Local Government Energy Audit Report

Newmark School Building

January 20, 2025

Prepared for:
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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.

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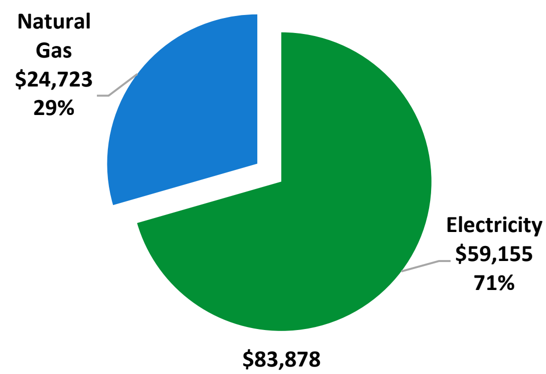
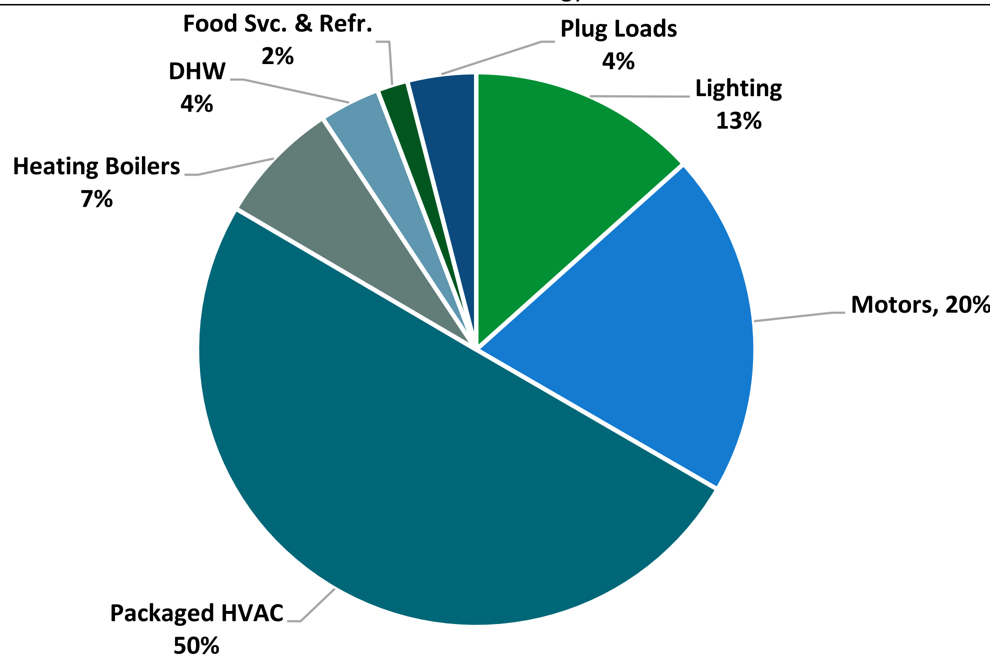
1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Newmark School Building. 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 Energy Utilities	Costs: $83,878 Electricity: 537,878 kWh Natural Gas: 17,598 Therms Water: 681,399 Gallons	
ENERGY STAR® Benchmarking Score	79 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.





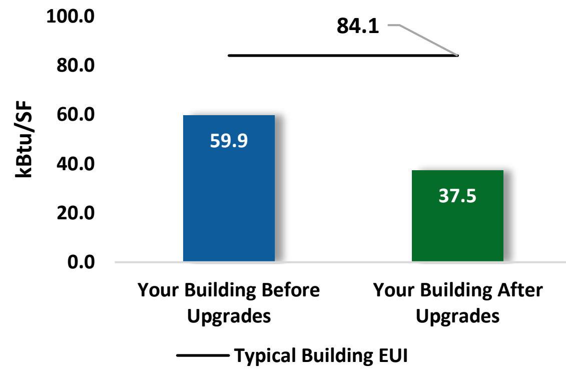
Energy Use by System

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.

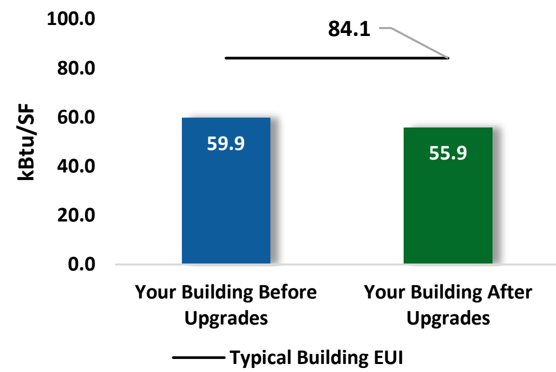
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$394,807
Potential Rebates & Incentives[1]	$27,710
Annual Cost Savings	$18,321
Annual Energy Savings	Electricity: -8,873 kWh Natural Gas: 13,735 Therms
Greenhouse Gas Emission Savings	76 Tons
Simple Payback	20.0 Years
Site Energy Savings (All Utilities)	37%



Scenario 2: Cost Effective Package[2]

Installation Cost	$61,640
Potential Rebates & Incentives	$12,310
Annual Cost Savings	$8,077
Annual Energy Savings	Electricity: 75,248 kWh Natural Gas: -142 Therms
Greenhouse Gas Emission Savings	37 Tons
Simple Payback	6.1 Years
Site Energy Savings (all utilities)	7%



On-site Generation Potential

Photovoltaic	None
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			**61,526**	**17.5**	**-13**	**$6,588**	**$47,300**	**$6,820**	**$40,480**	**6.1**	**60,467**
ECM 1	Install LED Fixtures	Yes	19,305	4.8	-4	$2,068	$19,670	$1,550	$18,120	8.8	18,978
ECM 2	Retrofit Fixtures with LED Lamps	Yes	42,221	12.7	-9	$4,520	$27,630	$5,270	$22,360	4.9	41,488
Lighting Control Measures			**12,860**	**2.3**	**-3**	**$1,377**	**$13,690**	**$5,480**	**$8,210**	**6.0**	**12,635**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	5,710	1.4	-1	$611	$8,070	$960	$7,110	11.6	5,611
ECM 4	Install High/Low Lighting Controls	Yes	7,149	0.9	-1	$765	$5,620	$4,520	$1,100	1.4	7,024
Unitary HVAC Measures			**-72,304**	**17.9**	**1,262**	**$9,773**	**$328,467**	**$15,400**	**$313,067**	**32.0**	**74,916**
ECM 5	Install High Efficiency Air Conditioning Units	No	1,130	0.7	0	$124	$4,167	$0	$4,167	33.5	1,138
ECM 6	Install High Efficiency Heat Pumps	No	-73,434	17.2	1,262	$9,649	$324,300	$15,400	$308,900	32.0	73,778
Domestic Water Heating Upgrade			**0**	**0.0**	**1**	**$17**	**$50**	**$10**	**$40**	**2.3**	**144**
ECM 7	Install Low-Flow DHW Devices	Yes	0	0.0	1	$17	$50	$10	$40	2.3	144
Custom Measures			**-10,955**	**0.0**	**126**	**$566**	**$5,300**	**$0**	**$5,300**	**9.4**	**3,722**
ECM 8	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-11,817	0.0	126	$471	$4,700	$0	$4,700	10.0	2,853
ECM 9	Install DHW Pump Timeclock Control	Yes	862	0.0	0	$95	$600	$0	$600	6.3	868
TOTALS (COST EFFECTIVE MEASURES)			**75,248**	**19.8**	**-14**	**$8,077**	**$61,640**	**$12,310**	**$49,330**	**6.1**	**74,113**
TOTALS (ALL MEASURES)			**-8,873**	**37.7**	**1,373**	**$18,321**	**$394,807**	**$27,710**	**$367,097**	**20.0**	**151,883**

* - 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).

All Evaluated Energy Improvements[3]

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

[3] 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.

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decision 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 for the largest energy consumers in the state. Customers in this category spend about $5 million a year on energy bills. This program 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 Newmark School Building. 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 October 1, 2024, TRC performed an energy audit at Newmark School Building located in Scotch Plains, New Jersey. TRC met with Rick Pucaro to review the facility operations and help focus our investigation on specific energy-using systems. Newmark K-8 School and Newmark High School are state-approved, private, non-profit institutions dedicated to supporting children with autism spectrum disorders, mood and anxiety disorders, attention issues, and other developmental disabilities.

The Newmark School Building is a two-story, 60,000-square-foot facility built in 1985. Spaces include classrooms, gymnasium, offices, cafeteria, corridors, stairwells, kitchen, and mechanical areas.

The primary lighting system consists of linear fluorescent T8 lamps. Staff is focused on replacing these with LED linear tubes. The facility uses rooftop packaged units for heating and cooling while a hydronic boiler supports the VAV reheat system. Additionally, the facility has an on-site rooftop photovoltaic (PV) array that produces around 47% of the total electricity used on-site.

2.2 Building Occupancy

The facility is occupied Monday through Friday during regular school hours. The facility is occupied intermittently on weekends, as needed for maintenance and operations.

The school is fully occupied from September through June. Typical weekday occupancy is 77 staff and 165 students. During the summer, occupancy primarily involves ongoing maintenance tasks and use of office space with a few summer classes being held.

Building Name	Weekday/Weekend	Operating Schedule
Newmark School Staff	Weekday	7:00 AM - 6:00 PM
	Weekend	Limited
Newmark School Classes	Weekday	8:00 AM - 2:45 PM
	Weekend	No

Building Occupancy Schedule

2.3 Building Envelope

The walls are made of brick and decorative block over structural steel with a painted CMU interior finish. The flat roof is supported with steel trusses and a metal deck and finished with a covering of white ethylene propylene diene monomer (EPDM). The roof encloses a plenum area with conditioned space below a drop ceiling.

Most of the windows are double paned and have aluminum frames with a thermal break. The seals between the glass and frames are in fair condition. The operable window weather seals are also in fair condition and show no signs of excessive wear. Exterior doors are made from fiberglass reinforced polymer (FRP) composite material with aluminum frames. They are in fair condition with undamaged door seals. Degraded window and door seals can increase drafts and outside air infiltration.

Building Envelope

Building Envelope: Doors

Building Envelope

Building Envelope

Building Envelope: Roof

Building Envelope: Roof (Solar)

2.4 Lighting Systems

The interior lighting system primarily uses 32-Watt linear fluorescent T8 lamps. Fixture types include 1-lamp, 2-lamp, 3-lamp, or 4-lamp, 4-foot-long recessed and surface-mounted fixtures with linear tube lamps. There are a very few two-foot and five-foot T8 fixtures in the mix. Several T5 fluorescent lamps illuminate the corridor. Typically, T5 and T8 fluorescent lamps use electronic ballasts.

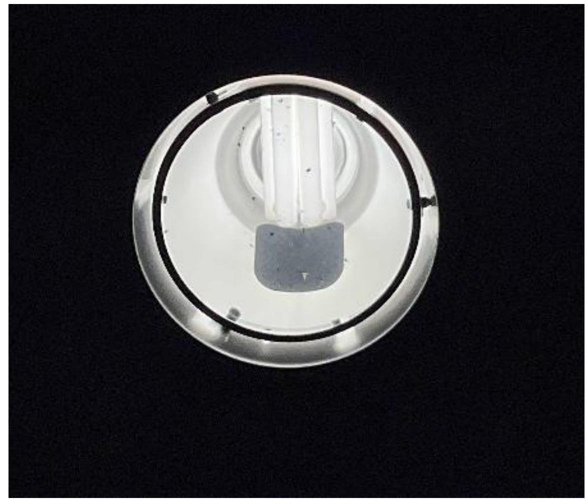
A significant number of LED fixtures of various types are used in classrooms, the gymnasium, offices, corridors, restrooms, and storerooms. Additionally, some compact fluorescent lamps (CFLs) and LED general purpose lamps are present in areas including the cafeteria, classrooms, corridors, offices, and restrooms.

The gymnasium fixtures have manually controlled high-bay high-intensity discharge (HID) lamps. Auditorium/cafeteria fixtures also incorporate high-bay HID lamps, which are manually controlled and used only during events in the stage area.

All exit signs are LED. Most fixtures are in fair condition, and interior lighting levels are generally sufficient. Most light fixtures are manually controlled by occupancy sensors while some are controlled by wall switches.

Typical Linear T8 Fluorescent Lamp

Typical Linear T8 Fluorescent Lamp



LED 2foot x 4-foot Fixture

CFL Can Fixture

Exterior fixtures include wall packs, floodlights and canopy lights with high intensity discharge (HID), CFL, and LED lamps. The pole mounted flood fixtures incorporate LED fixtures.

Exterior light fixtures are controlled by a time clock, or switch depending on the fixture.

Exterior HID Fixture

Exterior LED Fixture

Exterior Pole Mounted LED Fixtures

Exterior CFL Can Fixture

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

The server room uses a mini-split air conditioning unit with a 3-ton cooling capacity. The rooftop penthouse is conditioned by a mini-split heat pump unit with a 0.75-ton cooling capacity and a 10 MBh heating capacity. Both units are standard efficiency, are operating beyond their useful life, and are evaluated for replacement in this report. They are controlled locally with thermostats and are in good condition.

Mini-Split Air Conditioning Unit

Mini-Split Heat Pump

Packaged Units

The building is served by packaged rooftop units (RTUs). The Aaon units range in size from 4 tons to 31 tons. There are ten gas-fired burner units, ranging in size from 81 MBh to 432 MBh. The units are of standard efficiency and are nearing the end of their useful life and they are evaluated for replacement with heat pumps in the report.

The units have supply and return fans of various sizes equipped with variable frequency drives (VFDs) and operating in fair condition. These units are also equipped with economizers which are in fair condition. The units are controlled by the BAS system and are scheduled for occupied and unoccupied times. Refer to the following table for detailed information about each unit.

Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh/hr.)	Supply Fan (HP)	Return Fan (HP)	Manufacturer	Model
RTU - 8	1	Package Unit	31.00	432.00	15	3	Aaon	RN-031-8-0-EB09-3C9
RTU - 7 (Cafeteria)	1	Package Unit	25.00	432.00	7.5	2	Aaon	RN-025-8-0-EA09-3C9
RTU - 3A and 3B (Gymnasium)	2	Package Unit	13.00	234.00	5	2	Aaon	RN-013-8-0-EA09-3G9
RTU - 1 (First Floor Offices)	1	Package Unit	25.00	432.00	15	5	Aaon	RN-025-8-0-EA09-3C9
RTU - 5	1	Package Unit	4.00	81.00	2	1	Aaon	RQ-004-8-V-EA09-339
RTU-4 (Gymnasium Offices)	1	Package Unit	8.00	120.00	5	2	Aaon	RN-008-8-0-EB09-3K9
RTU- 6	1	Package Unit	8.00	120.00	5	2	Aaon	RN-008-8-0-EB09-3K9
RTU -9	1	Package Unit	31.00	432.00	15	3	Aaon	RN-031-8-0-EB09-3C9
RTU-2	1	Package Unit	31.00	432.00	15	3	Aaon	RN-031-8-0-EB09-3C9

RTU-3B

RTU–8

RTU–9

RTU-5

Exhaust Fan

There are several rooftop fractional horsepower exhaust fans serving the building. These fans operate continuously and are of standard efficiency. They are in fair operating condition. We recommend that the facility consider integrating these exhaust systems into the BAS during future upgrades to optimize their usage.

