Local Government Energy Audit Report

DePaul Catholic High School

September 24, 2024

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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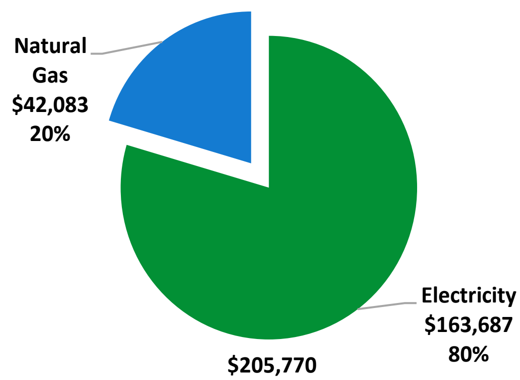
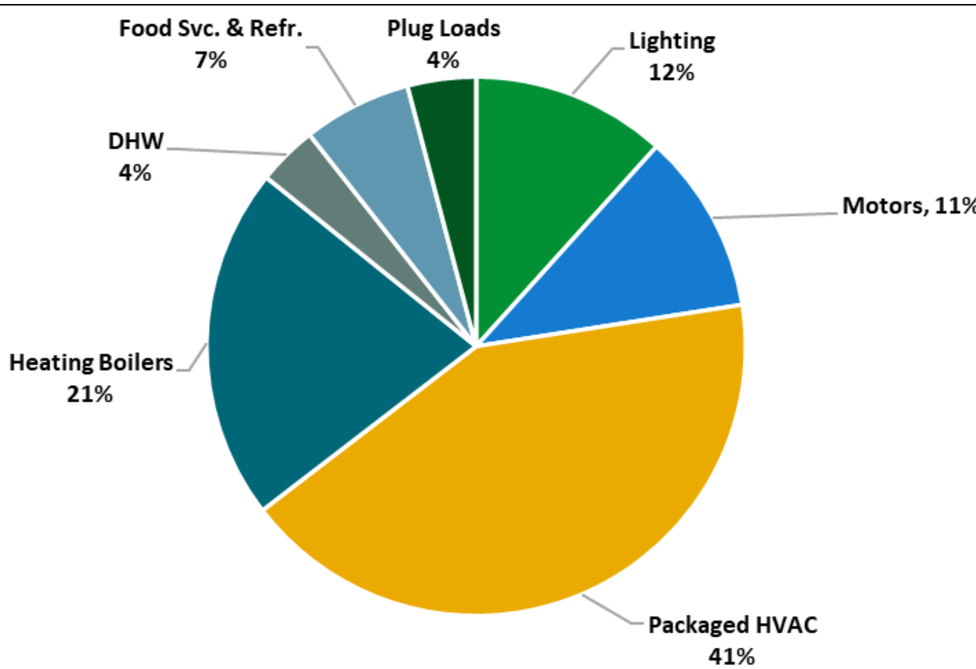
1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Energy Utilities	Costs: $205,770 Electricity: 833,961 kWh Natural Gas: 45,008 Therms Water: 703,333 Gallons	
ENERGY STAR® Benchmarking Score	29 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.



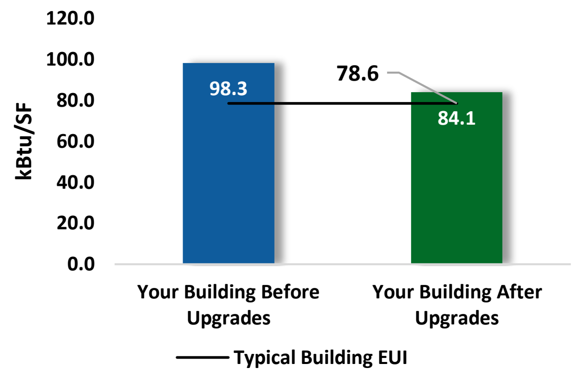
Energy Use by System

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.

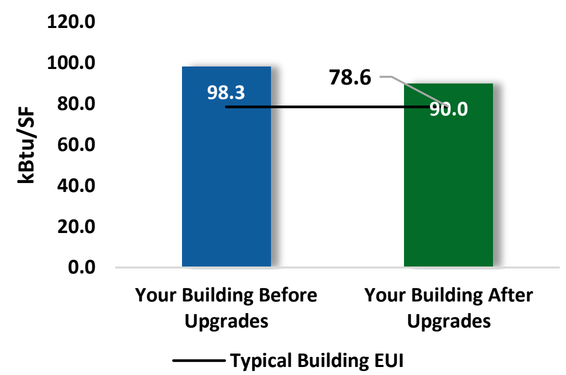
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$618,990
Potential Rebates & Incentives[1]	$50,050
Annual Cost Savings	$41,035
Annual Energy Savings	Electricity: 189,245 kWh Natural Gas: 4,161 Therms
Greenhouse Gas Emission Savings	120 Tons
Simple Payback	13.9 Years
Site Energy Savings (All Utilities)	14%



Scenario 2: Cost Effective Package[2]

Installation Cost	$113,090
Potential Rebates & Incentives	$23,550
Annual Cost Savings	$34,552
Annual Energy Savings	Electricity: 175,215 kWh Natural Gas: 173 Therms
Greenhouse Gas Emission Savings	89 Tons
Simple Payback	2.6 Years
Site Energy Savings (all utilities)	8%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**121,927**	**25.2**	**-25**	**$23,695**	**$51,660**	**$10,250**	**$41,410**	**1.7**	**119,817**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	2,628	0.5	-1	$511	$1,480	$160	$1,320	2.6	2,582
ECM 2	Retrofit Fixtures with LED Lamps	Yes	102,263	23.4	-21	$19,874	$45,550	$10,090	$35,460	1.8	100,497
ECM 3	Install LED Exit Signs	Yes	17,036	1.3	-4	$3,311	$4,630	$0	$4,630	1.4	16,738
Lighting Control Measures			**37,702**	**8.2**	**-8**	**$7,326**	**$42,330**	**$11,930**	**$30,400**	**4.1**	**37,042**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	27,244	6.3	-6	$5,294	$27,690	$3,340	$24,350	4.6	26,767
ECM 5	Install High/Low Lighting Controls	Yes	10,458	1.9	-2	$2,032	$14,640	$8,590	$6,050	3.0	10,275
Variable Frequency Drive (VFD) Measures			**2,996**	**0.4**	**0**	**$588**	**$5,100**	**$200**	**$4,900**	**8.3**	**3,017**
ECM 6	Install VFDs on Heating Water Pumps	Yes	2,996	0.4	0	$588	$5,100	$200	$4,900	8.3	3,017
Unitary HVAC Measures			**32,906**	**37.4**	**58**	**$6,999**	**$449,000**	**$24,500**	**$424,500**	**60.7**	**39,899**
ECM 7	Install High Efficiency Air Conditioning Units	No	32,906	37.4	58	$6,999	$449,000	$24,500	$424,500	60.7	39,899
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**92**	**$861**	**$33,800**	**$1,700**	**$32,100**	**37.3**	**10,778**
ECM 8	Install High Efficiency Hot Water Boilers	No	0	0.0	92	$861	$33,800	$1,700	$32,100	37.3	10,778
HVAC System Improvements			**993**	**0.0**	**35**	**$523**	**$1,770**	**$260**	**$1,510**	**2.9**	**5,111**
ECM 9	Install Pipe Insulation	Yes	993	0.0	35	$523	$1,770	$260	$1,510	2.9	5,111
Domestic Water Heating Upgrade			**0**	**0.0**	**15**	**$144**	**$2,320**	**$450**	**$1,870**	**13.0**	**1,797**
ECM 10	Install Low-Flow DHW Devices	Yes	0	0.0	15	$144	$2,320	$450	$1,870	13.0	1,797
Food Service & Refrigeration Measures			**13,810**	**1.4**	**0**	**$2,711**	**$22,910**	**$760**	**$22,150**	**8.2**	**13,907**
ECM 11	Refrigeration Controls	Yes	2,249	0.0	0	$441	$5,400	$260	$5,140	11.6	2,265
ECM 12	Replace Refrigeration Equipment	No	4,429	0.5	0	$869	$15,900	$300	$15,600	17.9	4,460
ECM 13	Vending Machine Control	Yes	7,132	0.8	0	$1,400	$1,610	$200	$1,410	1.0	7,182
Custom Measures* **			**-21,090**	**0.0**	**249**	**-$1,811**	**$10,100**	**$0**	**$10,100**	**-5.6**	**7,917**
ECM 14	Replace Electric Water Heater with Heat Pump Water Heater	Yes	2,216	0.0	0	$435	$2,900	$0	$2,900	6.7	2,231
ECM 15	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-23,306	0.0	249	-$2,246	$7,200	$0	$7,200	-3.2	5,686
TOTALS (COST EFFECTIVE MEASURES)			**175,215**	**34.6**	**17**	**$34,552**	**$113,090**	**$23,550**	**$89,540**	**2.6**	**178,464**
TOTALS (ALL MEASURES)			**189,245**	**72.5**	**416**	**$41,035**	**$618,990**	**$50,050**	**$568,940**	**13.9**	**239,287**

* - 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).
*** - Negative payback explained in section 4.9

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 DePaul Catholic High School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

2.1 Site Overview

On June 12, 2024, TRC performed an energy audit at DePaul Catholic High School located in Wayne, New Jersey. TRC met with Christopher Iannarone to review the facility operations and help focus our investigation on specific energy-using systems.

