal Zone	TZAL-324-2N	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Grounds	All Purpose Room	2	Package Unit	45.00		10.70		Mc Quay	ACZ045BC12-ER11	B	6	Yes	2	Package Unit	45.00		12.50		7.3	9,447	0	$1,023	$115,784	$7,650	105.7
Exterior Grounds	Principle & Nurse's Office	1	Ductless Mini-Split HP	3.00	34.00	12.35	4.6 HSPF	SAMSUNG	MH080FXCA4A	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Main Office	1	Split-System	1.50		12.00		FUJITSU	AOU18C1	B	6	Yes	1	Split-System	1.50		16.00		0.2	244	0	$26	$3,734	$158	135.4
Roof	Faculty Room	1	Split-System	1.00		11.15		FUJITSU	AOU12C1	B	6	Yes	1	Split-System	1.00		16.00		0.2	212	0	$23	$3,428	$105	144.6
Roof	Faculty Room	1	Split-System	1.50		12.00		FUJITSU	AOU18C1	B	6	Yes	1	Split-System	1.50		16.00		0.2	244	0	$26	$3,734	$158	135.4
Roof	Main Office	1	Split-System	1.00		12.00		FRIEDRICH	MR12C1F	B	6	Yes	1	Split-System	1.00		16.00		0.1	163	0	$18	$3,428	$105	188.7
Roof	Server Room & Media Center	1	Split-System	1.00		12.00		MITSUBISHI		B	6	Yes	1	Split-System	1.00		16.00		0.1	163	0	$18	$3,428	$105	188.7
Roof	AHU 2 - All Purpose Room	1	Package Unit		384.00		0.8 AFUE	Mc Quay		B	7	Yes	1	Unit Heater		384.00		0.82 AFUE	0.0	0	3	$44	$7,710	$0	175.7
Roof	RTU-1 - Media Center	1	Package Unit	10.00	192.00	11.50	0.8 AFUE	LENNOX	KGA120H4BH1Y	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 8	Window AC - Classroom 8	1	Window AC	2.40		8.50		FRIGIDAIRE	FAS296T2A	B	6	Yes	1	Window AC	2.40		12.00		0.5	642	0	$70	$1,829	$0	26.3
Classroom 9	Window AC - Classroom 9	1	Window AC	1.50		9.70		LG	LWHD1800RY7	W		No							0.0	0	0	$0	$0	$0	0.0
Clasrroms 12A & B	Classrooms 12A & B	1	Fan Coil	4.00		14.00		Airdale		W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms 14A & B	Classrooms 14A & B	1	Fan Coil	4.00		14.00		Airdale		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 22	Classroom 22	1	Fan Coil	4.00		14.00		Airdale		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 23	Classroom 23	1	Fan Coil	4.00		14.00		Airdale		W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 24	Classroom 24	1	Fan Coil	4.00		14.00		Airdale		W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Media Center	Media Center	1	Fan Coil	4.00		14.00		Airdale		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2 - Kitchen	1	Package Unit	10.00	192.00	11.50	0.8 AFUE	LENNOX	KGA120H4BH1Y	W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Franklin Elementary School	3	Condensing Hot Water Boiler	2,850	AERCO	BMK3000	W		No						0.0	0	0	$0	$0	$0	0.0

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	AHU-2 - All Purpose Room	8	4.00	45.00	0.00	384.00	0.0	1,640	7	$268	$5,438	$0	20.3
Attic	AHU-1 - Gymnasium	8	4.00	45.00	0.00	427.50	0.0	1,640	6	$261	$5,438	$0	20.9
Roof	RTU-1 - Media Center	8	3.00	10.00	0.00	192.00	0.0	339	3	$82	$4,078	$0	49.9