Typical Exhaust Fan

Typical Exhaust Fan

Unitary Heating Equipment

The kitchen is heated by rooftop gas-fired furnace, rated at 550 MBh. The unit is in good condition. The equipment is controlled by a BAS, which was set to 68°F at the time of the audit. The supply fan is a 1.5 hp constant-speed unit with a standard efficiency rating. There are a few suspended hot water heaters in the mechanical room and workshop. These heaters are in fair operating condition.

Kitchen Heating Equipment

Unit Heater: Hot Water

2.6 Heating Hot Water Systems

A single Smith boiler with an input rating of 1,477 MBh supplements the building's heating load. The burners are fully modulating, with a nominal efficiency of 78.5%. Refurbished in 2012, the boiler is in fair condition.

The hydronic distribution system is a two-pipe, heating-only system. The boilers operate in a variable-flow primary distribution configuration, with two, 7.5 hp VFD controlled hot water pumps running on an automated lead-lag control scheme. They supply hot water to VAV units throughout the building to supplement heating provided by the RTUs.

The supply and return pipes are insulated, and the insulation is in good condition. During the audit, hot water was supplied at 189.4°F, with a return temperature of 168°F. The boiler and heating system are controlled by the BAS.

Hydronic Boiler

Hot Water Heating Pump

Hot Water Heating Pump: VFD

Hydronic Boiler

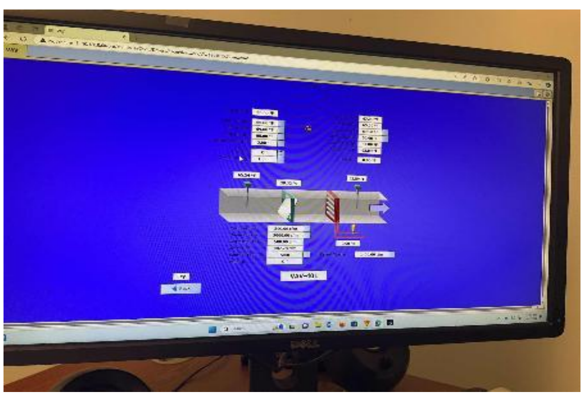
2.7 Building Automation System (BAS)

A Tridium JACE BAS controls the HVAC equipment, boiler, exhaust fans, VAV system, and package units. The existing BAS is frequently used to monitor and control the status of rooftop package units, boiler, hot water loop, lighting system, and exhaust fans. The BAS provides equipment scheduling control, allowing users to manage temperature settings based on predefined schedules. Additionally, it offers a graphical interface that provides users with an insightful view of the various HVAC components and their operational status.

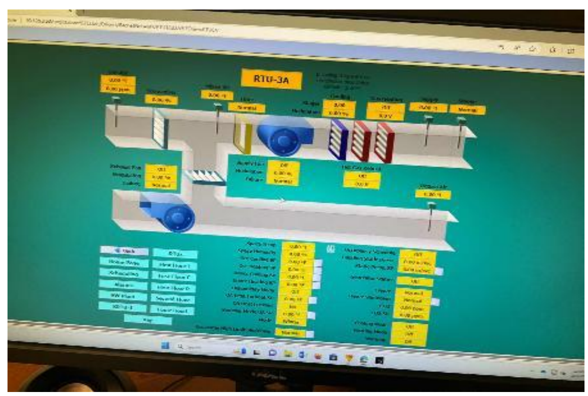
During the audit, the HVAC systems were set to operate Monday through Friday from 3:00 AM to 9:00 PM and on Saturdays from 6:00 AM to 1:00 PM. For VAV system 401, the T-Stat set point was 66°F, with an occupied cooling set point of 67°F and a heating set point of 65°F. The unoccupied cooling and heating set points were 80°F and 50°F, respectively. The requested airflow was 500 CFM, and the damper was modulating at 28.32%, set to auto.

For the gymnasium RTU 3B, the occupied cooling and heating set points were 70°F and 68°F, respectively; while the unoccupied set points were 85°F for cooling and 64°F for heating. The outdoor air lockout set point was 60°F. For demand control ventilation, the CO_2 threshold set point was 1078 PPM.

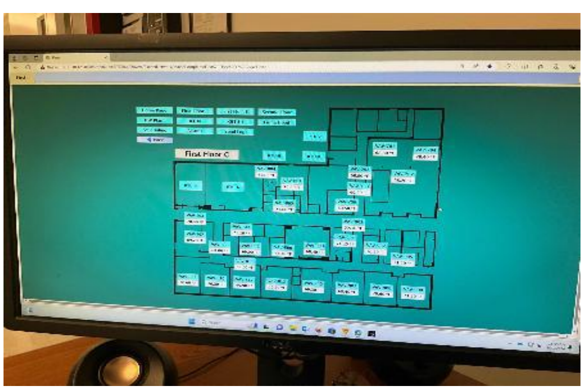
The site staff expressed interest in expanding the control capabilities of the BAS and upgrading it. Retro-commissioning is a common practice recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to be conducted every few years. Typical measures may include sensor calibration, equipment schedule adjustments, damper linkage repairs, and similar low-cost adjustments, though more advanced programming and control system upgrades may also be necessary.



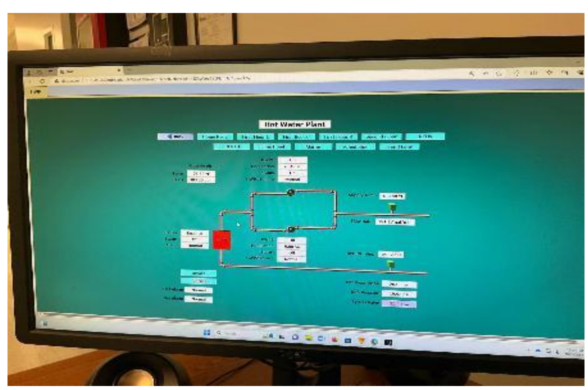
BAS Screenshot VAV-401



BAS Screenshot RTU 3A



BAS Screenshot First Floor Map



BAS Screenshot Hot Water Plant

2.8 Domestic Hot Water

Hot water is produced by an A.O. Smith 100-gallon, 250 MBh gas-fired storage water heater with an efficiency rating of 96%. The water heater was manufactured in 2017 and is in fair operating condition.

At the time of the site visit, the domestic water heaters were set to 130°F. A fractional hp Bell & Gossett recirculation pump distributes water to end uses and operates continuously. The domestic hot water pipes are insulated, and the insulation is in fair condition.

Gas-fired Storage Water Tank Heater

DHW Recirculation Pump

2.9 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is rarely used, except for a few occasions annually. Students' meals are brought in from outside and kept in several electric holding cabinets. The equipment is not high efficiency but is in good condition.

The dishwasher is an ENERGY STAR-rated, low-temperature, undercounter unit.

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

Insulated Food Holding Cabinet (Full Size)

Gas Convection Oven (Full Size)

2.10 Refrigeration

The kitchen has a stand-up refrigerator, freezer with solid doors, and chest freezer. All equipment is high-efficiency and in good condition.

There are also two ice makers in the facility, which are standard efficiency.

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

Stand-up Solid Door Freezer

Stand-up Solid Door Refrigerator

2.11 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 26 computer workstations throughout the facility. Plug loads include general cafe and office equipment. Typical loads include smartboards, projectors, laptops, microwaves, printers/copies, toaster ovens, air purifiers, televisions, and coffee machines.

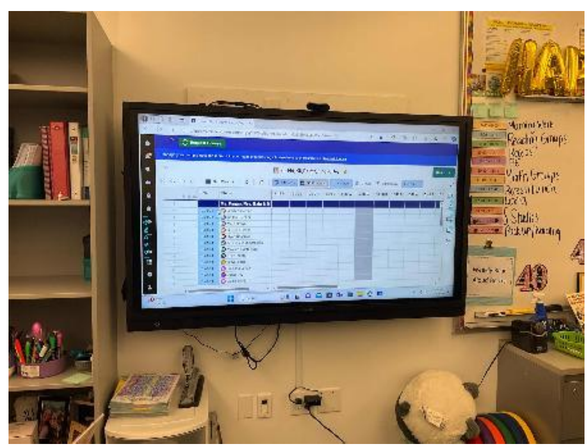
There are several residential-style refrigerators throughout the building used to store food and perishable items. These vary in condition and efficiency. The is a kiln in the art classroom, Rm 149.

The workshop has several other plug loads, including a miter saw, woodworking band saw, and portable air compressor. There are a few other loads, such as a serving table, dough maker, floor scrubber, and cleaners.

Serving Table

Television

Air Purifier



Smartboard

Kiln

Cooktop and Microwave

2.12 Water-Using Systems

Water is provided by the New Jersey American Water. Water is mainly used for drinking, cleaning, cooking, landscaping, and sanitary fixtures. Water leaks were not observed.

EPA WaterSense® has set maximum flow rates for sanitary fixtures. They are: 1.28 gallons per flush (gpf) for toilets, 0.5 gpf for urinals, 1.5 gallons per minute (gpm) for lavatory faucets, and 2.0 gpm for showerheads. There are few restrooms with toilets, urinals, and sinks. Faucet flow rates are 0.5 gpm or higher. Girl’s and boy’s locker rooms are frequently used.

Typical Restroom Faucet

Typical Kitchen Faucet

2.13 On-Site Generation

The Newmark School building is equipped with a 324-kW photovoltaic (PV) array, with panels installed on the rooftop. This system generates about 47% of the building's electricity needs.

The building also has a Kohler gas-fired emergency generator, rated at 150 kW. In the event of a power outage, this generator powers critical services and is used solely for emergency purposes.

Solar Onsite Generation

Solar Onsite Generation

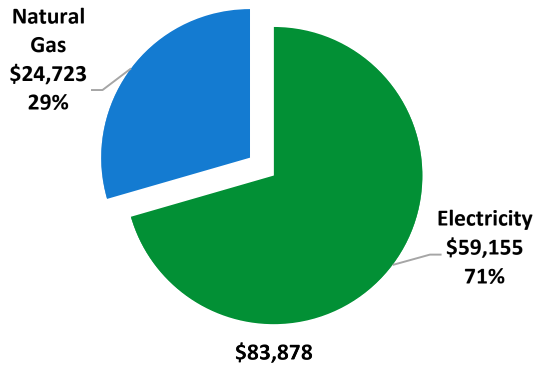
Solar Onsite Generation

Natural Gas-fired Emergency Generator

3 Energy and Water Use and Costs

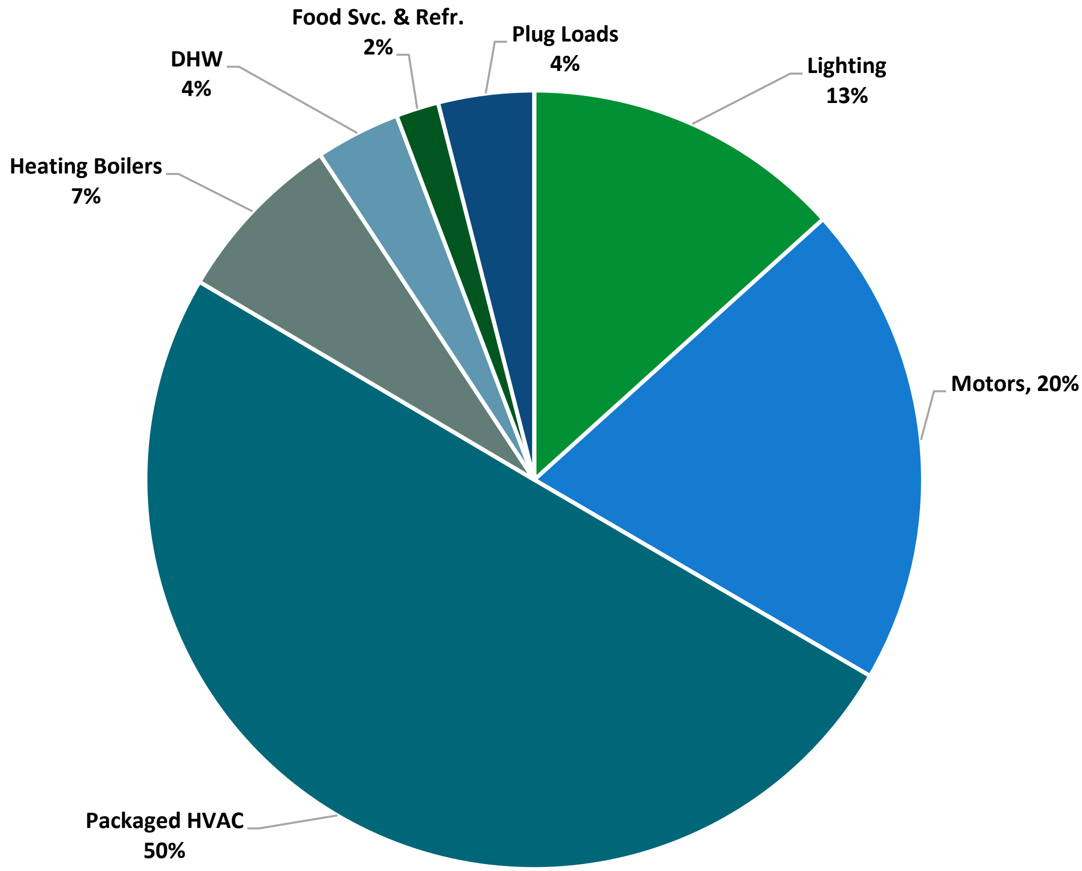
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	537,878 kWh	$59,155
Natural Gas	17,598 Therms	$24,723
Total		**$83,878**



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.

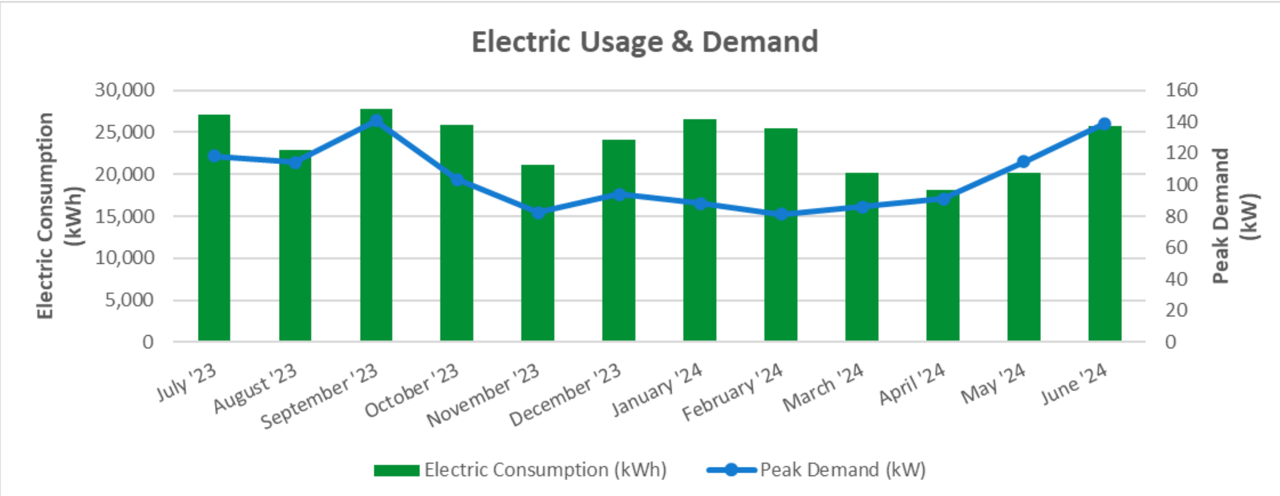


Energy Balance by System

3.1 Electricity

Most electricity used by the complex is purchased off the grid. Additional electricity is generated on-site by the rooftop solar plant. The average electric cost over the past 12 months was $0.110/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.