DePaul High School is a three-story, 72,000 square foot facility built in 1956 and most recently renovated in 2000. Spaces include classrooms, corridors, a gym, kitchen spaces, locker rooms, offices, restrooms, staircases, storage rooms, and electrical and mechanical spaces. Lighting systems consist primarily of fluorescent sources with CFL and LED sources. The school is 100% heated by a combination of roof top units (RTUs) with gas fired furnace sections, electric resistance heaters, gas fired non-condensing heating hot water (HHW) boilers, and split system air source heat pumps. Facility cooling is supplied by RTUs equipped with DX cooling, window AC units, unit ventilators connected to rooftop condensers, and air source heat pumps.

The Art Annex is a single-story, 1,500 square foot facility located on the school's exterior grounds. Spaces include the art classroom and a mechanical space. The interior lighting system consists of fluorescent sources. The building is 100% heated by a gas fired forced hot air furnace and a split AC system cools the space.

Snack Stand is a single-story, 100 square foot facility located near the sports field. Spaces include the press box and the snack stand. Linear fluorescent sources illuminate the interior of the stand. No heating or cooling is present at this site.

Maintenance Garage is a single-story, 1,151 square foot facility. Spaces include an interior maintenance garage and storage area. Interior lighting is supplied by fluorescent sources. There is no HVAC equipment present.

Aerial View of Facility

Recent Improvements and Facility Concerns

There have been no recent facility improvements. Staff has noted the age and conditions of the RTUs serving the school.

2.2 Building Occupancy

The facility is occupied Monday through Friday with class times starting at 6:15 AM and ending at 2:10 PM. After school events and clubs can run from 6 PM to 9 PM. School maintenance hours extend from 6:00 AM to 4:00 PM. An outside janitorial cleaning company operates from 6:00 PM to 10:00 PM Monday through Friday.

Building Name	Weekday/Weekend	Operating Schedule
DePaul Catholic HS - Maintenance Hours	Weekday	6:00 AM - 4:00 PM
	Weekend	N/A
DePaul Catholic HS - School Hours	Weekday	6:15 AM - 2:10 PM
	Weekend	N/A
DePaul Catholic HS - Outside Cleaning Company	Weekday	6:00 PM - 10:00 PM
	Weekend	N/A

Building Occupancy Schedule

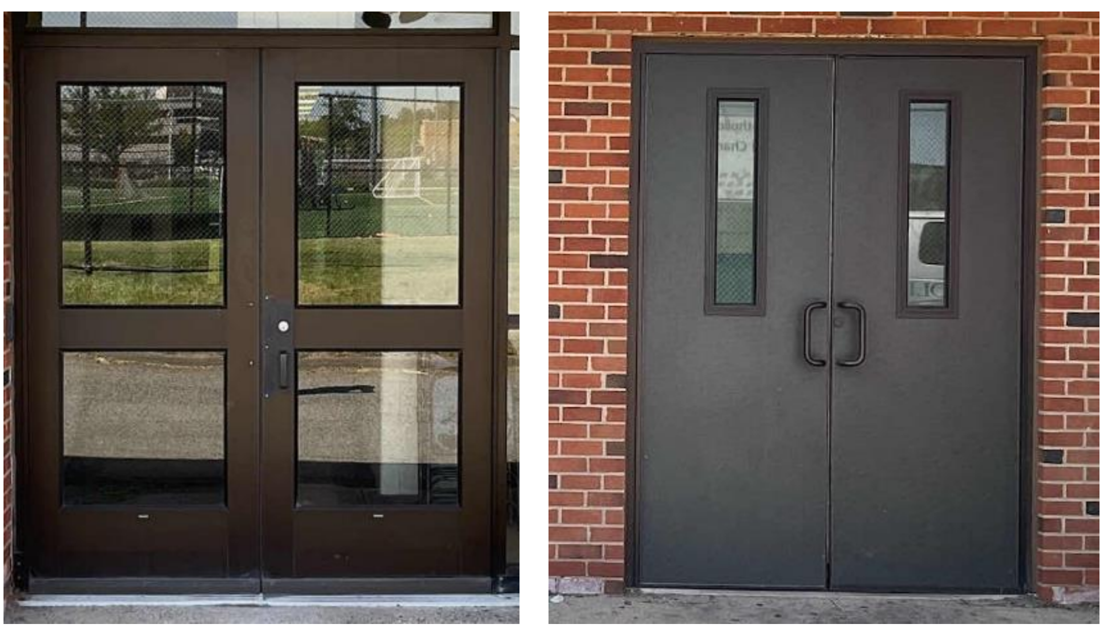
2.3 Building Envelope

The High School envelope is comprised of concrete masonry units (CMU) and red brick walls with some sections equipped with wood panel façades. A truss system supports the flat roof section, which is equipped with an insulated deck clad in ethylene propylene diene monomer (EPDM). The front entrance and main face of the building are equipped with pitched metal roofing. One section of the roof is made of a spray foam base finished in gravel. The building envelope and the three roof areas are in good condition.

Facility windows include operable and fixed double paned units with metal frames. The glass units and the glass to frame seals are in fair condition. There are two facility door types. Fiber reinforced polymer (FRP) and aluminum framed glass units. Both types are equipped with metal frames and weather stripping. The doors and frames are in good condition and the weather stripping is in good to fair condition.

DePaul High School: Envelope

DePaul High School: EPDM, Metal, and Foam with Gravel Finish Roof



DePaul High School: Aluminum Framed Glass and FRP Doors

The Art Annex is a wood frame structure with a wood siding exterior. A pitched roof deck clad in asphalt shingles encloses the space. Facility windows are double paned with wood frames and are in good condition. The facility uses wooden doors with wood frames, which also appear to be in good condition.

Art Annex: Envelope

The Snack Stand is comprised of CMU walls that are in good condition. A pitched wood deck roof clad in asphalt shingles encloses the space and is in good condition. The building has a single metal door equipped with a metal frame and weather stripping. The door, frame, and weather stripping are in good condition.

Snack Stand: Envelope and Facility Door

The Maintenance Garage envelope is made of CMU walls that are in good condition. A pitched asphalt roof encloses the garage and is in good condition. The space is equipped with a motorized overhead garage door that is also in good condition.

2.4 Lighting Systems

The primary interior lighting system for DePaul High School relies primarily on linear fluorescent sources with LED, incandescent, and CFL sources supplementing. Spaces including most classrooms, corridors, offices, storage rooms, and restrooms, are illuminated by surface mounted, 4-foot, T8 linear fluorescent fixtures with two, three, and four lamps per fixture. A small number of linear fluorescent 4-foot and 8-foot T12 lamps serve spaces including the lobby corridor, the gym, mechanical room 5, the gym office, and the janitorial basement. Only the staff dining area and corridor 5 are illuminated by U-bend fluorescent T8 lamps. There are 60 watt, A19 incandescent lamps along with recessed can, CFL plug in lamps serving various spaces including some classrooms, storage rooms, electrical and mechanical spaces, restrooms, and staircases. Larger spaces including corridors and portions of the gym rely on LED ambient 2x4 and 2x2 panels. The gym is also served by LED high bay fixtures. There are several LED downlight fixtures as well as LED BR30 lamps throughout the building. Offices including the principal's office, the vice principal's office, and the main office use LED U-bend tubes to light the space. Emergency exit signs throughout the school are equipped with incandescent lamps. Wall switches control the interior lighting system which is in good condition.