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Franklin Elementary School	2	Storage Tank Water Heater (> 50 Gal)	A.O. SMITH	BTR-200A 118	N		No						0.0	0	0	$0	$0	$0	0.0
Kitchen	Electric Booster Heater	1	Booster Water Heater			W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boys Restroom #1	9	5	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	3	$37	$36	$18	0.5
Boys Restroom #2	9	3	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	2	$22	$22	$11	0.5
Various Classrooms Restroom	9	7	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	4	$51	$50	$25	0.5
Girls Restroom #1	9	5	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	3	$37	$36	$18	0.5
Girls Restroom #2	9	3	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	2	$22	$22	$11	0.5
Kitchen Restroom	9	1	Faucet Aerator (Kitchen)	2.50	1.50	0.0	0	0	$4	$7	$2	1.4

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Manufacturer	Model	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Medium Temp Freezer (0F to 30F)	ColdZone		10, 11	Yes	No	Yes	0.1	1,251	0	$135	$2,281	$155	15.7

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Refrigerator Chest	Powers Equipment Co.	681	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Refrigerator Chest	Silver King	SKDC48PT/C10	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Traulsen	G20000	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Continental		No		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Vulcan		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	CresCor		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Gas Convection Oven (Half Size)	BLODGETT		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	MARKET FORGE		No		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	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Door Type (High Temp)	JACKSON	150B	Natural Gas	Electric	No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Various Spaces	1	Coffee Machine	900	No		
Various Spaces	40	Desktop	270	No		
Various Spaces	3	Microwave	1,000	No		
Faculty Room	1	Electric Stove	3,000	No		
Main Office	1	Paper Shredder	150	No		
Various Spaces	6	Printer (Medium/Small)	240	No		
Various Spaces	3	Printer (Large)	600	No		
Various Spaces	22	Projector	200	No		
Gymnasium	1	Refrigerator (Mini)	126	No		
Various Spaces	3	Refrigerator (Residential)	172	No		
Media Center Office	1	Smart Board	316	Yes		
Various Spaces	11	Television	130	No		
Faculty Restroom	1	Water Cooler	92	No		
Kitchen	1	Steam Table	2,720	No		
Kitchen	1	Steam Pot	12,000	No		

Custom (High Level) Measure Analysis

Retro-Commissioning Study

Building Square Footage	15,000	Fuel Utility Rate	$13.149 MMBtu
Percent of Conditioned Area Impacted	100%	Blended Electric Utility Rate	$0.108 kWh

Existing Conditions						Proposed Conditions					Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	Remaining Useful Life	Total HVAC Motor Usage kWh	Total HVAC Electric Usage kWh	Total HVAC Fuel Usage MMBtu	Description	% Savings HVAC Motor Usage kWh	% Savings HVAC Electric Usage kWh	% Savings HVAC Fuel Usage MMBtu	Estimated Cost per Sqft	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Simple Payback w/ Incentives in Years
HVAC Controls Not Currently Optimized	HVAC Equipment & Systems	3	164,464	115,180	2,794	Retro-Commissioning Study	3%	3%	3%	$0.50	0.00	8,389	84	$2,011	$7,500	$0	$0	$0	$7,500	3.73	3.73

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Franklin Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 47,260
Built: 1956

For Year Ending: June 30, 2022
Date Generated: April 27, 2023

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 Elementary School 8 Meeker Street Succasunna, New Jersey 07876	Roxbury Township Public Schools 42 N. Hillside Avenue Succasunna, NJ 07876 (973) 584-6099	Kathy Kolbusch 42 N. Hillside Avenue Succasunna, NJ 07876 (973) 584-6099 5005 kkolbusch@roxbury.org

Property ID: 21476798
99643748: 021108312626
8313333115: 100000834448

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
93 kBtu/ft²

Source EUI
155.4 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,558,964 (36%)
Natural Gas (kBtu)	2,835,071 (64%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	60.3
National Median Source EUI (kBtu/ft²)	100.8
% Diff from National Median Source EUI	54%
Annual Emissions	
Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	286

Signature & Stamp of Verifying Professional

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

LP Signature: ______________________ Date: __________

Licensed Professional

____ ________

(___)____-______

____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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