The following graph indicates the grid purchased electricity total, delivered by PSE&G under rate class Large Power & Lighting Secondary (LPLS).

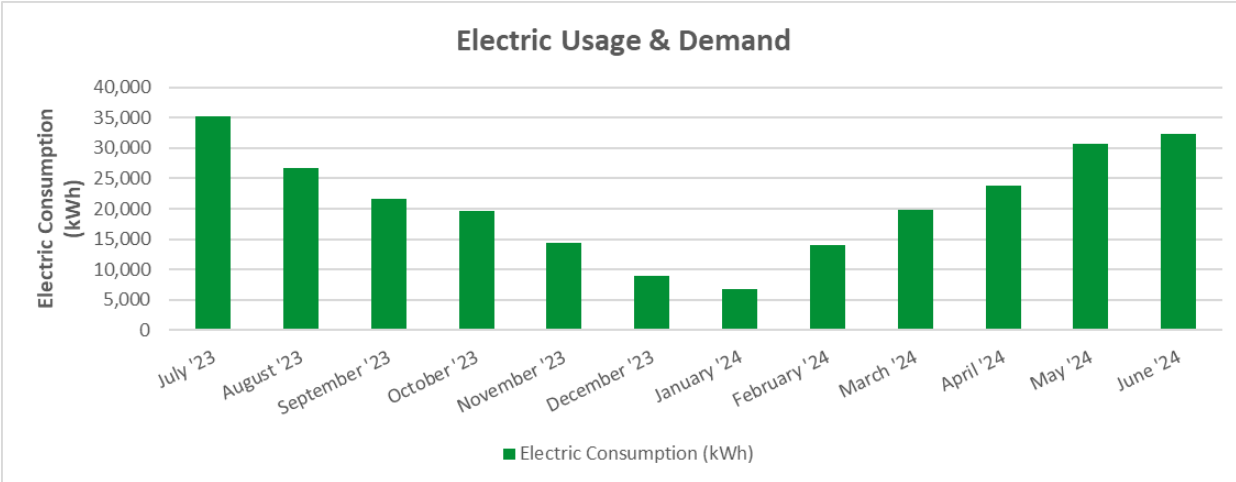


Electric Billing Data for Newmark School Building					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/25/23	31	27,149	118	$1,666	$4,039
8/23/23	29	22,939	114	$1,419	$3,262
9/22/23	30	27,797	141	$1,983	$4,571
10/23/23	31	25,831	103	$510	$3,195
11/21/23	29	21,173	82	$408	$2,782
12/22/23	31	24,056	94	$467	$3,252
1/24/24	33	26,602	88	$437	$3,692
2/23/24	30	25,423	81	$402	$3,524
3/25/24	31	20,151	86	$430	$2,327
4/23/24	29	18,137	91	$451	$2,181
5/23/24	30	20,171	115	$570	$2,775
6/24/24	32	25,769	139	$1,700	$4,107
Totals	**366**	**285,198**	**140.7**	**$10,443**	**$39,707**
Annual	**365**	**284,419**	**140.7**	**$10,414**	**$39,599**

Notes:

- Peak demand of 141 kW occurred in September '23.
- Average demand over the past 12 months was 104 kW.
- The average electric cost over the past 12 months was $0.14/kWh

The following graph illustrates total of on-site produced electricity.

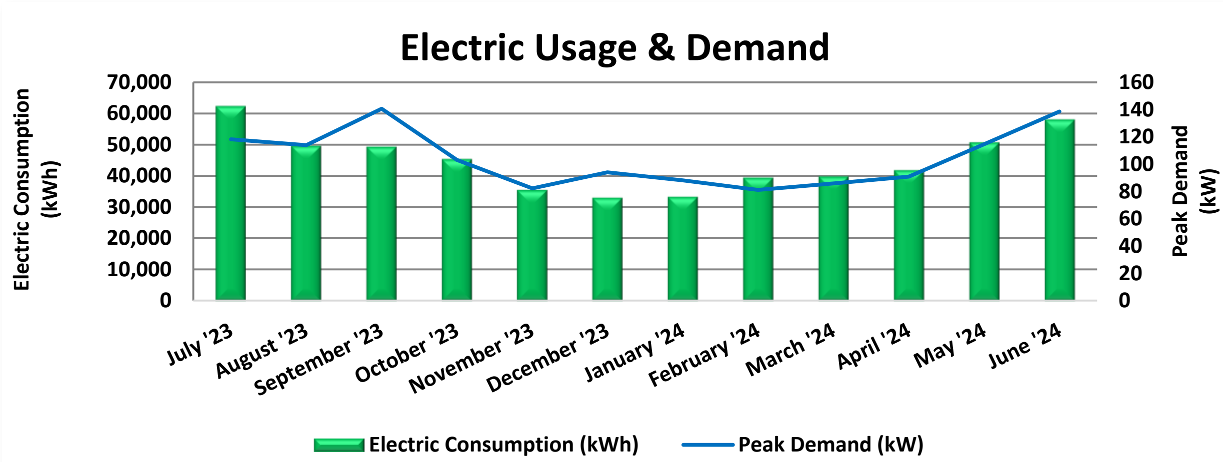


Electric Billing Data for Newmark School Building			
Period Ending	Days in Period	Electric Usage (kWh)	Total Electric Cost
7/31/23	31	35,211	$2,571
8/31/23	31	26,765	$2,280
9/30/23	30	21,660	$1,772
10/31/23	31	19,642	$800
11/30/23	30	14,443	$1,069
12/31/23	31	9,007	$663
1/31/24	31	6,773	$463
2/29/24	29	14,063	$946
3/31/24	31	19,820	$1,825
4/30/24	30	23,728	$2,112
5/31/24	31	30,658	$2,352
6/30/24	30	32,384	$2,756
Totals	**366**	**254,154**	**$19,610**
Annual	**365**	**253,459**	**$19,557**

Notes:

- On-site generation is through a PPA, and all of the electricity generated on-site is used on-site.
- Demand (kW) information is not available for generated electricity.
- The average electric cost over the past 12 months for generated solar was $0.08/kWh.

The following graph illustrates the total electricity consumption, including both grid purchases and onsite generation.



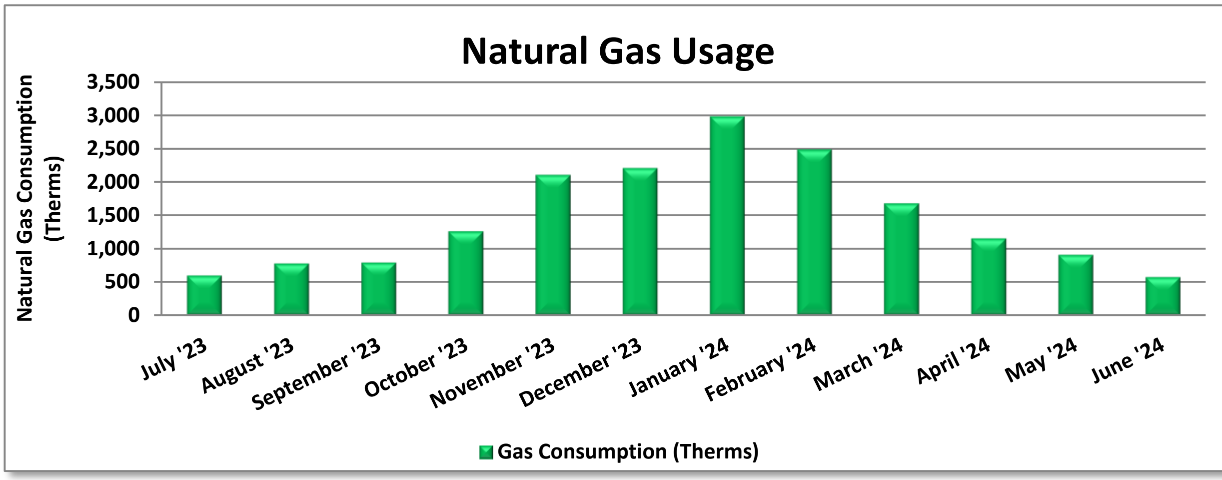
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
7/25/23	31	62,360	118	$1,666	$6,610
8/23/23	29	49,704	114	$1,419	$5,542
9/22/23	30	49,457	141	$1,983	$6,343
10/23/23	31	45,473	103	$510	$3,995
11/21/23	29	35,616	82	$408	$3,851
12/22/23	31	33,063	94	$467	$3,916
1/24/24	33	33,375	88	$437	$4,155
2/23/24	30	39,486	81	$402	$4,470
3/25/24	31	39,971	86	$430	$4,152
4/23/24	29	41,865	91	$451	$4,294
5/23/24	30	50,829	115	$570	$5,127
6/24/24	32	58,153	139	$1,700	$6,863
Totals	**366**	**539,352**	**141**	**$10,443**	**$59,318**
Annual	**365**	**537,878**	**141**	**$10,414**	**$59,155**

Notes:

- The average electric cost over the past 12 months was $0.110/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.
- 47% of the total electric energy used is produced on-site.

3.2 Natural Gas

Elizabethtown Gas delivers natural gas under rate class of General Delivery Service.



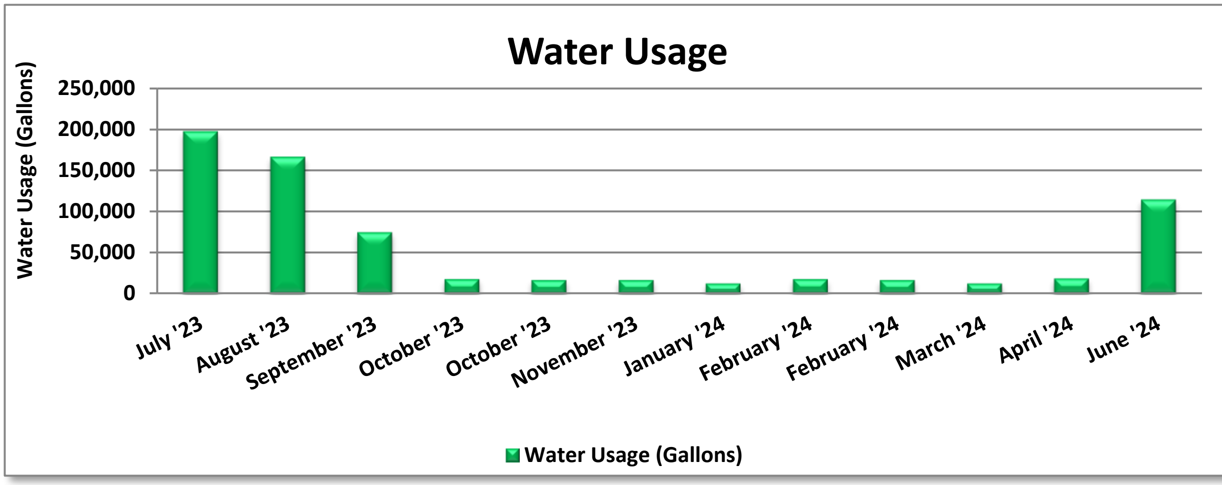
Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
8/3/23	28	592	$1,303
9/6/23	34	777	$1,456
10/4/23	28	791	$1,477
11/3/23	30	1,260	$1,931
12/5/23	32	2,104	$2,759
1/4/24	30	2,205	$2,748
2/5/24	32	2,981	$3,407
3/5/24	29	2,486	$2,940
4/3/24	29	1,678	$2,092
5/3/24	30	1,153	$1,681
6/5/24	33	904	$1,505
7/3/24	28	570	$1,288
Totals	**363**	**17,501**	**$24,587**
Annual	**365**	**17,598**	**$24,723**

Notes:

- The average gas cost for the past 12 months is $1.405/therm, which is the blended rate used throughout the analysis.

3.3 Water

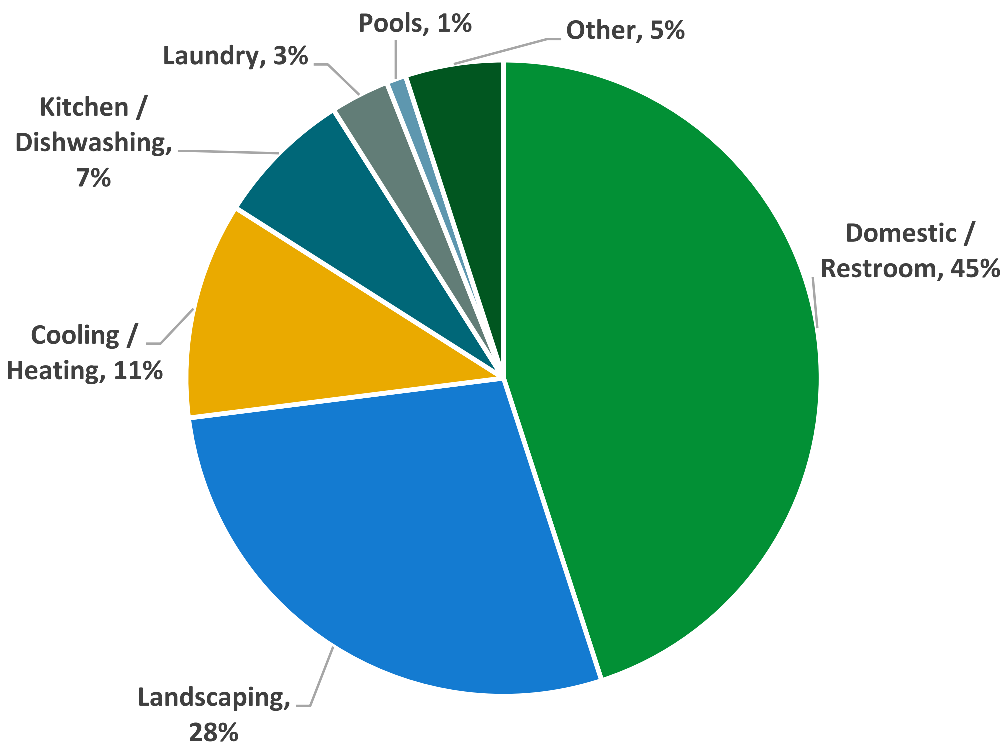
New Jersey American Water delivers water to the project site.



Water Billing Data			
Period Ending	Days in Period	Water Usage (gallons)	Water Cost
7/18/23	33	198,000	$1,880
8/16/23	29	167,000	$1,633
9/18/23	33	75,000	$827
10/16/23	28	18,000	$328
11/15/23	30	17,000	$330
12/15/23	30	17,000	$330
1/17/24	33	13,000	$297
2/16/24	30	18,000	$344
3/15/24	28	17,000	$334
4/15/24	31	13,000	$298
5/15/24	30	19,000	$359
6/17/24	33	115,000	$1,223
Totals	**368**	**687,000**	**$8,185**
Annual	**365**	**681,399**	**$8,118**

Notes:

- The average cost of water for the past 12 months is $0.0119/gal.