Exterior lighting for the high school is provided by recessed can fixtures equipped with CFL lamps, socketed LED lamps, LED bollards, and LED wall packs. The parking lot is illuminated by several large pole mounted LED fixtures of various types. Photocells control the exterior lighting system which is in good condition.

DePaul High School: Linear Fluorescent T8 Lamps

DePaul High School: Recessed Can Plug-In CFL Lamps, A19 Incandescent, and Downlight Recessed LED Fixture

DePaul High School: Gym LED High Bay Fixture and LED 2x5 Ambient Panel

DePaul High School: LED Wall Pack, LED Bollard, and LED Pole Mounted Fixtures

The interior lighting system for the Art Annex relies on 4-foot, T8 linear fluorescent fixtures equipped with 4 lamps per fixture. Wall switches control the interior lights which are in good condition. Emergency exit signs are equipped with incandescent lamps and appear in good condition.

The Art Annex exterior is illuminated by two socketed A19 LED lamps controlled by photocell.

Art Annex: Exterior Socketed LED Lamps w/ Photocell Control

The Snack Stand interior is served by 4-foot, T8 linear fluorescent fixtures with 2 lamps per fixture. Wall switches control the interior lighting system which is in good condition.

The Snack Stand exterior lighting system uses two LED wall packs. The nearby field is lit by 56,600-watt LED flood lights.

Snack Stand: Interior Linear Fluorescent Lights

Snack Stand: LED Wall Pack and LED Field Lighting

The Maintenance Garage interior lighting system uses 4-foot, T8 linear fluorescent fixtures with two lamps per fixture. A wall switch controls the interior lights, and they are in good condition.

Exterior lighting is provided by socketed LED A19 lamps and LED PAR38 lamps. The A19 lamps are controlled by wall switch while a photocell controls the PAR 38 lamps. At the time of the audit the exterior PAR lamps were running during daylight hours. It is recommended to verify if the photocell controls are properly operating.

Maintenance Garage: Linear Fluorescent T8 Lamps

Maintenance Garage: LED PAR38 Lamps and LED A19 Lamp

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators provide heating, cooling, and ventilation to various high school classrooms. They are equipped with fractional supply fan motors and digitally controlled outside air dampers and connect to the school's HHW supply and the AC condensers located on the roof. The units are controlled by Honeywell Stryker controllers allowing integration into the school's building automation system (BAS).

DePaul High School: Unit Ventilator

DePaul High School: Unit Ventilator Honeywell Controller

Unitary Electric HVAC Equipment

Sections of the high school are heated and cooled by roof mounted split system air source heat pumps. Cooling capacities range from 0.79 to 1.5 tons and operate at a seasonal energy efficiency ratio (SEER) of 10.3 to 10.5. Heating capacities range from 9 to 18 MBh at heating seasonal performance factors (HSPF) ranging from 7 to 12. The rooftop heat pumps are in good condition and are operating within their rated useful lives.

DePaul High School: Rooftop Heat Pump

Window AC units cool classroom 212 and the two high school gym offices. They range in capacity from 0.42 to 0.67 tons of cooling with energy efficiency ratios (EER) that span from 10.5 to 11. All three units are in good condition.

DePaul High School: Window AC Unit

Fifteen rooftop mounted AC condensing units cool DePaul High School's Flarity Hall area. The units range in capacity from 2.5 to 3.5 tons of cooling and all operated at an EER rating of 10. The units are in good condition and are operating beyond their rated useful life.

DePaul High School: Roof Mounted AC Condensing Unit

The Art Annex is cooled by a 3-ton, 13 SEER, split AC condensing unit. The unit connects to the evaporator located within the forced air furnace. The unit is in good condition and is operating within its rated useful life.

Art Annex: Split AC Condensing Unit

Unitary Heating Equipment

Spaces at the DePaul High School including staircases, mechanical room 5, and some corridor spaces such as corridor 6 are heated by electric resistance heaters. These range in capacity from 3.41 to 10.24 MBh (1 to 3 kW) and are in good condition. Temperature is controlled by dial thermostat or on-board thermostats, depending on the unit.

DePaul High School: Electric Resistance Heater & Dial Thermostat

The Art Annex is heated by an Armstrong Air, gas fired forced hot air furnace. The outdoor split AC condensing unit terminates at the evaporator in the furnace. The unit is in good condition and is operating within its rated useful life.

Art Annex: Forced Hot Air Furnace

Packaged Units

Larger areas of DePaul High School are heated and cooled by roof top units (RTUs). The RTUs are equipped with supply and exhaust fans and most units have a gas fired furnace section. All current RTUs are in good to fair condition and are operating beyond their rated useful life. The units are controlled by the building automation system. Some of the motor horsepower ratings were estimated as the systems were not accessible during the site survey. Please see the following chart for detailed information.

DePaul High School: RTU 7

Unit	Area Served	DX Cooling (Tons)	Gas Heating (MBh)	Supply Fan (hp)	Return/Exhaust Fan (hp)
RTU 1	West Wing	30	320	10	N/A
RTU 2	W. Wing	20	200	10	N/A
RTU 3	W. Wing	30	320	15	N/A
RTU 4	East Wing	30	320	20	N/A
RTU 5	W. Wing Cafeteria	40	N/A	10	N/A
RTU 6	Gym	30	N/A	10	N/A
RTU 7	Gym	30	N/A	10	N/A
RTU 8	E. Wing Main Office	5	98	1.5	0.5
RTU 9	Lobby	5	80	1.0	N/A
RTU 10	E. Wing Link	3	80	1.0	N/A
RTU 11	E. Wing Chapel	3	80	1.0	N/A
RTU 12	E. Wing Corridors	5	80	1.0	N/A

DePaul High School: RTU Inventory

2.6 Building General Exhaust Air Systems

Approximately 21 fractional horsepower exhaust fans are present at the high school. Exhaust fans serve to ventilate offices, restrooms, corridors, and other spaces. There is dedicated fume hood exhaust for the chem lab and an exhaust fan for the kitchen hood. The units are in good condition and are controlled by the BAS system.

DePaul High School: Exhaust Fan

2.7 Heating Hot Water Systems

The DePaul High School's Flarity Hall is heated by a Smith Cast, 963 MBh, non-condensing hot water boiler. The unit is controlled by a Honeywell controller that provides temperature control, monitoring, and integration with the BAS. The boiler operates at an estimated nominal efficiency of 80 percent. A Marathon Electric fractional horsepower combustion air fan serves the boiler. The boiler is in fair condition and is operating beyond its rated useful life.

Heating hot water (HHW) generated by the boiler is distributed by a constant speed fractional horsepower HHW pump and a constant speed 3 hp HHW pump. The HHW terminates at radiators and hydronic unit heaters located throughout the hall.

DePaul High School: HHW Boiler & HHW Supply Pumps

2.8 Building Automation System (BAS)

A Honeywell BAS controls the HVAC equipment, the boiler, and the RTUs. The BAS provides equipment scheduling control and monitoring and control of space temperatures, supply air temperatures, and HHW loop temperatures.

2.9 Domestic Hot Water

Domestic hot water (DHW) for the DePaul High School is mainly produced by 100-gallon, 80% efficient, Ruud natural gas domestic water heater. A 40-gallon, 80% efficient Rheem natural gas storage water heater and a 50-gallon, 4.5 kW G.E. electric DHW tank heater supplements the hot water demand. The two gas fired units are in good condition and are operating within their rated useful life. The electric DHW tank is in good condition and has reached the end of its rated useful life. DHW pipe insulation measures have been evaluated.


DePaul High School: RUUD & GE Water Heater

The Art Annex is equipped with a 20-gallon, 2.0 kW G.E electric storage tank water heater. The unit is from 2010 and is in good condition.

Art Annex: DHW Tank

The Snack Stand uses a 20-gallon, 2.0 kW A.O Smith electric DHW tank heater. Installed in 2017 the unit is in good condition and is operating within its rated useful life. A measure to install pipe insulation has been evaluated.