Typical Education Water End Use[4]

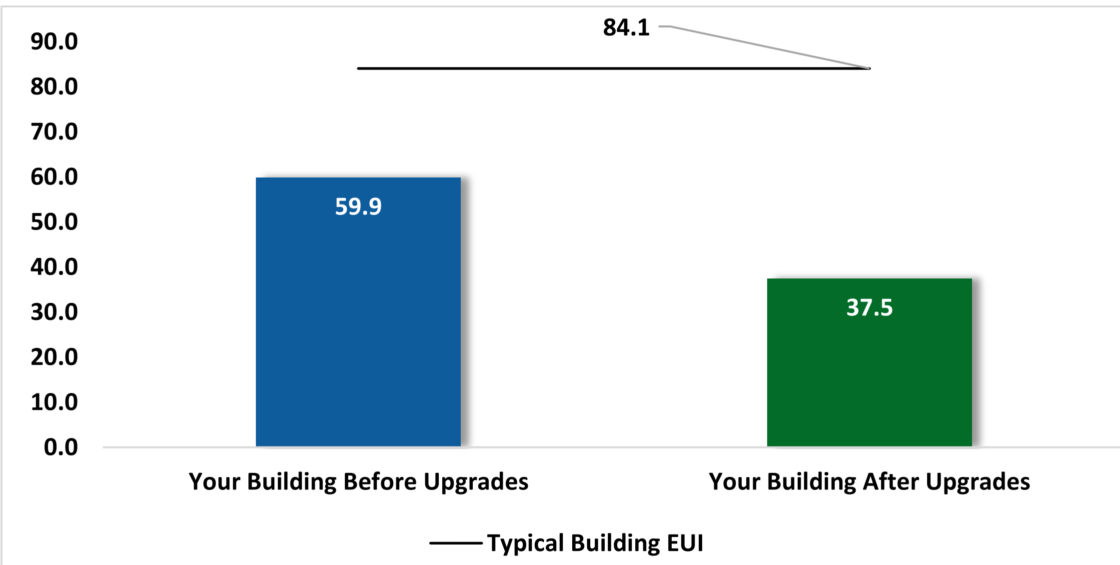
[4] Chart is of typical water end use and not specific to the facility

3.4 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	79



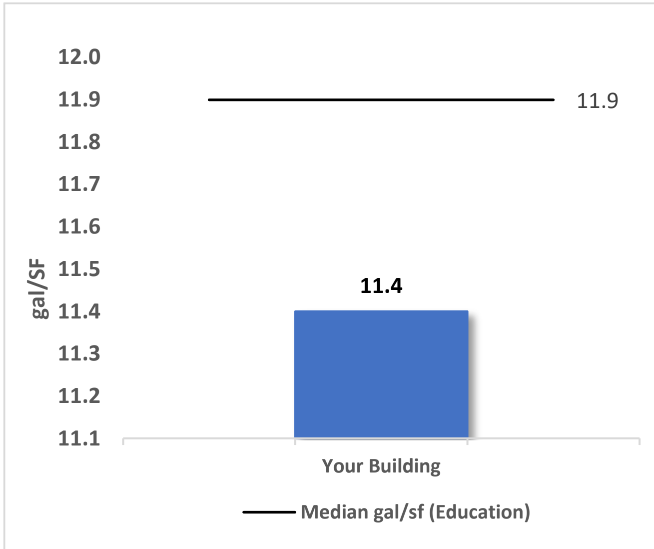
Energy Use Intensity Comparison[5]

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

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.

[5] Based on all evaluated ECMs

Water Benchmarking



A benchmark is provided for your building's water use based on the annual water use in gallons per square foot of building area (gal/sf-yr). Your building is compared to other similar buildings based on average water usage as available from the 2012 Commercial Buildings Energy Consumption Survey (CBECS) and from the EPA ENERGY STAR DataTrends Water Use Tracking database.

Water use varies considerably depending mainly on the extent of outdoor water use and whether process water is use. Cooling towers and steam boilers are also significant water users. Kitchens and sanitary fixtures may use varying amounts of water.

Tracking your Energy Performance

Keeping track of your energy and water use on a monthly basis is one of the best ways to keep utility costs in check and keep your facility operating efficiently. 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.](https://www.energystar.gov/buildings/training)

For more information on ENERGY STAR and Portfolio Manager, visit their [website](#).

3.5 Understanding Your Utility Bills

The State of New Jersey Department of the Public Advocate provides detailed information on how to read natural gas and electric bills. Your bills contain important information including account numbers, meter numbers, rate schedules, meter readings, and the supply and delivery charges. Gas and electric bills both provide comparisons of current energy consumption with prior usage.

Sample bills, with annotation, may be viewed at:
https://www.nj.gov/rpa/docs/Understanding_Electric_Bill.pdf
https://www.nj.gov/rpa/docs/Understanding_Gas_Bill.pdf

Why Utility Bills Vary

Utility bills vary from one month to another for many reasons. For this reason, assessing the effects of your energy savings efforts can be difficult.

Billing periods vary, typically ranging between 28 and 33 days. Electric bills provide the kilowatt-hours (kWh) used per month while gas bills provide therms (or hundreds of cubic feet - CCF) per month consumption information. Monthly consumption information can be helpful as a tool to assess your efforts to reduce energy, particularly when compared to monthly usage from a similar calendar period in a prior year.

Bills typically vary seasonally, often with more gas consumed in the winter for heating, and more electricity used in the summer when air conditioning is used. Facilities with electric heating may experience higher electricity use in the winter. Seasonal variance will be impacted by the type of heating and cooling systems used. Normal seasonal fluctuations are further impacted by the weather. Extremely cold or hot weathers causes HVAC equipment to run longer, increasing usage. Other monthly fluctuations in usage can be caused by changes in building occupancy. Utility bills provide a comparison of usage between the current period and comparable billing month period of the prior year. Year-to-year monthly use comparisons can point to trends with energy savings for measures/projects that were implemented within the timeframe, but these comparisons do not account for changing weather of occupancy patterns.

The price of fuel and purchased power used to produce and delivery electricity and gas fluctuates. Any increase or decrease in these costs will be reflected in your monthly bill. Additionally, billing rates occasionally change after justification and approval of the NJBPU. For this reason, it is more useful to review energy use rather than cost when assessing energy use trends or the impact of energy conservation measures implemented.

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			**61,526**	**17.5**	**-13**	**$6,588**	**$47,300**	**$6,820**	**$40,480**	**6.1**	**60,467**
ECM 1	Install LED Fixtures	Yes	19,305	4.8	-4	$2,068	$19,670	$1,550	$18,120	8.8	18,978
ECM 2	Retrofit Fixtures with LED Lamps	Yes	42,221	12.7	-9	$4,520	$27,630	$5,270	$22,360	4.9	41,488
Lighting Control Measures			**12,860**	**2.3**	**-3**	**$1,377**	**$13,690**	**$5,480**	**$8,210**	**6.0**	**12,635**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	5,710	1.4	-1	$611	$8,070	$960	$7,110	11.6	5,611
ECM 4	Install High/Low Lighting Controls	Yes	7,149	0.9	-1	$765	$5,620	$4,520	$1,100	1.4	7,024
Unitary HVAC Measures			**-72,304**	**17.9**	**1,262**	**$9,773**	**$328,467**	**$15,400**	**$313,067**	**32.0**	**74,916**
ECM 5	Install High Efficiency Air Conditioning Units	No	1,130	0.7	0	$124	$4,167	$0	$4,167	33.5	1,138
ECM 6	Install High Efficiency Heat Pumps	No	-73,434	17.2	1,262	$9,649	$324,300	$15,400	$308,900	32.0	73,778
Domestic Water Heating Upgrade			**0**	**0.0**	**1**	**$17**	**$50**	**$10**	**$40**	**2.3**	**144**
ECM 7	Install Low-Flow DHW Devices	Yes	0	0.0	1	$17	$50	$10	$40	2.3	144
Custom Measures			**-10,955**	**0.0**	**126**	**$566**	**$5,300**	**$0**	**$5,300**	**9.4**	**3,722**
ECM 8	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-11,817	0.0	126	$471	$4,700	$0	$4,700	10.0	2,853
ECM 9	Install DHW Pump Timeclock Control	Yes	862	0.0	0	$95	$600	$0	$600	6.3	868
TOTALS			**-8,873**	**37.7**	**1,373**	**$18,321**	**$394,807**	**$27,710**	**$367,097**	**20.0**	**151,883**

* - 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).

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		**61,526**	**17.5**	**-13**	**$6,588**	**$47,300**	**$6,820**	**$40,480**	**6.1**	**60,467**
ECM 1	Install LED Fixtures	19,305	4.8	-4	$2,068	$19,670	$1,550	$18,120	8.8	18,978
ECM 2	Retrofit Fixtures with LED Lamps	42,221	12.7	-9	$4,520	$27,630	$5,270	$22,360	4.9	41,488
Lighting Control Measures		**12,860**	**2.3**	**-3**	**$1,377**	**$13,690**	**$5,480**	**$8,210**	**6.0**	**12,635**
ECM 3	Install Occupancy Sensor Lighting Controls	5,710	1.4	-1	$611	$8,070	$960	$7,110	11.6	5,611
ECM 4	Install High/Low Lighting Controls	7,149	0.9	-1	$765	$5,620	$4,520	$1,100	1.4	7,024
Domestic Water Heating Upgrade		**0**	**0.0**	**1**	**$17**	**$50**	**$10**	**$40**	**2.3**	**144**
ECM 7	Install Low-Flow DHW Devices	0	0.0	1	$17	$50	$10	$40	2.3	144
Custom Measures		**862**	**0.0**	**0**	**$95**	**$600**	**$0**	**$600**	**6.3**	**868**
ECM 9	Install DHW Pump Timeclock Control	862	0.0	0	$95	$600	$0	$600	6.3	868
TOTALS		**75,248**	**19.8**	**-14**	**$8,077**	**$61,640**	**$12,310**	**$49,330**	**6.1**	**74,113**

* - 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).

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		**61,526**	**17.5**	**-13**	**$6,588**	**$47,300**	**$6,820**	**$40,480**	**6.1**	**60,467**
ECM 1	Install LED Fixtures	19,305	4.8	-4	$2,068	$19,670	$1,550	$18,120	8.8	18,978
ECM 2	Retrofit Fixtures with LED Lamps	42,221	12.7	-9	$4,520	$27,630	$5,270	$22,360	4.9	41,488

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: Install LED Fixtures

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

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

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

Affected Building Areas: gymnasium and exterior fixtures

ECM 2: Retrofit Fixtures with LED Lamps

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

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

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes; T5 fixtures: corridor; and CFLs: cafeteria, classrooms, exterior fixtures, restrooms, offices, and corridors

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		**12,860**	**2.3**	**-3**	**$1,377**	**$13,690**	**$5,480**	**$8,210**	**6.0**	**12,635**
ECM 3	Install Occupancy Sensor Lighting Controls	5,710	1.4	-1	$611	$8,070	$960	$7,110	11.6	5,611
ECM 4	Install High/Low Lighting Controls	7,149	0.9	-1	$765	$5,620	$4,520	$1,100	1.4	7,024

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: offices, cafeteria, gymnasium, and restrooms

ECM 4: Install High/Low Lighting Controls

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

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

The controller lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be considered when selecting retrofit lamps and bulbs for the areas proposed for high/low control. For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as occupants approach the area.

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

Affected Building Areas: hallways and stairwells

4.3 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		**-72,304**	**17.9**	**1,262**	**$9,773**	**$328,467**	**$15,400**	**$313,067**	**32.0**	**74,916**
ECM 5	Install High Efficiency Air Conditioning Units	1,130	0.7	0	$124	$4,167	$0	$4,167	33.5	1,138
ECM 6	Install High Efficiency Heat Pumps	-73,434	17.2	1,262	$9,649	$324,300	$15,400	$308,900	32.0	73,778

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 air conditioners are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 5: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency air conditioning units with high efficiency 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: Mitsubishi ductless mini-split AC

ECM 6: Install High Efficiency Heat Pumps

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

The package units are nearing the end of their useful life. For the heating system, we calculated savings based on the current natural gas furnace. We then applied the same load to the heat pump system, adjusting for its COP. This method minimizes reliance on natural gas heating while supporting the transition to an electrified HVAC system.

Affected Units:

Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Manufacturer	Model
Exterior Roof	Exterior Roof Room	1	Ductless Mini-Split HP	0.75	10.00	Fujitsu	AOU9RL2
Exterior Roof	RTU - 8	1	Package Unit	31.00	432.00	Aaon	RN-031-8-0-EB09-3C9
Exterior Roof	RTU - 7 (Cafeteria)	1	Package Unit	25.00	432.00	Aaon	RN-025-8-0-EA09-3C9
Exterior Roof	RTU - 3A and 3B (Gymnasium)	2	Package Unit	13.00	234.00	Aaon	RN-013-8-0-EA09-3G9

Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Manufacturer	Model
Exterior Roof	RTU - 1 (First Floor Offices)	1	Package Unit	25.00	432.00	Aaon	RN-025-8-0-EA09-3C9
Exterior Roof	RTU - 5	1	Package Unit	4.00	81.00	Aaon	RQ-004-8-V-EA09-339
Exterior Roof	RTU-4 (Gymnasium Offices)	1	Package Unit	8.00	120.00	Aaon	RN-008-8-0-EB09-3K9
Exterior Roof	RTU- 6	1	Package Unit	8.00	120.00	Aaon	RN-008-8-0-EB09-3K9
Exterior Roof	RTU -9	1	Package Unit	31.00	432.00	Aaon	RN-031-8-0-EB09-3C9
Exterior Roof	RTU-2	1	Package Unit	31.00	432.00	Aaon	RN-031-8-0-EB09-3C9

4.4 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**	**1**	**$17**	**$50**	**$10**	**$40**	**2.3**	**144**
ECM 7	Install Low-Flow DHW Devices	0	0.0	1	$17	$50	$10	$40	2.3	144

ECM 7: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
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.

4.5 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		**-10,955**	**0.0**	**126**	**$566**	**$5,300**	**$0**	**$5,300**	**9.4**	**3,722**
ECM 8	Replace Gas Fired Water Heater with Heat Pump Water Heater	-11,817	0.0	126	$471	$4,700	$0	$4,700	10.0	2,853
ECM 9	Install DHW Pump Timeclock Control	862	0.0	0	$95	$600	$0	$600	6.3	868

ECM 8: Replace Gas Fired Water Heater with Heat Pump Water Heater

We evaluated replacing existing the gas water heater with a heat pump water heater (HPWH).

A gas fired water heater uses a burner to heat water. Air source heat pump water heaters use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. Water heater efficiency is rated by the uniform energy factor (UEF). For a relative comparison of water heater UEFs, the criteria for certifying a water heater in the ENERGY STAR program are provided below. These values indicate that HPWH heaters are significantly more efficient than gas fired water heaters.

There are two types of HPWH: those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The measure considers an integrated HPWH.