Snack Stand: DHW Tank

2.10 Food Service Equipment

The kitchen is equipped with a combination of gas and electric equipment used to prepare meals for students. Most cooking is done using a gas combination oven and gas convection ovens. Other cooking relies on a gas fired griddle and a gas fryer. Prepared food is held in one insulated food holding cabinet. Additional kitchen equipment includes hot and cold drop pan food wells and a food storage case.

The Snack Stand has incidental food prep and serving equipment.

While cost effective opportunities to replace equipment are limited at this time, we recommend that you work with your food service equipment suppliers to maintain equipment in a way that minimizes energy use. This may include cleaning air intakes and exhausts or other methods of keeping your existing equipment operating in top shape. When food service equipment is eventually replaced, consider installing high efficiency or ENERGY STAR labeled equipment.

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

DePaul High School: Kitchen Equipment

2.11 Refrigeration

The kitchen houses one standard efficiency stand-up refrigerator with solid doors and four stand-up refrigerators of varying efficiencies with glass doors. Two high efficiency ice machines are present at the school with one located in the kitchen and the other in the trainer office. One refrigerator chest is also present in the kitchen.

The second kitchen is equipped with a walk-in cooler and a walk-in freezer. The walk-in cooler utilizes a 0.66-ton compressor and is equipped with 1 fan evaporator and an air only defrost system. The walk-in freezer has a 0.96-ton compressor with a 2-fan evaporator and is equipped with a 2-kW electric defrost system. Both units were not equipped with evaporator fan controls or electric defrost controls. All refrigeration and ice making equipment are in good condition.

DePaul High School: Stand-Up Refrigerator w/ Solid Doors & Glass Doors

DePaul High School: Walk-In Two Fan Evaporator

The Snack Stand uses one, high efficiency, stand-up refrigerator with glass doors to store food and drink. The unit is in good condition and is operating within its rated useful life.

Snack Stand: Stand-Up Refrigerator

While cost effective opportunities to replace equipment are limited at this time, we recommend that you work with your refrigeration suppliers to maintain equipment in a way that minimizes energy use. When refrigeration equipment does need to be replaced consider installing high efficiency or ENERGY STAR labeled equipment.

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

2.12 Plug Load and Vending Machines

Plug loads at the DePaul High School include standard classroom and office equipment. Common plug loads include coffee machines, printers, projectors, microwaves, televisions, water fountains, and server and networking equipment.

There are approximately 25 desktops and 525 laptops throughout the facility. Six full size and 11 mini residential refrigerators are also present.

The main dining area and the staff dining area are equipped with a total of three refrigerated vending machines. The installation of vending machine controls has been evaluated.

Classroom 107 is equipped with standard shop equipment including a miter saw, scroll saw, drill press, and band saw.

DePaul High School: Plug Load

DePaul High School: Refrigerated Vending Machine

DePaul High School: Shop Drill Press & Miter Saw

Plug loads at the Art Annex are limited to a microwave, projector, and residential refrigerator. No other plug loads are present on site.

The Snack Stand uses two coffee machines, two microwaves, and two food heat lamps. No other plug loads are present.

2.13 Water-Using Systems

Water is provided by a township of Wayne water department. Potable water is used for drinking, cleaning, cooking, sanitary fixtures, and irrigation with the irrigation system being controlled by a weather-based controller. Water leaks were not observed or reported during the audit.

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 19 restrooms and four locker rooms throughout DePaul High School with toilets, urinals, sinks, and showers. Faucet flow rates are at 1.5 gallons per minute (gpm) or lower. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf. Showers are rated at 1.8 gpm or lower.

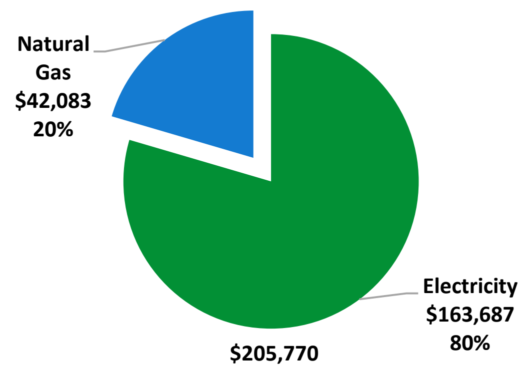
The Art Annex and Snack Stand are each equipped with one kitchen style faucet rated at 1.5 gpm.

DePaul High School: Restroom & Kitchen Style Faucet

3 Energy and Water Use and Costs

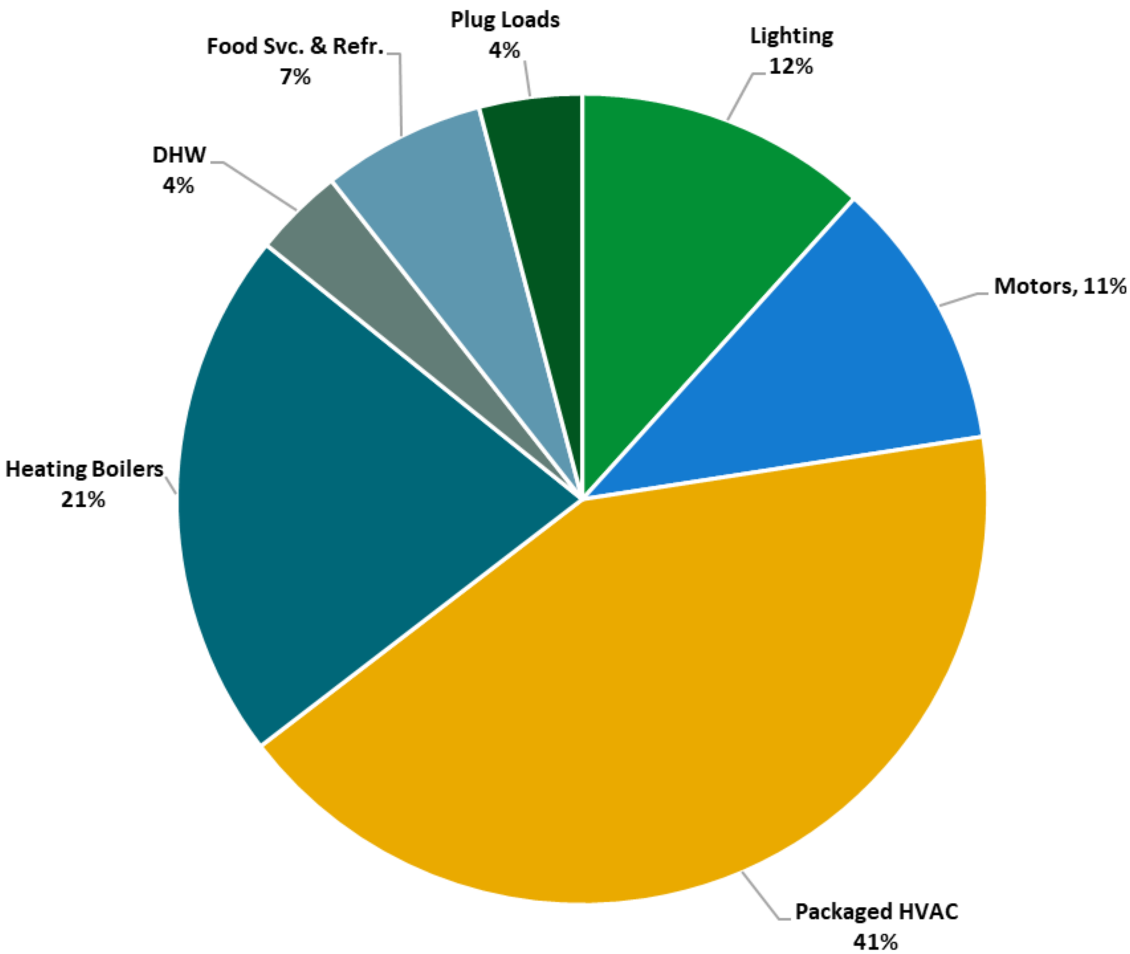
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	833,961 kWh	$163,687
Natural Gas	45,008 Therms	$42,083
Total		**$205,770**



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.