ENERGY STAR Uniform Energy Factor (UEF) Criteria for Certified Water Heaters *

Water Heater Type	*Minimum UEF*	*Other*
Integrated HPWH	3.3	
Integrated HPWH	2.2	120 Volt, 15 Amp circuit
Split System HPWH	2.2	
Gas Fired Storage	0.64	≤ 55 gal, Medium Draw Pattern
Gas Fired Storage	0.68	≤ 55 gal, High Draw Pattern
Gas Fired Storage	0.78	> 55 gal, Medium Draw Pattern
Gas Fired Storage	0.80	> 55 gal, High Draw Pattern
Gas Fired Storage	0.80	Residential Duty
Gas Fired Instantaneous	0.87	

** Note: Uniform Energy Factor (UEF): The newest measure of water heater overall efficiency. The higher the UEF value is, the more efficient the water heater. UEF is determined by the Department of Energy's test method outlined in 10 CFR Part 430, Subpart B, Appendix E.*[6]

[6] https://www.energy.gov/sites/prod/files/2014/06/f17/rwh_tp_final_rule.pdf

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation[7]. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room. The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

Most HPWH operate effectively down to an air temperature of 40 °F. Below that temperature, an electric resistance booster heater is typically required to achieve full heating capacity. It is critical that the HPWH controls are set up so that the electric resistance heat only engages when the air temperature is too cold for the HPWH to extract heat from it. HPWHs have a slow recovery. During periods of high demand, the electric resistance heating element, if enabled, may be energized to maintain set point, thus reducing the overall efficiency of the unit. It is recommended that a careful analysis of the hot water demand be conducted to determine if the application makes economic sense, and the HPWH heating capacity and storage are properly sized.

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank to maintain stratification within the storage tank. Water should be drawn from the bottom of the tank to be heated. If there is a DHW recirculation pump, it should only be operated during high hot water demand periods.

Switching from a gas fired water heater to a HPWH has the potential to reduce the sites overall greenhouse gas emissions. If the electricity for the HPWH is provided by an on-site photovoltaic (PV) system then there are essentially no greenhouse gas (GHG) emissions. A 2016 study conducted at Cornell[8] calculated the kg of methane (CH_4) and carbon dioxide (CO_2) produced per GJ of water heated. The study compared HPWH to gas and electric fired, storage and tankless water heaters. The study also considered electricity produced from natural gas and coal fired electric plants. In all cases the study found that HPWHs produced less methane than all of the other water heaters. The study also found that HPWH produced less carbon dioxide than electric resistance water heaters but more carbon dioxide than tankless gas water heaters and about the same amount of carbon dioxide as storage gas water heaters. The summary tables provide the reduction in CO2 equivalent emissions based on the typical New Jersey electric utility.

Affected Units: domestic hot water storage tank

ECM 9: Install DHW Pump Timeclock Control

Integrate a timer system into the domestic hot water (DHW) circulation pump. This enhancement will offer significant energy savings in terms of electrical consumption. This adaptive approach ensures that energy is only consumed when necessary, resulting in a reduction in kWh consumption and ultimately lowering operational costs. Savings are based on the difference between baseline and proposed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours.

The existing domestic hot water circulation pump operates continuously to circulate hot water throughout the building. We recommend implementing timer-based controls to only operate the motor when the building is occupied.

Affected Units: DHW recirculation pump

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[7] https://basc.pnnl.gov/code-compliance/heat-pump-water-heaters-code-compliance-brief#:~:text=HPWH%20must%20have%20unrestricted%20airflow,depending%20on%20size%20of%20system

[8] Greenhouse gas emissions from domestic hot water: Heat pumps compared to most commonly used systems. Bongghi Hong, Robert W. Howarth. Department of Ecology and Evolutionary Biology, Cornell University. Energy Science and Engineering 2016.

4.6 Measures for Future Consideration

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

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

- Evaluate these measures further.
- Develop firm costs.
- Determine measure savings.
- Prepare detailed implementation plans.

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

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.

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[9]. 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.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single-pane windows and east- or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

[9] 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 Controls

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Whenever possible, use automatic devices such as twist timers or occupancy sensors to turn off motors when they are not needed.

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.

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

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

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

Boiler Maintenance

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

Furnace Maintenance

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

Label HVAC Equipment

For improved coordination in maintenance practices, we recommend labeling or re-labeling the site HVAC equipment. Maintain continuity in labeling by following labeling conventions as indicated in the facility drawings or 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 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.

Water Heater Maintenance

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

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

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

Procurement Strategies

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

6 Water Best Practices

Getting Started

The commercial and institutional sector is the second largest consumer of publicly supplied water in the United States, accounting for 17% of the withdrawals from public water supplies[10]. In New Jersey, excluding water used for power generation, approximately 80% of total water use was attributed to potable supply during the period of 2009 to 2018. Water withdrawals for potable supply have not changed noticeably during the period from 1990 to 2018[11].

Water management planning serves as the foundation for any successful water reduction effort. It is the first step a commercial or institutional facility owner or manager should take to achieve and sustain long-term water savings. Understanding how water is used within a facility is critical for the water management planning process. A water assessment provides a comprehensive account of all known water uses at the facility. It allows the water management team to establish a baseline from which progress and program success can be measured. It also enables the water management team to set achievable goals and identify and prioritize specific projects based on the relative savings opportunities and project cost-effectiveness.

Water conservation devices may significantly reduce your water and sewer usage costs. Any reduction in water use reduces grid-level electricity use since a significant amount of electricity is used to treat and deliver water from reservoirs to end users.

For more information regarding water conservation or additional details regarding the practices shown below go to the EPA's WaterSense website[12] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[13] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Leak Detection and Repair

Identifying and repairing leaks and other water use anomalies within a facility's water distribution system or from processes or equipment can keep a facility from wasting significant quantities of water. Examples of common leaks include leaking toilets and faucets, drip irrigation malfunctions, stuck float valves, and broken distribution lines. Reading meters, installing failure abatement technologies, and conducting visual and auditory inspections are important best practices to detect leaks. Train building occupants, employees, and visitors to report any leaks that they detect. To reduce unnecessary water loss, detected leaks should be repaired quickly. Repairing leaks in water distribution that is pressurized by on-site pumps or in heated or chilled water piping will also reduce energy use.

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[10] Estimated from analyzing data in: Solley, Wayne B,. et al, "Estimated Use of Water in the United States in 1995", U.S Geological Survey Circular 1200, (1998)

[11] https://dep.nj.gov/wp-content/uploads/dsr/trends-water-supply.pdf

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

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

Toilets and Urinals

Toilets and urinals are considered sanitary fixtures and are found in most facilities. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously flushing, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older inefficient fixtures with current generation WaterSense labeled equipment.

Commercial facilities typically use tank toilets or wall-mount flushometers. Educate and inform users with restroom signage and other means to avoid flushing inappropriate objects. For tank toilets, periodically check to ensure fill valves are working properly and that water level is set correctly. Annually test toilets to ensure the flappers are not worn or allowing water to seep from the tank into the bowl and down the sewer. Control stops and piston valves on flushometer toilets should be checked at least annually.

Most urinals use water to flush liquid. These standard single-user fixtures are present in most facilities. Non-water urinals use a specially designed trap that allows liquid waste to drain out of the fixture through a trap seal, and into the drainage system. Flushing urinals should be inspected at least annually for proper valve and sensor operation. For non-water urinals, follow maintenance practices as directed by the manufacturer to ensure products perform as expected. Non-water urinals can be considered during urinal replacement, however, review the condition and design of the existing plumbing system and the expected usage patterns to ensure that these products will provide the anticipated performance.

Faucets and Showerheads

Faucets and showerheads are sanitary fixtures that generally dispense heated water. Reducing water use by these fixtures translates into a reduction of site fuel or electric use depending on how water is heated. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously dripping, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older fixtures with current generation WaterSense labeled equipment.

Faucets are used for a variety of purposes, and standard flow rates are dictated by the intended use. Public use lavatory faucets and kitchen faucets are subject to maximum flow rates while service sinks are not. Periodically inspect faucet aerators for scale buildup to ensure flow is not being restricted. Clean or replace the aerator or other spout end device as needed. Check and adjust automatic sensors (where installed) to ensure they are operating properly to avoid faucets running longer than necessary. Post materials in restrooms and kitchens to ensure user awareness of the facility’s water-efficiency goals. Remind users to turn off the tap when they are done and to consider turning the tap off during sanitation activities when it is not being used. Consider installing lavatory and kitchen faucet fixtures with reduced flow. Federal standards limit kitchen and restroom faucet flows to 2.2 gpm. To qualify for a WaterSense label a faucet cannot exceed 1.5 gpm.

Effective in 1992, the maximum allowable flow rate for all showerheads sold in the United States is 2.5 gpm. Since this standard was enacted, many showerheads have been designed to use even less water. WaterSense labeled equipment is designed to use 2.0 gpm, or less. For optimum showerhead efficiency, the system pressure should be tested to make sure that it is between 20 and 80 pounds per square inch (psi). Verify that plumbing lines are routed through a shower valve to prevent water pressure fluctuations. Periodically inspect showerheads for scale buildup to ensure flow is not being restricted. In general, replace showerheads with 2.5 gpm flow rates or higher with WaterSense labeled models. Note: Use of poor performing replacement reduced flow showerheads may result in increased use if the duration of use is increased to compensate for reduced performance. WaterSense labeled showerheads are independently certified to meet or exceed minimum performance requirements for spray coverage and force.

Ice Machines

Commercial ice machines use refrigeration units to freeze water into ice. Ice machines typically use water for two purposes: cooling the refrigeration unit and making ice. Because the ice-making process generates a significant amount of heat, either water or air is used to remove this waste heat from the ice machine's refrigeration unit.

Water-cooled ice machines generally pass water through the machine once to cool it and then dispose of the single-pass water down the drain. Water-cooled systems can use less water by recirculating the cooling water through a chiller or a cooling tower to lower the temperature, returning the water to the machine for reuse. To eliminate using water to cool the refrigeration unit altogether, air can be used to cool the unit. Air-cooled ice machines use motor-driven fans or centrifugal blowers to move air through the refrigeration unit to remove heat. In general, water-cooled units are more energy efficient than air-cooled units but use more water. Commercial ice machines that are ENERGY STAR qualified are, on average, 15% more energy-efficient and 10% more water-efficient than standard air-cooled models.

For optimal ice machine efficiency, consider the following:

- Clean the ice machine to remove lime and scale buildup; sanitize it to kill bacteria and fungi. Run the self-cleaning sequence if available. For machines without a self-cleaning mode, shut down the machine, empty the bin of ice, add cleaning or sanitizing solution to the machine, switch it to cleaning mode, and then switch it to ice production mode. For health and safety purposes, create and discard several batches of ice to remove residual cleaning solution.
- Keep the ice machine's coils clean to ensure the heat exchange process is running efficiently.
- Keep the lid closed to preserve cool air and maintain the appropriate temperature.
- Install a timer to shift ice production to off-peak hours to decrease peak energy demand.
- Work with the manufacturer to ensure that the ice machine's rinse cycle is set to the lowest possible frequency that still provides sufficient ice quality and meets local water quality and site requirements.
- Follow the manufacturer's use and care instructions for the specific ice machine model.
- Train users to report leaking or otherwise improperly operating ice machines to the appropriate personnel.

If the machine is cooled using single-pass water, modify the machine to operate on a closed loop that recirculates the cooling water through a cooling tower or heat exchanger, if possible.

When replacing an ice machine or installing a new one, ensure that the new model is sized appropriately to fit the facility's need. Choose an ice machine that is appropriate for the quality of ice needed. Producing ice of higher quality than required will use water unnecessarily. Look for ENERGY STAR qualified models, all of which are air-cooled. Also consider air- or water-cooled ice machines that meet the efficiency specifications outlined by the Consortium for Energy Efficiency. If feasible, consider selecting air-cooled flake or nugget ice machines, which use less water and energy than cubed ice machines.

Landscaping and Irrigation

Most facilities that own or maintain surrounding landscape will have outdoor water use. The amount of outdoor water use is dictated by the size and design of the landscape and the need for supplemental irrigation. Studies show that average landscape water use in the institutional sector can range from 7% of total water use for hospitals, 22% for office buildings, and up to 30% for schools.

Proper landscape design can help minimize outdoor water use. Regionally appropriate plant choices, healthy soils with appropriate grading, the use of mulches, and limiting the use of high water-using plants such as turfgrass can significantly reduce the need for supplemental irrigation. In addition, proper design, installation, and maintenance of irrigation equipment can have a dramatic impact on outdoor water use.

- Retain a landscape professional certified in water-efficient landscaping.
- Maintain soil quality by applying mulch, soil amendments, and good topsoil.
- Maintain existing plants by manually pulling weeds, raising the blade on mowers, and including shaded areas in the overall landscape design.
- Minimize water used for hardscape cleaning and use recycled or reclaimed water where applicable, especially in water features.

Irrigation system optimization combines efficient irrigation practices with efficient technologies and can be complex. Irrigation professionals who are properly educated on water-efficient practices can help ensure that existing irrigation systems are efficiently operated and properly maintained. In general, plan for or adjust irrigation systems to prevent over (or under) watering.

- Improve distribution uniformity so water is evenly applied over the landscape.
- Irrigation schedules should be updated based on changing weather conditions.
- In general, apply water in larger amounts, but less frequently, resulting in deep watering.
- If a dedicated landscape water meter is installed, incorporate an outdoor water budget.
- Routinely look for leaks, overwatering, or overspray.
- Require a full irrigation system audit every 3 years by a qualified irrigation auditor.
- Consider drip irrigation systems for plant beds as they can reduce irrigation water use by 20% to 50% as compared to traditional sprinklers.
- More efficient sprinkler heads can reduce irrigation water use by 30%.
- Smart irrigation controllers can schedule irrigation based on weather data or on-site conditions, reducing irrigation water use by 15% compared to manual or clock timer irrigation systems.

7 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.

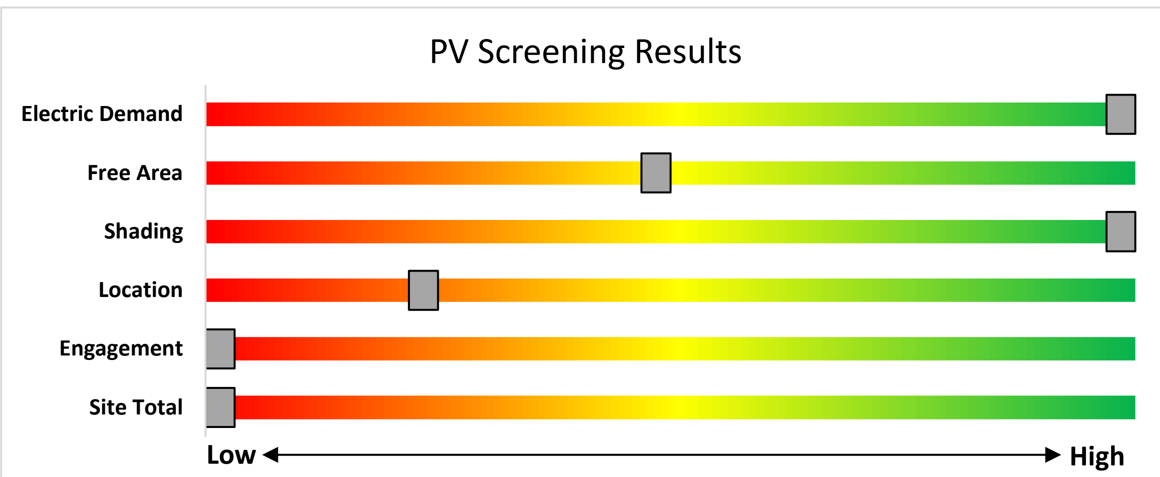
7.1 Solar Photovoltaic

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 no potential for installing an additional PV array.