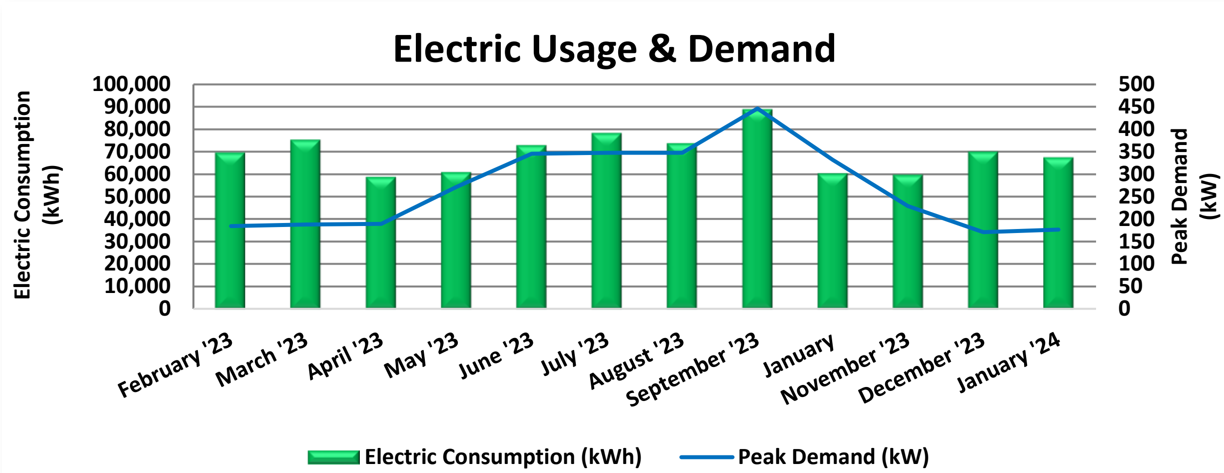
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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

PSE&G delivers electricity under rate class Large Power & Lighting Secondary (LPLS), with electric production provided by Constellation, a third-party supplier.



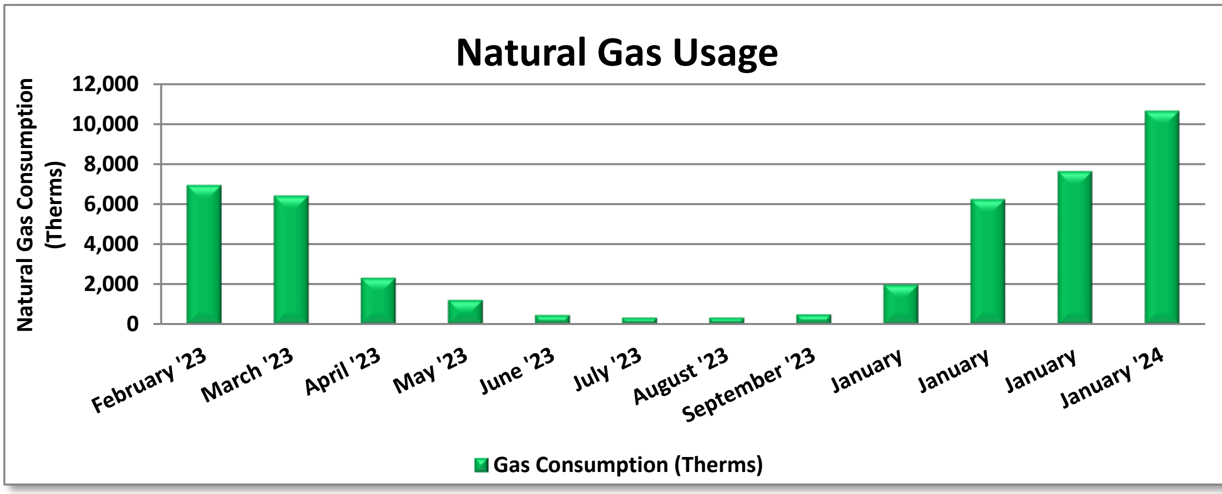
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
2/17/23	28	69,472	184	$823	$12,043
3/21/23	32	75,060	188	$840	$12,895
4/20/23	30	58,597	189	$848	$10,138
5/19/23	29	60,750	272	$1,222	$10,937
6/21/23	33	72,746	345	$1,654	$16,466
7/20/23	29	78,058	348	$1,723	$17,635
8/18/23	29	73,568	348	$1,722	$16,893
9/19/23	32	88,608	447	$2,210	$21,050
10/18/2023	29	60,205	332	$1,647	$11,366
11/16/23	29	59,714	229	$1,139	$10,734
12/19/23	33	69,809	171	$848	$11,985
1/20/24	32	67,374	177	$877	$11,544
Totals	**365**	**833,961**	**447**	**$15,553**	**$163,687**
Annual	**365**	**833,961**	**447**	**$15,553**	**$163,687**

Notes:

- Peak demand of 447 kW occurred in September '23.
- Average demand over the past 12 months was 269 kW.
- The average electric cost over the past 12 months was $0.196/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class Large Volume Gas (LVG).



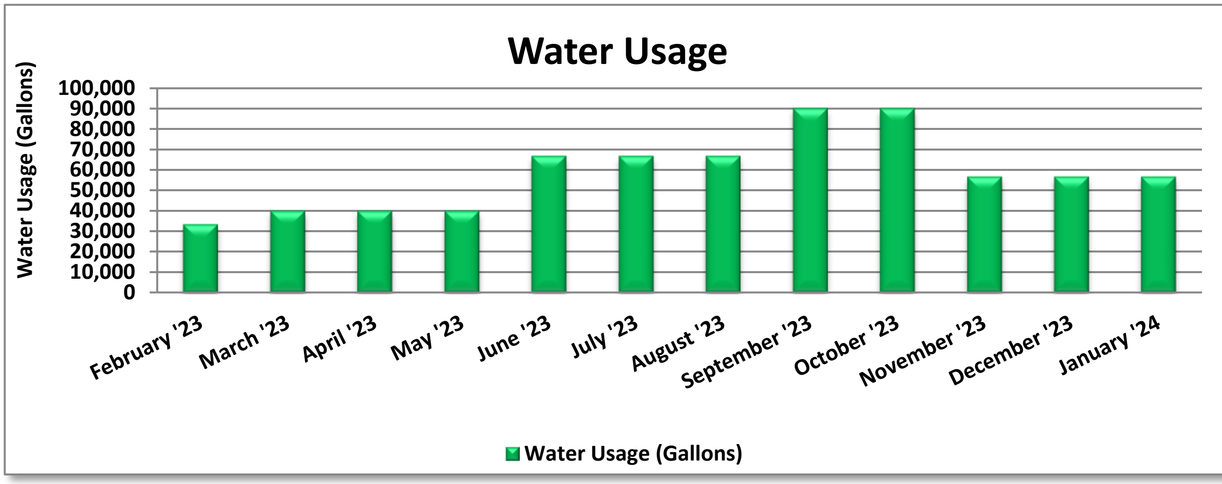
Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
2/28/23	28	6,943	$7,079
3/31/23	31	6,419	$6,130
4/30/23	30	2,318	$1,671
5/31/23	31	1,211	$939
6/30/23	30	471	$448
7/31/23	31	336	$386
8/31/23	31	331	$377
9/30/23	30	493	$476
10/31/2023	31	1,988	$1,604
11/30/2023	30	6,230	$6,484
12/31/2023	31	7,629	$6,970
1/31/24	31	10,638	$9,519
Totals	**365**	**45,008**	**$42,083**
Annual	**365**	**45,008**	**$42,083**

Notes:

- The average gas cost for the past 12 months is $0.935/therm, which is the blended rate used throughout the analysis.

3.3 Water

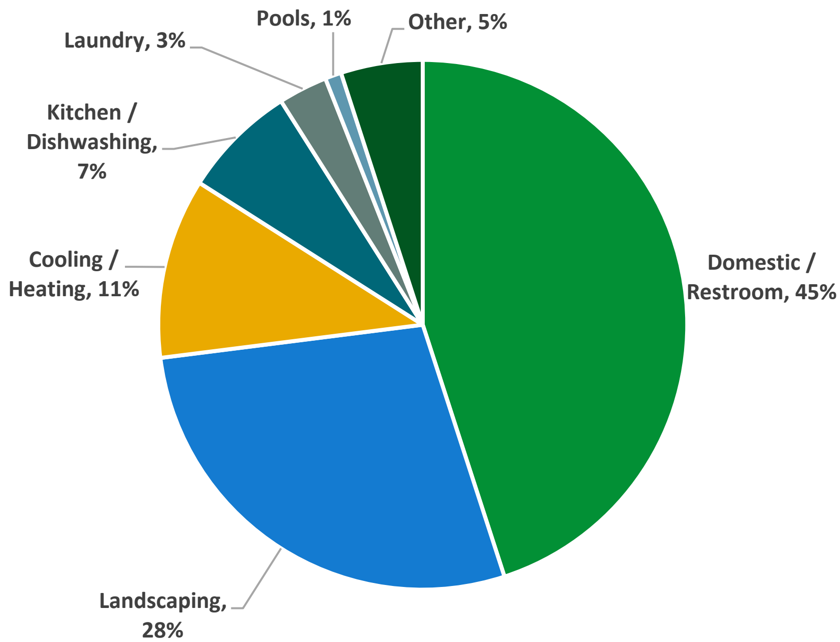
Township of Wayne Water Department delivers water to the project site.