This facility does not appear to meet the minimum criteria for a cost-effective solar PV installation. To be cost-effective, a solar PV array needs certain minimum criteria, such as sufficient and sustained electric demand and sufficient flat or south-facing rooftop or other unshaded space on which to place the PV panels.

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.



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

7.2 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.

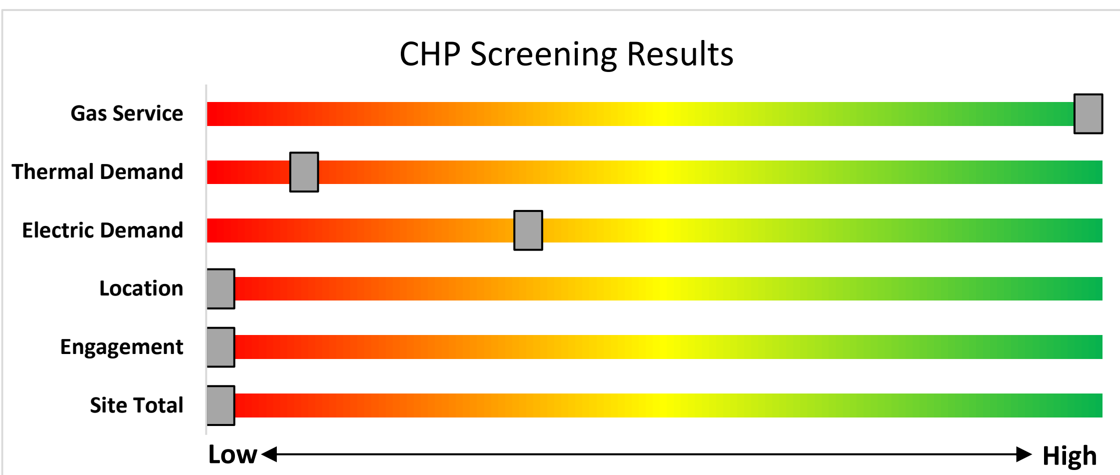
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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



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/

8 Sustainable Energy Pathways

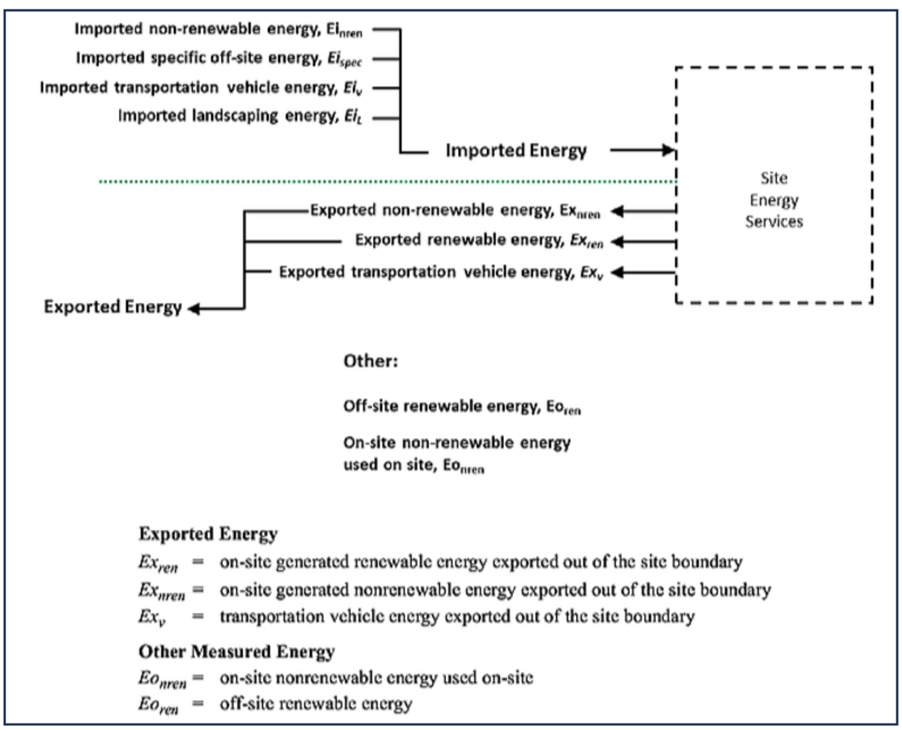
Visions for a climate friendly future include a healthy mix of approaches in all facets where energy is consumed. Strategies for commercial buildings typically include a mix of supply side measures (sustainable generation), and reduced consumption through efficiency upgrades and right-sizing.

The concept of "Zero Net Energy" combines both strategies to bring building energy usage in balance with sustainable production. "Electrification" is a strategy that seeks to minimize the use of fossil fuel at the building so that fuel can be substituted with clean-generated electricity. Electric vehicle (EV) charging, supplied at the building level, can bring help clean fuel to the transportation sector.

8.1 Zero Net Energy and Zero Net Carbon Facilities

In 2015 the United States Department of Energy (US DOE) released a definition of a zero net energy building as "an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy"[14]. This definition also applies to campuses, portfolios, and communities. In 2023 ASHRAE published Standard 228, which establishes requirements for determining whether a building or group of buildings meets a definition of "zero net energy" or a definition of "zero net carbon" during building operation."[15].

A facilities energy use can be calculated as site energy or source energy. Site energy is similar to what is measured by utility meters, while source energy includes energy used to extract and process fuels and losses during energy distribution. Source energy quantities used in the standard's zero net energy formula are calculated by multiplying the site energy use (or energy exports from the site) by source energy conversion factors in the standard.



Energy Flows Across a Site Boundary (ANSI/ASHRAE Standard 228-2023)

[14] A Common Definition for Zero Energy Buildings, US DOE, September 2015
[15] ANSI/ASHRAE Standard 228-2023 Foreword

ANSI/ASHRAE Standard 228-2023, Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance, contains a method of evaluating a building, or group of buildings, to determine if they have achieved "zero net energy" and/or "zero net carbon" operation. Standard 228 can be used during the design and operation phases of new and existing buildings to track energy and carbon performance during the building lifetime to verify whether the annual net energy use and the carbon emissions are zero. Various factors such as weather, building occupancy and overall building condition can impact the buildings energy and carbon use. The methodologies provided in Standard 228 can be used to track a building's energy and carbon use over time to determine if the building is maintaining "zero net" status.

8.2 Electrification

The US DOE reports that, "Electrification converts an energy-consuming device, system, or sector from non-electric sources of energy to electricity. It's an emerging economy-wide decarbonization strategy that is beginning to impact the electric power industry. Electrification is not necessarily the goal, rather a means to achieving a community goal such as reducing greenhouse gas emissions or lowering energy costs. For utilities, the goal—or the benefits—of electrification might be to support system optimization, improve efficiencies, and increase resiliency. Ultimately, people and businesses will choose beneficial electric technologies"[16].

Electrification can help reduce carbon in the atmosphere by reducing the use of fossil fuels at the building level. In many cases, the substitution of fossil fuel burning equipment with electrification technologies can save money. Electrification can foster a more robust or resilient power grid overall by providing utilities more flexibility in load management.

Many opportunities exist for facility managers when replacing fossil fuel equipment through electrification, however, opportunities should be evaluated on a per building basis. Opportunities may include heat pump hot water heaters, heat pump space heating, chilled water systems, and specific process system improvements.

For best results, consider electrification as a "whole systems" building approach. This approach may include generation and battery storage strategies as well as equipment substitution. Consider a wholistic electrification study for your building to help you choose your sustainable energy pathway!

[16] What is Electrification? | Department of Energy

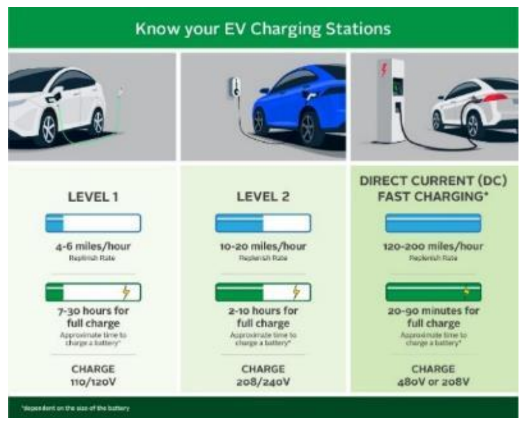
8.3 EV Charging

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.

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.



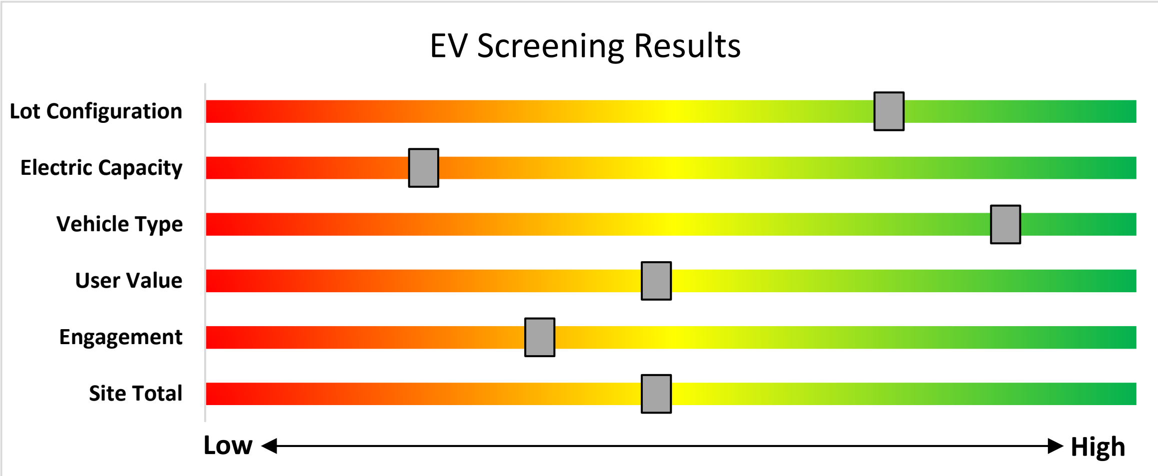
The preliminary assessment of EV charging at the facility shows that there is medium potential for adding EV chargers at the facility, based on potential costs of installation and other site factors.

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. The location and capacity of facility electric panels also impact charger installation costs. 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. Adding EV charging may have a negative financial impact due to increased electric demand charges.

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.



EV Charger Screening

Electric Vehicle Programs Available

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), Public Service Electric and Gas Company (PSE&G) or Jersey Central Power and Light (JCP&L), 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, PSE&G or JCP&L, up to 90% of the combined charger purchase and installation costs. Please check program eligibility requirements before purchasing EV charging equipment, as additional conditions on types of eligible chargers may apply for utility incentives.

EV Charging incentive information is available from Atlantic City Electric, PSE&G and JCP&L. 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

9 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 New Jersey.

NJBPU and NJCEP Administered Programs

- New Construction (residential, commercial, industrial, government)
- Large Energy Users
- Energy Savings Improvement Program (financing)
- State Facilities Initiative*
- Local Government Energy Audits
- Combined Heat & Power & Fuel Cells

*State facilities are also eligible for utility programs

Utility Administered Programs

- Existing buildings (residential, commercial, industrial, government)
- Efficient Products
  - Lighting & Marketplace
  - HVAC
  - Appliance Rebates
  - Appliance Recycling

9.1 New Jersey's Clean Energy Program

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. To qualify entities must have incurred at least $5 million in total 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 http://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[17]

Eligible Technology	Size (Installed Rated Capacity)	Incentive ($/Watt)[5]	% of Total Cost Cap per Project	$ Cap per Project
CHPs powered by non-renewable or renewable fuel source, or a combination:[4] - Gas Internal Combustion Engine - Gas Combustion Turbine - Microturbine Fuel Cells ≥60%	≤500 kW[1]	$2.00	30-40%[2]	$2 million
	>500 kW - 1 MW[1]	$1.00		
	> 1 MW - 3 MW[1]	$0.55	30%	$3 million
	>3 MW[1]	$0.35		
Fuel Cells ≥40%	Same as above[1]	Applicable amount above	30%	$1 million
Waste Heat to Power (WHP)[3] Powered by non-renewable fuel source. Heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine)	≤1MW[1]	$1.00	30%	$2 million
	> 1MW[1]	$.50	30%	$3 million

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1 Incentives are tiered, which means the incentive levels vary based upon the installed rated capacity, as listed in the chart above. For example, a 4 MW CHP system would receive $2.00/watt for the first 500 kW, $1.00/watt for the second 500 kW, $0.55/watt for the next 2 MW and $0.35/watt for the last 1 MW (up to the caps listed).

2 The maximum incentive will be limited to 30% of total project. For CHP projects up to 1 MW, this cap will be increased to 40% where a cooling application is used or included with the CHP system (e.g. absorption chiller).

3 Projects will be eligible for incentives shown above, not to exceed the lesser of % of total project cost per project cap or maximum $ per project cap. Projects installing CHP or FC with WHP will be eligible for incentive shown above, not to exceed the lesser caps of the CHP or FC incentive. Minimum efficiency will be calculated based on annual total electricity generated, utilized waste heat at the host site (i.e. not lost/rejected), and energy input.

4 Systems fueled by a Class 1 Renewable Fuel Source, as defined by N.J.A.C. 14:8-2.5, are eligible for a 30% incentive bonus. If the fuel is mixed, the bonus will be prorated accordingly. For example, if the mix is 60/40 (60% being a Class 1 renewable), the bonus will be 18%. This bonus will be included in the final performance incentive payment, based on system performance and fuel mix consumption data. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

5 CHP-FC systems located at Critical Facility and incorporating blackstart and islanding technology are eligible for a 25% incentive bonus. This bonus incentive will be paid with the second/Installation incentive payment. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

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 http://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 (CSI) Program

The CSI Program opened on April 15, 2023, and will serve as the permanent program within the SuSI Program providing incentives to larger solar facilities. The CSI Program is open to qualifying grid supply solar facilities, non-residential net metered solar installations with a capacity greater than five (5) megawatts ("MW"), and to eligible grid supply solar facilities installed in combination with energy storage.

CSI eligible facilities will only be allowed to register in the CSI program upon award of a bid pursuant to N.J.A.C. 14:8-11.10.

The CSI program structure has separate categories, or tranches, to ensure that a range of solar project types, including those on preferred sites, are able to participate despite potentially different project cost profiles. The Board has approved four tranches for grid supply and large net metered solar and an additional fifth tranche for storage in combination with grid supply solar. The following table lists procurement targets for the first solicitation:

Tranche	Project Type	MW (dc) Targets
Tranche 1.	Basic Grid Supply	140
Tranche 2.	Grid Supply on the Built Environment	80
Tranche 3.	Grid Supply on Contaminated Sites and Landfills	40
Tranche 4.	Net Metered Non- Residential	40
Tranche 5.	*Storage Paired with Grid	160 MWh

*The storage tranche of 160 MWh corresponds to a 4-hour storage pairing of 40 MW of solar

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 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 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.