Water Billing Data			
Period Ending	**Days in Period**	**Water Usage (gallons)**	**Water Cost**
2/24/23	31	33,333	$506
3/24/23	28	40,000	$347
4/24/23	31	40,000	$347
5/24/23	30	40,000	$347
6/24/23	31	66,667	$632
7/24/23	30	66,667	$632
8/24/23	31	66,667	$632
9/24/23	31	90,000	$1,015
10/24/23	30	90,000	$1,015
11/24/23	31	56,667	$741
12/24/23	30	56,667	$741
1/24/24	31	56,667	$741
Totals	**365**	**703,333**	**$7,697**
Annual	**365**	**703,333**	**$7,697**

Notes:

- The average cost of water for the past 12 months is $0.0109/gal.



Typical Education Water End Use[4]

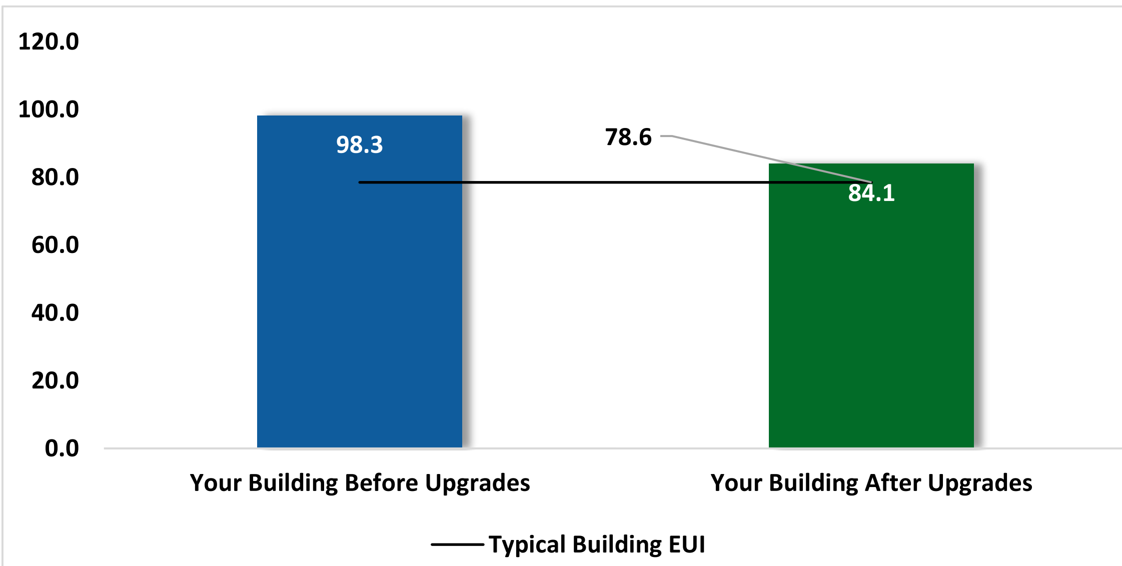
[4] Chart is of typical water end use and not specific to the facility.

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	29



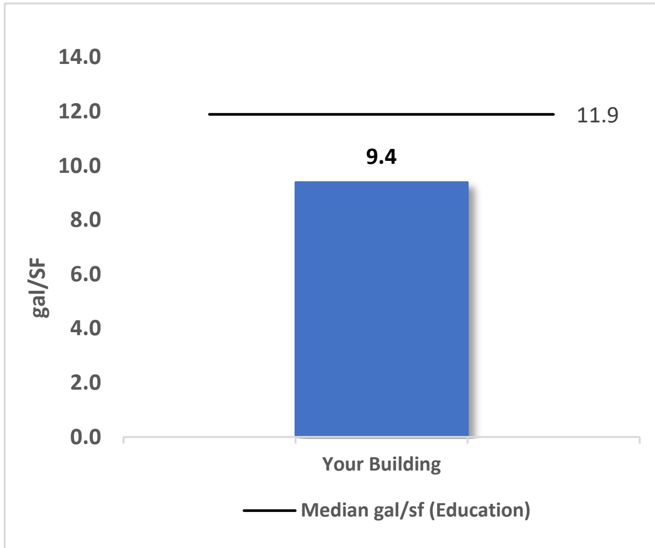
Energy Use Intensity Comparison[5]

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

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

[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. 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.

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			**121,927**	**25.2**	**-25**	**$23,695**	**$51,660**	**$10,250**	**$41,410**	**1.7**	**119,817**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	2,628	0.5	-1	$511	$1,480	$160	$1,320	2.6	2,582
ECM 2	Retrofit Fixtures with LED Lamps	Yes	102,263	23.4	-21	$19,874	$45,550	$10,090	$35,460	1.8	100,497
ECM 3	Install LED Exit Signs	Yes	17,036	1.3	-4	$3,311	$4,630	$0	$4,630	1.4	16,738
Lighting Control Measures			**37,702**	**8.2**	**-8**	**$7,326**	**$42,330**	**$11,930**	**$30,400**	**4.1**	**37,042**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	27,244	6.3	-6	$5,294	$27,690	$3,340	$24,350	4.6	26,767
ECM 5	Install High/Low Lighting Controls	Yes	10,458	1.9	-2	$2,032	$14,640	$8,590	$6,050	3.0	10,275
Variable Frequency Drive (VFD) Measures			**2,996**	**0.4**	**0**	**$588**	**$5,100**	**$200**	**$4,900**	**8.3**	**3,017**
ECM 6	Install VFDs on Heating Water Pumps	Yes	2,996	0.4	0	$588	$5,100	$200	$4,900	8.3	3,017
Unitary HVAC Measures			**32,906**	**37.4**	**58**	**$6,999**	**$449,000**	**$24,500**	**$424,500**	**60.7**	**39,899**
ECM 7	Install High Efficiency Air Conditioning Units	No	32,906	37.4	58	$6,999	$449,000	$24,500	$424,500	60.7	39,899
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**92**	**$861**	**$33,800**	**$1,700**	**$32,100**	**37.3**	**10,778**
ECM 8	Install High Efficiency Hot Water Boilers	No	0	0.0	92	$861	$33,800	$1,700	$32,100	37.3	10,778
HVAC System Improvements			**993**	**0.0**	**35**	**$523**	**$1,770**	**$260**	**$1,510**	**2.9**	**5,111**
ECM 9	Install Pipe Insulation	Yes	993	0.0	35	$523	$1,770	$260	$1,510	2.9	5,111
Domestic Water Heating Upgrade			**0**	**0.0**	**15**	**$144**	**$2,320**	**$450**	**$1,870**	**13.0**	**1,797**
ECM 10	Install Low-Flow DHW Devices	Yes	0	0.0	15	$144	$2,320	$450	$1,870	13.0	1,797
Food Service & Refrigeration Measures			**13,810**	**1.4**	**0**	**$2,711**	**$22,910**	**$760**	**$22,150**	**8.2**	**13,907**
ECM 11	Refrigeration Controls	Yes	2,249	0.0	0	$441	$5,400	$260	$5,140	11.6	2,265
ECM 12	Replace Refrigeration Equipment	No	4,429	0.5	0	$869	$15,900	$300	$15,600	17.9	4,460
ECM 13	Vending Machine Control	Yes	7,132	0.8	0	$1,400	$1,610	$200	$1,410	1.0	7,182
Custom Measures* **			**-21,090**	**0.0**	**249**	**-$1,811**	**$10,100**	**$0**	**$10,100**	**-5.6**	**7,917**
ECM 14	Replace Electric Water Heater with Heat Pump Water Heater	Yes	2,216	0.0	0	$435	$2,900	$0	$2,900	6.7	2,231
ECM 15	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-23,306	0.0	249	-$2,246	$7,200	$0	$7,200	-3.2	5,686
TOTALS			**189,245**	**72.5**	**416**	**$41,035**	**$618,990**	**$50,050**	**$568,940**	**13.9**	**239,287**

* - 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).

*** - Negative payback explained in section 4.9

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		**121,927**	**25.2**	**-25**	**$23,695**	**$51,660**	**$10,250**	**$41,410**	**1.7**	**119,817**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	2,628	0.5	-1	$511	$1,480	$160	$1,320	2.6	2,582
ECM 2	Retrofit Fixtures with LED Lamps	102,263	23.4	-21	$19,874	$45,550	$10,090	$35,460	1.8	100,497
ECM 3	Install LED Exit Signs	17,036	1.3	-4	$3,311	$4,630	$0	$4,630	1.4	16,738
Lighting Control Measures		**37,702**	**8.2**	**-8**	**$7,326**	**$42,330**	**$11,930**	**$30,400**	**4.1**	**37,042**
ECM 4	Install Occupancy Sensor Lighting Controls	27,244	6.3	-6	$5,294	$27,690	$3,340	$24,350	4.6	26,767
ECM 5	Install High/Low Lighting Controls	10,458	1.9	-2	$2,032	$14,640	$8,590	$6,050	3.0	10,275
Variable Frequency Drive (VFD) Measures		**2,996**	**0.4**	**0**	**$588**	**$5,100**	**$200**	**$4,900**	**8.3**	**3,017**
ECM 6	Install VFDs on Heating Water Pumps	2,996	0.4	0	$588	$5,100	$200	$4,900	8.3	3,017
HVAC System Improvements		**993**	**0.0**	**35**	**$523**	**$1,770**	**$260**	**$1,510**	**2.9**	**5,111**
ECM 9	Install Pipe Insulation	993	0.0	35	$523	$1,770	$260	$1,510	2.9	5,111
Domestic Water Heating Upgrade		**0**	**0.0**	**15**	**$144**	**$2,320**	**$450**	**$1,870**	**13.0**	**1,797**
ECM 10	Install Low-Flow DHW Devices	0	0.0	15	$144	$2,320	$450	$1,870	13.0	1,797
Food Service & Refrigeration Measures		**9,381**	**0.8**	**0**	**$1,841**	**$7,010**	**$460**	**$6,550**	**3.6**	**9,447**
ECM 11	Refrigeration Controls	2,249	0.0	0	$441	$5,400	$260	$5,140	11.6	2,265
ECM 13	Vending Machine Control	7,132	0.8	0	$1,400	$1,610	$200	$1,410	1.0	7,182
Custom Measures		**2,216**	**0.0**	**0**	**$435**	**$2,900**	**$0**	**$2,900**	**6.7**	**2,231**
ECM 14	Replace Electric Water Heater with Heat Pump Water Heater	2,216	0.0	0	$435	$2,900	$0	$2,900	6.7	2,231
TOTALS		**175,215**	**34.6**	**17**	**$34,552**	**$113,090**	**$23,550**	**$89,540**	**2.6**	**178,464**

* - 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		**121,927**	**25.2**	**-25**	**$23,695**	**$51,660**	**$10,250**	**$41,410**	**1.7**	**119,817**
ECM 1	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	2,628	0.5	-1	$511	$1,480	$160	$1,320	2.6	2,582
ECM 2	Retrofit Fixtures with LED Lamps	102,263	23.4	-21	$19,874	$45,550	$10,090	$35,460	1.8	100,497
ECM 3	Install LED Exit Signs	17,036	1.3	-4	$3,311	$4,630	$0	$4,630	1.4	16,738

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

ECM 1: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected Building Areas:

High School - T-12 lamps in corridor lobby, the gym, mechanical room 5, the gym office, and the janitorial basement.

ECM 2: Retrofit Fixtures with LED Lamps

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

High School - classrooms, corridors, dining areas, exterior ground floor, gym spaces, janitorial spaces, kitchens 1 and 2, mechanical rooms, offices, restrooms, staircases, and storage rooms
Art Annex - classroom and the mechanical room
Snack Stand - interior
The Press Box - box
The Maintenance Garage - garage interior

ECM 3: Install LED Exit Signs

Replace incandescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output. Maintenance savings and improved reliability may also be achieved, as the longer-lasting LED lamps will not need to be replaced as often as the existing lamps.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**37,702**	**8.2**	**-8**	**$7,326**	**$42,330**	**$11,930**	**$30,400**	**4.1**	**37,042**
ECM 4	Install Occupancy Sensor Lighting Controls	27,244	6.3	-6	$5,294	$27,690	$3,340	$24,350	4.6	26,767
ECM 5	Install High/Low Lighting Controls	10,458	1.9	-2	$2,032	$14,640	$8,590	$6,050	3.0	10,275

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

ECM 4: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas:

High School - classrooms, gym spaces, janitorial spaces, the kitchen, offices, and restrooms
Art Annex - classroom
The Maintenance Garage - garage interior

ECM 5: Install High/Low Lighting Controls

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

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety 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:

High School - corridors, dining areas, and staircases

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**2,996**	**0.4**	**0**	**$588**	**$5,100**	**$200**	**$4,900**	**8.3**	**3,017**
ECM 6	Install VFDs on Heating Water Pumps	2,996	0.4	0	$588	$5,100	$200	$4,900	8.3	3,017

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

ECM 6: Install VFDs on Heating Water Pumps

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

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

Affected Pumps:

High School - mechanical boiler room 3 hp HHW pump

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**32,906**	**37.4**	**58**	**$6,999**	**$449,000**	**$24,500**	**$424,500**	**60.7**	**39,899**
ECM 7	Install High Efficiency Air Conditioning Units	32,906	37.4	58	$6,999	$449,000	$24,500	$424,500	60.7	39,899

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 RTU and condensing units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 7: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. Some of the replacement units will incorporate efficient gas furnaces. 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:

High School - RTUs 1 through 9 and the rooftop condensing units

4.5 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**92**	**$861**	**$33,800**	**$1,700**	**$32,100**	**37.3**	**10,778**
ECM 8	Install High Efficiency Hot Water Boilers	0	0.0	92	$861	$33,800	$1,700	$32,100	37.3	10,778

ECM 8: Install High Efficiency Hot Water Boilers

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

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

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

High School - boiler located in the mechanical boiler room

4.6 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**993**	**0.0**	**35**	**$523**	**$1,770**	**$260**	**$1,510**	**2.9**	**5,111**
ECM 9	Install Pipe Insulation	993	0.0	35	$523	$1,770	$260	$1,510	2.9	5,111

ECM 9: Install Pipe Insulation

Install insulation on domestic hot water system piping. Distribution system thermal losses are dependent on system fluid temperature, the size of the distribution system, and the extent and condition of piping insulation. When the insulation has been damaged due to exposure to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated, system thermal efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Affected Systems:

High School - DHW pipes located in mechanical room 5, mechanical boiler room, and mechanical WW room.
Snack Stand - snack stand interior

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**15**	**$144**	**$2,320**	**$450**	**$1,870**	**13.0**	**1,797**
ECM 10	Install Low-Flow DHW Devices	0	0.0	15	$144	$2,320	$450	$1,870	13.0	1,797

ECM 10: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
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.

4.8 Food Service and Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**13,810**	**1.4**	**0**	**$2,711**	**$22,910**	**$760**	**$22,150**	**8.2**	**13,907**
ECM 11	Refrigeration Controls	2,249	0.0	0	$441	$5,400	$260	$5,140	11.6	2,265
ECM 12	Replace Refrigeration Equipment	4,429	0.5	0	$869	$15,900	$300	$15,600	17.9	4,460
ECM 13	Vending Machine Control	7,132	0.8	0	$1,400	$1,610	$200	$1,410	1.0	7,182

ECM 11: Refrigeration Controls

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

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

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

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

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

Affected Equipment:

High School - walk-in cooler and walk-in freezer

ECM 12: Replace Refrigeration Equipment

We evaluated replacing the existing stand-up refrigerators and refrigerator chests with new ENERGY STAR rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

ECM 13: Vending Machine Control

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

Affected Equipment:

High School - vending machines located in the dining areas

4.9 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**-21,090**	**0.0**	**249**	**-$1,811**	**$10,100**	**$0**	**$10,100**	**-5.6**	**7,917**
ECM 14	Replace Electric Water Heater with Heat Pump Water Heater	2,216	0.0	0	$435	$2,900	$0	$2,900	6.7	2,231
ECM 15	Replace Gas Fired Water Heater with Heat Pump Water Heater***	-23,306	0.0	249	-$2,246	$7,200	$0	$7,200	**-3.2**	5,686

ECM 14: Replace Electric Water Heater with Heat Pump Water Heater

Replace the existing electric water heater with a heat pump water heater (HPWH).