Demand Response (DR) Energy Aggregator

Demand Response Energy Aggregator is a program designed to reduce the electric load when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Grid operators call upon curtailment service providers and commercial facilities to reduce electric usage during times of peak demand, making the grid more reliable and reducing transmission costs for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary, and participants receive payments whether or not their facility is called upon to curtail its electric usage.

Typically, an electric customer must be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with greater capability to quickly curtail their demand during peak hours receive higher payments. Customers with back-up generators on site may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in DR programs often find it to be a valuable source of revenue for their facility, because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature setpoints on thermostats (so that air conditioning units run less frequently) or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a DR activity in most situations.

The first step toward participation in a DR program is to contact a curtailment service provider. A list of these providers is available on the website of the independent system operator, PJM, and it includes contact information for each company, as well as the states where they have active business[18]. PJM also posts training materials for program members interested in specific rules and requirements regarding DR activity along with a variety of other DR program information[19].

Curtailment service providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities, and they may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

[18] http://www.pjm.com/markets-and-operations/demand-response.aspx.

[19] http://www.pjm.com/training/training-events.aspx.

9.2 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.

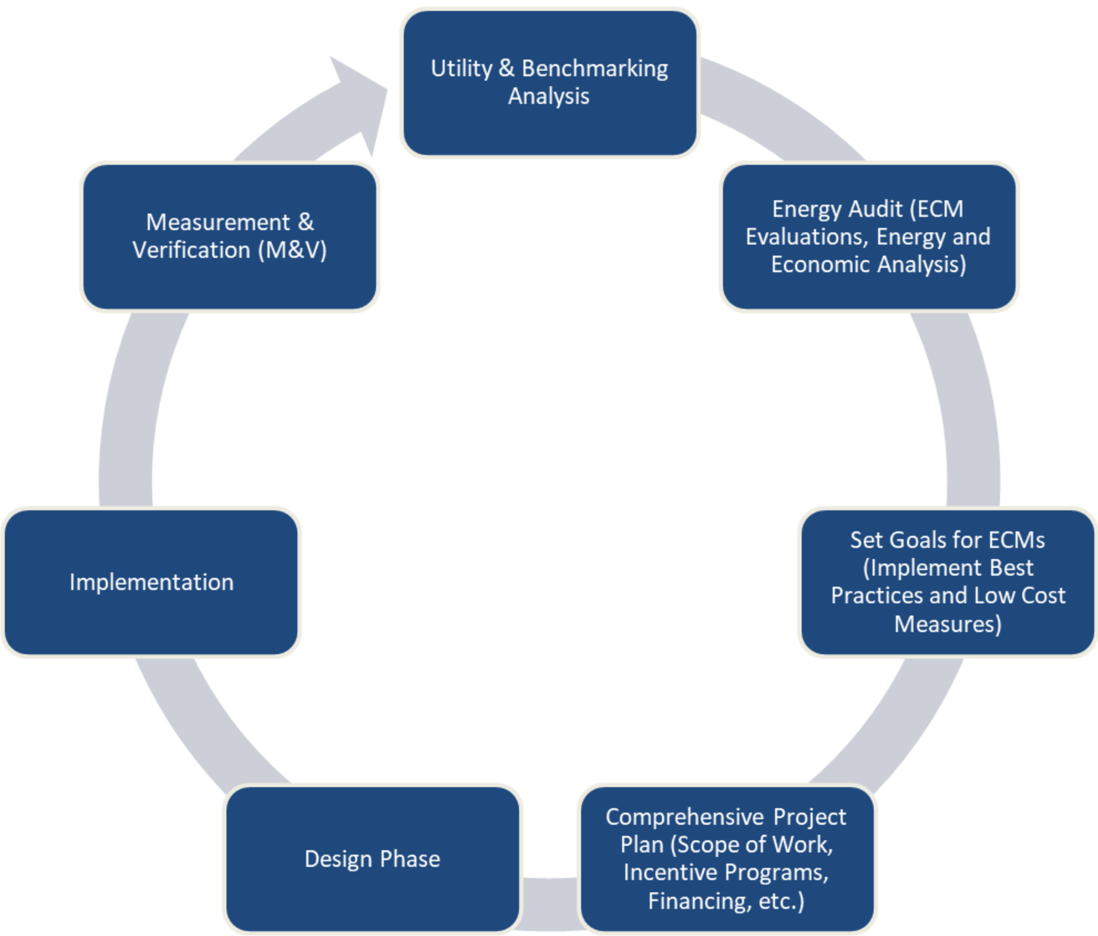
Engineered Solutions

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.

10 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.



Project Development Cycle

11 Energy Purchasing and Procurement Strategies

11.1 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[20].

11.2 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[21].

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

[21] 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
Cafeteria	29	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Wall Switch	S	24	2,600	2, 3	Relamp	Yes	29	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,794	0.3	1,018	0	$109	$1,030	$100	8.5
Cafeteria	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	13	Metal Halide: (1) 400W Lamp	Wall Switch	S	458	80		None	No	13	Metal Halide: (1) 400W Lamp	Wall Switch	458	80	0.0	0	0	$0	$0	$0	0.0
Cafeteria	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	2	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,600	0.0	50	0	$5	$30	$10	3.7
Cafeteria	52	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,794	2	Relamp	No	52	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	1.2	3,386	-1	$362	$2,630	$520	5.8
Classroom 101	22	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,725	2	Relamp	No	22	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,725	0.1	292	0	$31	$280	$20	8.3
Classroom 101	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,002	0	$107	$810	$160	6.1
Classroom 105	9	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	9	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Classroom 108	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	2, 3	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.3	1,221	0	$131	$860	$160	5.4
Classroom 131	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	501	0	$54	$400	$80	6.0
Classroom 146	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 147	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 148	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 149	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.5	1,190	0	$127	$960	$190	6.0
Classroom 149	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,725	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.0	94	0	$10	$60	$20	4.0
Classroom 150	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 151	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 152	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 153	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,002	0	$107	$810	$160	6.1
Classroom 154	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,064	0	$114	$860	$170	6.1
Classroom 165	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,725		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,725	0.0	0	0	$0	$0	$0	0.0
Classroom 165	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,725	2	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,725	0.0	66	0	$7	$50	$10	5.6
Classroom 165	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	376	0	$40	$300	$60	6.0
Classroom 166	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	939	0	$101	$760	$150	6.1
Classroom 202	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.5	1,378	0	$147	$1,110	$220	6.0

	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 203	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	751	0	$80	$610	$120	6.1
Classroom 204	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	751	0	$80	$610	$120	6.1
Classroom 205	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	751	0	$80	$610	$120	6.1
Classroom 207	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	751	0	$80	$610	$120	6.1
Classroom 208	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	751	0	$80	$610	$120	6.1
Classroom 209	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	751	0	$80	$610	$120	6.1
Classroom 212	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Corridor	10	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	S	30	5,096	2, 4	Relamp	Yes	10	LED - Linear Tubes: (1) 4' T5 (14.5W) Lamp	High/Low Control	15	3,516	0.1	1,102	0	$118	$940	$400	4.6
Corridor	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	5,096	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	3,516	0.1	477	0	$51	$150	$20	2.5
Corridor 2nd Floor	4	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Wall Switch	S	24	5,096	2, 4	Relamp	Yes	4	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	17	3,516	0.0	275	0	$29	$50	$0	1.7
Corridor 2nd Floor	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2nd Floor	11	LED - Fixtures: Ambient 1x4 Fixture	Wall Switch	S	40	5,096	4	None	Yes	11	LED - Fixtures: Ambient 1x4 Fixture	High/Low Control	40	3,516	0.1	765	0	$82	$560	$390	2.1
Corridor First Floor	38	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Wall Switch	S	24	5,096	2, 4	Relamp	Yes	38	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	17	3,516	0.3	2,614	-1	$280	$1,890	$1,370	1.9
Corridor First Floor	16	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	16	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor First Floor	44	LED - Fixtures: Ambient 1x4 Fixture	Wall Switch	S	40	5,096	4	None	Yes	44	LED - Fixtures: Ambient 1x4 Fixture	High/Low Control	40	3,516	0.4	3,058	-1	$327	$1,690	$1,540	0.5
Corridor First Floor	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	24	5,096		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	24	5,096	0.0	0	0	$0	$0	$0	0.0
Corridor First Floor	13	LED - Fixtures: Linear Strip	Wall Switch	S	14	5,096	4	None	Yes	13	LED - Fixtures: Linear Strip	High/Low Control	14	3,516	0.0	316	0	$34	$280	$280	0.0
Corridor First Floor	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,096	2	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	5,096	0.0	98	0	$11	$30	$10	1.9
Corridor First Floor	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	5,096	2, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	3,516	0.5	4,147	-1	$444	$1,440	$550	2.0
Corridor First Floor	4	Linear Fluorescent - T8: 5' T8 (40W) - 2L	Wall Switch	S	79	5,096	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 5' Lamps	High/Low Control	40	3,516	0.1	1,153	0	$123	$480	$140	2.8
Electrical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.1	366	0	$39	$480	$70	10.5
Electrical Room 106	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$10	$50	$10	3.9
Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$10	$50	$10	3.9
Exterior Ground	8	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Timeclock		24	4,380	2	Relamp	No	8	LED Lamps: GX23 (Plug-In) Lamps	Timeclock	17	4,380	0.0	245	0	$27	$100	$10	3.3
Exterior Ground	13	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		100	4,380		None	No	13	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	100	4,380	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
Exterior Ground	7	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		100	4,380		None	No	7	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Ground	20	LED - Fixtures: Wall Pack	Timeclock		75	4,380		None	No	20	LED - Fixtures: Wall Pack	Timeclock	75	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Roof	1	Metal Halide: (1) 100W Lamp	Wall Switch		128	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	30	4,380	0.0	429	0	$47	$330	$50	5.9
Gymnasium	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Gymnasium	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,600	3	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,794	0.0	106	0	$11	$330	$40	25.5
Gymnasium	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.5	1,921	0	$206	$1,470	$230	6.0
Gymnasium	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.3	1,081	0	$116	$790	$130	5.7
Gymnasium	30	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	2,600	1, 3	Fixture Replacement	Yes	30	LED - Fixtures: High-Bay	Occupancy Sensor	75	1,794	5.3	20,871	-4	$2,234	$19,880	$1,570	8.2
Kitchen	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.3	1,219	0	$131	$840	$140	5.4
Library 102	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,822	2	Relamp	No	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.8	2,116	0	$226	$1,620	$320	5.7
Mechanical Roof	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,900	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,900	0.0	69	0	$7	$40	$10	4.1
Mechanical Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,900	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,691	0.3	1,621	0	$174	$790	$130	3.8
Office - 102C	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	2,500	0.0	0	0	$0	$0	$0	0.0
Office - 104	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 132	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,500	3	None	Yes	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,725	0.0	23	0	$2	$330	$40	117.7
Office - 132	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500	3	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	68	0	$7	$150	$20	17.8
Office - 133	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500	3	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	68	0	$7	$150	$20	17.8
Office - 134	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500	3	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	68	0	$7	$150	$20	17.8
Office - 136	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500	3	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	102	0	$11	$330	$40	26.5
Office - 136	3	LED - Fixtures: Ceiling Mount	Wall Switch	S	24	2,500	3	None	Yes	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	24	1,725	0.0	61	0	$7	$330	$40	44.1
Office - 137	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500	3	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	102	0	$11	$330	$40	26.5
Office - 137	3	LED - Fixtures: Ceiling Mount	Wall Switch	S	24	2,500	3	None	Yes	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	24	1,725	0.0	61	0	$7	$330	$40	44.1
Office - 138	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,500	3	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	102	0	$11	$330	$40	26.5
Office - 142	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 155	1	LED Lamps: (4) 9W A19 Screw-In Lamps	Occupancy Sensor	S	36	1,725		None	No	1	LED Lamps: (4) 9W A19 Screw-In Lamps	Occupancy Sensor	36	1,725	0.0	0	0	$0	$0	$0	0.0

Location	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office - 155	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 160A	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 160B	7	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	7	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 169	6	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,725	2	Relamp	No	6	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,725	0.0	80	0	$9	$80	$10	8.2
Office - 169A	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 169A	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	24	1,725		None	No	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	24	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 169B	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	24	1,725		None	No	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	24	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 169B	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	250	0	$27	$200	$40	6.0
Office - 169C	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 169C	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	24	1,725		None	No	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	24	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 170	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	S	9	1,725		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 170	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 170	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	24	1,725		None	No	3	LED - Fixtures: Ceiling Mount	Occupancy Sensor	24	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 172	7	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,725	2	Relamp	No	7	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,725	0.0	93	0	$10	$90	$10	8.0
Office - 172	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,725		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 172B	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,725		None	No	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 172C	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,725		None	No	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,725	0.0	0	0	$0	$0	$0	0.0
Office - 172D	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	376	0	$40	$300	$60	6.0
Office - 215	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	91	0	$10	$50	$10	4.1
Office - Enclosed 174	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	376	0	$40	$300	$60	6.0
Office - Main Office	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	13	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Office - Nurse 130	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,725		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,725	0.0	0	0	$0	$0	$0	0.0
Office - Nurse 130	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Receiving Area 110	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 3	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.5	2,195	0	$235	$1,570	$250	5.6
Restroom - Female	2	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,898	2	Relamp	No	2	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,898	0.0	29	0	$3	$30	$0	9.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Female	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	2,750	3	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	105	0	$11	$330	$40	25.8
Restroom - FeMale 2nd Floor	1	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,898	2	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,898	0.0	15	0	$2	$10	$0	6.4
Restroom - FeMale 2nd Floor	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,898		None	No	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	0	0	$0	$0	$0	0.0
Restroom - Male	2	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,898	2	Relamp	No	2	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,898	0.0	29	0	$3	$30	$0	9.6
Restroom - Male	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	2,750	3	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	105	0	$11	$330	$40	25.8
Restroom - Male 2nd Floor	1	Compact Fluorescent: (1) 24W Triple Biaxial Plug-In Lamp	Occupancy Sensor	S	24	1,898	2	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	17	1,898	0.0	15	0	$2	$10	$0	6.4
Restroom - Male 2nd Floor	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,898		None	No	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,898		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,898		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	28	1,898		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	1,898	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,898		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,898	0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,898		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,898	0.0	0	0	$0	$0	$0	0.0
Rick Office	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,725		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,725	0.0	0	0	$0	$0	$0	0.0
Rick Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,725	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.0	63	0	$7	$50	$10	6.0
Server Room 102B	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.1	488	0	$52	$530	$80	8.6
Stairs B	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs B	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch		33	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,640	0.0	46	0	$5	$40	$10	6.0
Stairs B	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	2,640	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,822	0.1	488	0	$52	$480	$180	5.7
Storage Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,640	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,640	0.0	96	0	$10	$50	$10	3.9
Storage Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,822	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.0	66	0	$7	$50	$10	5.7
Storage Gown	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,640	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,822	0.1	430	0	$46	$330	$60	5.9
Storeroom	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,640		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	2,640	0.0	0	0	$0	$0	$0	0.0
Workshop	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,822	2	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,822	0.1	331	0	$35	$250	$50	5.7

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions: Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	Proposed Conditions: ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Energy Impact & Financial Analysis: 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 Roof	Bathroom Exhaust Fan	1	Exhaust Fan	0.33	65.0%	No	Cook	135 ACE 135C4B	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Building Exhaust Fan	1	Exhaust Fan	0.33	65.0%	No	Cook		W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Lab Exhaust Fan	1	Exhaust Fan	0.75	68.0%	No	Cook	165 ACRUX 165RX6B	W	8,736		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.05	65.0%	No	Cook	70 ACEH 70C15DH	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No	Cook	120 ACE 120C3B	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Heating Hot Water Pump	2	Heating Hot Water Pump	7.50	91.0%	Yes	Baldor	EM3311T	W	1,696		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Heating Hot Water Pump	1	DHW Circulation Pump	0.29	65.0%	No	Bell & Gossett	PL -38B	W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Kitchen Hood Exhaust Fan	1	Kitchen Hood Exhaust Fan	2.00	84.0%	No	Captive Aire		W	50		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Elevator Motor	1	Other	25.00	85.0%	No			W	200		No	85.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Roof	Unit Heater	1	Supply Fan	0.25	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Unit Heater	1	Supply Fan	0.25	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Workshop	Unit Heater	1	Supply Fan	0.25	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Combustion Fan	1	Combustion Air Fan	0.75	80.0%	No			W	2,745		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.17	65.0%	No	Cook	100 ACE 100C2B	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.05	65.0%	No	Cook	70-ACEH 70C15DH	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No	Cook	120 ACE 120C3B	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.33	65.0%	No	Cook	135 ACE 135C4B	W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Exhaust Fan	1	Exhaust Fan	0.04	65.0%	No	Cook		W	8,736		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Wall Mounted Unit	1	Supply Fan	0.25	65.0%	No	Fujitsu	AOU9RL2	B	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Gymnasium	Air Handling Unit	1	Supply Fan	0.25	65.0%	No			W	3,020		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**
Server Room 102B	Ceiling Cassette Unit	1	Supply Fan	0.25	65.0%	No	Mitsuibishi	PUY-A36NHA4	B	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 8	1	Supply Fan	15.00	90.0%	Yes	Aaon	RN-031-8-0-EB09-3C9	W	3,020		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 8	1	Return Fan	3.00	85.0%	Yes	Aaon	RN-031-8-0-EB09-3C9	W	3,020		No	85.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 7 (Cafeteria)	1	Supply Fan	7.50	87.0%	Yes	Aaon	RN-025-8-0-EA09-3C9	W	3,020		No	87.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 7	1	Return Fan	2.00	83.0%	Yes	Aaon	RN-025-8-0-EA09-3C9	W	3,020		No	83.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 3A and 3B (Gymnasium)	1	Supply Fan	5.00	86.0%	Yes	Aaon	RN-013-8-0-EA09-3G9	W	3,020		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 3A and 3B (Gymnasium)	1	Return Fan	2.00	83.0%	Yes	Aaon	RN-013-8-0-EA09-3G9	W	3,020		No	83.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 1	1	Supply Fan	15.00	90.0%	Yes	Aaon	RN-025-8-0-EA09-3C9	W	3,020		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 1	1	Return Fan	5.00	86.0%	Yes	Aaon	RN-025-8-0-EA09-3C9	W	3,020		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 5	1	Supply Fan	2.00	83.0%	Yes	Aaon	RQ-004-8-V-EA09-339	W	3,020		No	83.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU - 5	1	Return Fan	1.00	82.5%	Yes	Aaon	RQ-004-8-V-EA09-339	W	3,020		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU-4 (Gymnasium Offices)	1	Supply Fan	5.00	86.0%	Yes	Aaon	RN-008-8-0-EB09-3K9	W	3,020		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU-4 (Gymnasium Offices)	1	Return Fan	2.00	83.0%	Yes	Aaon	RN-008-8-0-EB09-3K9	W	3,020		No	83.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU- 6	1	Supply Fan	5.00	86.0%	Yes	Aaon	RN-008-8-0-EB09-3K9	W	3,020		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU- 6	1	Return Fan	2.00	83.0%	Yes	Aaon	RN-008-8-0-EB09-3K9	W	3,020		No	83.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU -9	1	Supply Fan	15.00	90.0%	Yes	Aaon	RN-031-8-0-EB09-3C9	W	3,020		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU -9	1	Return Fan	3.00	85.0%	Yes	Aaon	RN-031-8-0-EB09-3C9	W	3,020		No	85.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU-2	1	Supply Fan	15.00	90.0%	Yes	Aaon	RN-031-8-0-EB09-3C9	W	3,020		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	RTU-2	1	Return Fan	3.00	85.0%	Yes	Aaon	RN-031-8-0-EB09-3C9	W	3,020		No	85.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof	Kitchen RTU	1	Supply Fan	1.50	83.0%	No	CaptiveAire	A1-D.500-G10	W	3,020		No	83.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Roof	Server Room Cooling	1	Ductless Mini-Split AC	3.00		10.63		Mitsuibishi	PUY-A36NHA4	B	5	Yes	1	Ductless Mini-Split AC	3.00		18.00		0.7	1,130	0	$124	$4,200	$0	33.5
Exterior Roof	Exterior Roof Room	1	Ductless Mini-Split HP	0.75	10.00	10.02	9 HSPF	Fujitsu	AOU9RL2	B	6	Yes	1	Ductless Mini-Split HP	0.75	10.00	18.00	3.8 COP	0.3	520	0	$57	$2,400	$0	42.0
Exterior Roof	RTU - 8	1	Package Unit	31.00	432.00	11.02	0.8 AFUE	Aaon	RN-031-8-0-EB09-3C9	W	6	Yes	1	Packaged Air-Source HP	31.00	432.00	12.00	3.2 COP	1.4	-12,064	185	$1,271	$49,300	$2,500	36.8
Exterior Roof	RTU - 7 (Cafeteria)	1	Package Unit	25.00	432.00	9.79	0.8 AFUE	Aaon	RN-025-8-0-EA09-3C9	W	6	Yes	1	Packaged Air-Source HP	25.00	432.00	12.00	3.2 COP	2.8	-10,527	185	$1,440	$41,200	$2,100	27.2
Exterior Roof	RTU - 3A and 3B (Gymnasium)	2	Package Unit	13.00	234.00	10.17	0.8 AFUE	Aaon	RN-013-8-0-EA09-3G9	W	6	Yes	2	Packaged Air-Source HP	13.00	234.00	15.00	3.3 COP	4.9	-8,936	200	$1,831	$50,100	$2,100	26.2
Exterior Roof	RTU - 1 (First Floor Offices)	1	Package Unit	25.00	432.00	9.79	0.8 AFUE	Aaon	RN-025-8-0-EA09-3C9	W	6	Yes	1	Packaged Air-Source HP	25.00	432.00	12.00	3.2 COP	2.8	-10,527	185	$1,440	$41,200	$2,100	27.2
Exterior Roof	RTU - 5	1	Package Unit	4.00	81.00	11.11	0.81 AFUE	Aaon	RQ-004-8-V-EA09-339	W	6	Yes	1	Packaged Air-Source HP	4.00	81.00	15.50	8.5 HSPF	0.6	-2,607	34	$194	$9,100	$400	44.8
Exterior Roof	RTU-4 (Gymnasium Offices)	1	Package Unit	8.00	120.00	10.55	0.8 AFUE	Aaon	RN-008-8-0-EB09-3K9	W	6	Yes	1	Packaged Air-Source HP	8.00	120.00	12.80	3.5 COP	0.8	-2,581	51	$438	$16,200	$600	35.6
Exterior Roof	RTU- 6	1	Package Unit	8.00	120.00	10.55	0.8 AFUE	Aaon	RN-008-8-0-EB09-3K9	W	6	Yes	1	Packaged Air-Source HP	8.00	120.00	12.80	3.5 COP	0.8	-2,581	51	$438	$16,200	$600	35.6
Exterior Roof	RTU -9	1	Package Unit	31.00	432.00	11.02	0.8 AFUE	Aaon	RN-031-8-0-EB09-3C9	W	6	Yes	1	Packaged Air-Source HP	31.00	432.00	12.00	3.2 COP	1.4	-12,064	185	$1,271	$49,300	$2,500	36.8
Exterior Roof	RTU-2	1	Package Unit	31.00	432.00	11.02	0.8 AFUE	Aaon	RN-031-8-0-EB09-3C9	W	6	Yes	1	Packaged Air-Source HP	31.00	432.00	12.00	3.2 COP	1.4	-12,064	185	$1,271	$49,300	$2,500	36.8
Exterior Roof	Kitchen RTU	1	Package Unit		550.00		0.8 AFUE	CaptiveAire	A1-D.500-G10	W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Heating Hot Water	1	Non-Condensing Hot Water Boiler	1,160	Smith	28A-7	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Domestic Hot Water System	1	Storage Tank Water Heater (> 50 Gal)	A.O Smith	BTH-250A 200	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
Various Restroom	7	26	Faucet Aerator (Lavatory)	0.50	0.50	0.0	0	0	$0	$0	$0	0.0
Cafeteria	7	2	Faucet Aerator (Kitchen)	2.20	1.50	0.0	0	0	$5	$20	$0	3.6
Kitchen and Offices	7	3	Faucet Aerator (Kitchen)	2.50	1.50	0.0	0	1	$12	$30	$10	1.7

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
Receiving Area 110	1	Refrigerator Chest	TRUE	TUC-24	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Traulsen	G22010	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen	G200100	Yes		No	0.0	0	0	$0	$0	$0	0.0

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker 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
Classroom 166	1	Ice Making Head (<450 lbs/day), Batch	Scotsman		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Ice Making Head (<450 lbs/day), Batch	Avantco		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	Cooktop / Oven	Monogram		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Gas Convection Oven (Full Size)	South Bend	GS/25SC	Yes		No	0.0	0	0	$0	$0	$0	0.0
Cafeteria	2	Insulated Food Holding Cabinet (Full Size)	Metro	CM2000	No		No	0.0	0	0	$0	$0	$0	0.0
Classroom 165	1	Cooktop / Oven			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
Classroom 165	1	Under Counter (Low Temp)			Electric	None	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Under Counter (High Temp)	Hobart	Lxi-H	Electric	None	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

Location	Existing Conditions					
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Various Office	26	Desktop	69	No		
Classroom 149	1	Kiln	11,520	No	L & L Kiln	e23T-240-3P
Classroom 105	2	Laptop	45	No		
Office - 142	2	Laptop	45	No		
Various Space	6	Microwave	800	No		
Various Space	2	Paper Shredder	200	No		
Various Space	40	Printer (Medium/Small)	200	No		
Various Space	5	Printer/Copier (Large)	400	No		
Library 102	1	Projector	75	No		
Cafeteria	1	Refrigerator (Mini)	137	No		
Office - 104	1	Refrigerator (Mini)	137	No		
Classroom 165	1	Refrigerator (Residential)	210	No		
Office - 104	1	Refrigerator (Residential)	210	No		
Cafeteria	1	Serving Table (Chilled/Heated)	1,440	No		
Various Classroom	18	Smart Board	120	No		
Various Space	26	Television	88	No		
Kitchen	1	Toaster Oven	1,227	No		
Office - 104	1	Toaster Oven	1,227	No		
Office - 160B	1	Toaster Oven	1,227	No		
Various Space	28	Air Purifier	30	No	Medify Air	MA-25
Gymnasium	4	Treadmill	750	No		
Electrical Room	4	Floor Scrubber	750	No		
Electrical Room	1	Dough Maker	500	No		
Library 102	1	Color Printer	500	No		
Office - Main Office	1	Server Equipments	1,500	No		
Server Room 102B	1	Server Equipments	1,500	No		
Workshop	1	Drilling Machine	497	No	Craftsman	
Workshop	1	Portable Air Compressor	745	No	Campbell Hausfeld	DC060500
Workshop	1	Miter Saw	840	No	Craftsman	137.212371
Workshop	1	Woodworking Band Saw	248	No		
Classroom 165	1	Clothes Dryer	5,000	No		
Classroom 165	1	Clothes Washer	1,200	No		
Cafeteria	2	Coffee Machine	900	No		
Office - 104	2	Coffee Machine	900	No		
Office - 160B	2	Coffee Machine	900	No		

Custom (High Level) Measure Analysis

Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	SF of Area Served	Fuel Type	Input Capacity per Unit (MBH)	Tank Capacity per Unit (Gal)	Description	COP	Tank Capacity per Unit (Gal)	Estimated Unit Cost	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	Payback w/ Incentives in Years
Storage Tank Water Heater (>50 Gal)	Domestic Hot Water System	18,000	Natural Gas	250.0	100	Heat Pump Water Heater	2.5	100	$3,949.52	0.00	-11,817	126	$471	$4,700	$0	$0	$0	$4,700	9.98	9.98
			Natural Gas																	
			Natural Gas																	

DHW Pump Timeclock Control

Existing Conditions				Proposed Conditions			Energy Impact & Financial Analysis										
Description	Number of Pumps	Rated kW per Pump	Annual Run Hours	Description	% Runtime Reduction	Estimated Unit Cost	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
DHW Circulation Pumps	1	0.214	8,760.0	DHW Circulation Pump w/ Timeclock Control	46.00%	$500.00	0.00	862	0	$95	$600	$140	$0	$0	$600	6.32	6.32

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]

The Newmark School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 60,000
Built: 1985

For Year Ending: May 31, 2024
Date Generated: October 14, 2024

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
The Newmark School 1000 Cellar Drive Scotch Plains, New Jersey 07076	The Newmark School 1000 Cellar Drive Scotch Plains, NJ 07076 908-753-0330	Dr. Regina M. Peter 1000 Cellar Drive Scotch Plains, NJ 07076 908-753-0330 RPeter@NewmarkEducation.com

Property ID: 36197549

Energy Consumption and Energy Use Intensity (EUI)

Site EUI 60 kBtu/ft²	**Annual Energy by Fuel**		**Annual Emissions**	
	Natural Gas (kBtu)	1,783,551 (50%)	Total (Location-Based) GHG Emissions (Metric Tons CO2e/ year)	254
	Electric - Grid (kBtu)	962,753 (27%)		
	Electric - Solar (kBtu)	855,427 (24%)		
Source EUI 90.4 kBtu/ft²	**National Median Comparison**		**Green Power**	
	National Median Site EUI (kBtu/ft²)	84.1	Green Power – Onsite (kWh)	0
	National Median Source EUI (kBtu/ft²)	126.6	Green Power – Offsite (kWh)	0
	% Diff from National Median Source EUI	-29%	Percent of RECs Retained	0%

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

____ ________

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(____)____-______

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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, which 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 1/8th of an inch.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
therm	100,000 Btu. Typically used as a measure of natural gas consumption.
tons	A unit of cooling capacity equal to 12,000 Btu/hr.
Turnkey	Provision of a complete product or service that is ready for immediate use.
VAV	*Variable air volume*
VFD	*Variable frequency drive*: a controller used to vary the speed of an electric motor.
WaterSense®	The symbol for water efficiency. The WaterSense® program is managed by the EPA.
Watt (W)	Unit of power commonly used to measure electricity use.