A typical electric water heater uses electric resistance coils to heat water at a coefficient of performance (COP) of 1. Air source heat pump water heaters use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. The typical average COP for a HPWH is about 2.5, so they require significantly less electricity to produce the same amount of hot water as a traditional electric water heater. 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 following addresses integrated HPWH.

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room.[6] 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.

Affected Units:

High School - electric DHW tank located in the mechanical room.

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

ECM 15: Replace Gas Fired Water Heater with Heat Pump Water Heater

We evaluated replacing existing the gas water heaters with heat pump water heaters (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.*[7]

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation[8]. 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

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

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

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[9] 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.

This measure has a negative simple payback due to the relative cost of electricity to natural gas. At this site the cost per Btu for natural gas is significantly lower than for electricity. Therefore, even though this measure will result in a net energy savings in terms of Btu at this site it will increase the overall cost for providing domestic hot water.

Affected Units:

High School - the gas DHW tanks located in the mechanical 5 room and the mechanical boiler room

4.10 Measures for Future Consideration

There are additional opportunities for improvement that High School 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.

High School 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.

[9] 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.

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.

Upgrade to a Heat Pump System

Electric resistance heating units work by passing an electric current through wires to heat them. The system is 100% efficient since for every unit of electricity consumed, one unit of heat is produced.

But there is a way to convert electricity to create heat at better than a 1:1 ratio. Heat pumps operate on a more efficient principle, the refrigeration cycle. Instead of directly converting electricity to heat, electricity does the work, via a compressor, of moving refrigerant through a system that transfers heat from a cooler place to a warmer place. That system can move three to five as much energy as is available using electric resistance heating methods. Heat pumps work in a similar manner to an air conditioner, except they reverse the cooling process to circulate warm air instead of cold air. Also, heat pumps are generally capable of dispensing refrigerated air as they can typically be operated in air conditioning mode.

Electric resistance heat, including electric furnaces and baseboard heaters, can be inexpensive to install but often expensive to run. Facilities with these systems can save substantial energy at a moderate cost by installing a heat pump when they replace a central air conditioner.

Even in buildings without central air-conditioning, there are opportunities to save energy when an existing electric furnace needs to be replaced, as well as opportunities to install ductless electric heat pumps in buildings with baseboard electric heaters and electric fan coils. Unit ventilators with built-in electric resistance heaters can be replaced with unit ventilators with integrated heat pumps.

Electric heat pumps have high coefficient of performance (COP) ratings and are substantially more efficient than traditional electric heating systems. Further investigation is required to determine whether installing a heat pump system is a cost-effective solution when replacing existing electrical heating systems.

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[10] . 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.

[10] 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.

Fans to Reduce Cooling Load

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

Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5-10°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.

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.

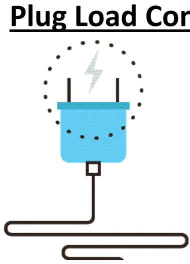
Water Heater Maintenance

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.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[11]. Your local utility may offer incentives or rebates for this equipment.

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.

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

6 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[12]. 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[13].

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[14] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[15] 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.

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

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

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

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

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

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.

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.

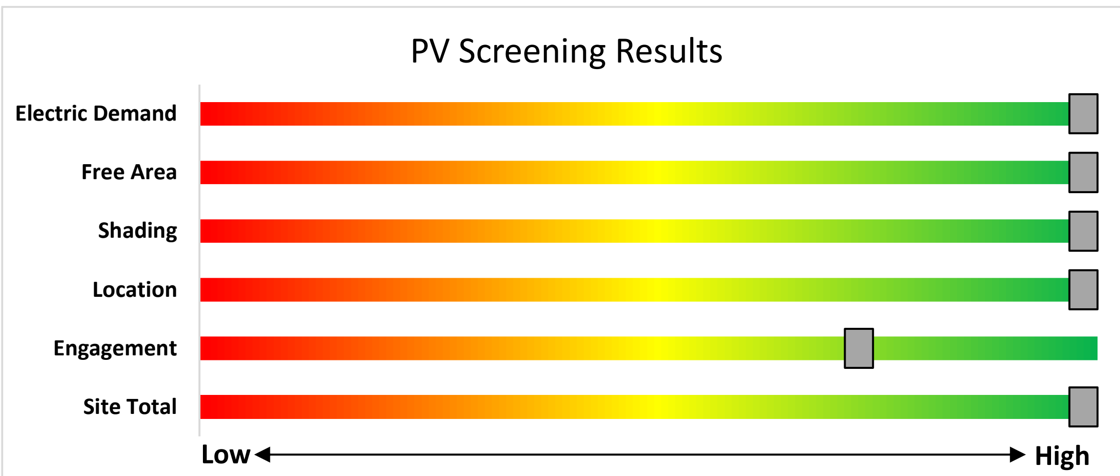
7.1 Solar Photovoltaic

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 high potential for installing a PV array.

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

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



Potential	High	
System Potential	215	kW DC STC
Electric Generation	256,145	kWh/yr
Displaced Cost	$50,280	/yr
Installed Cost	$559,000	

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.

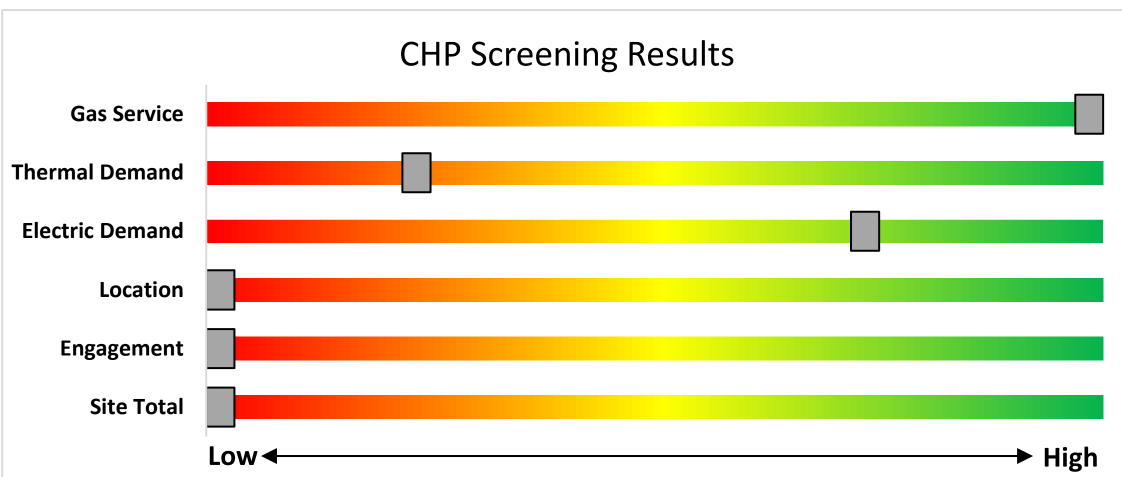
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

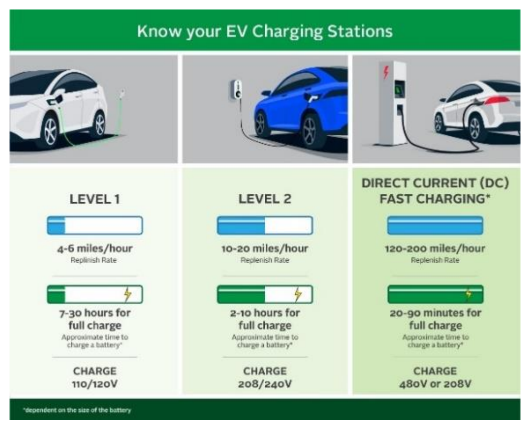
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes 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

8.1 EV Charging

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

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



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

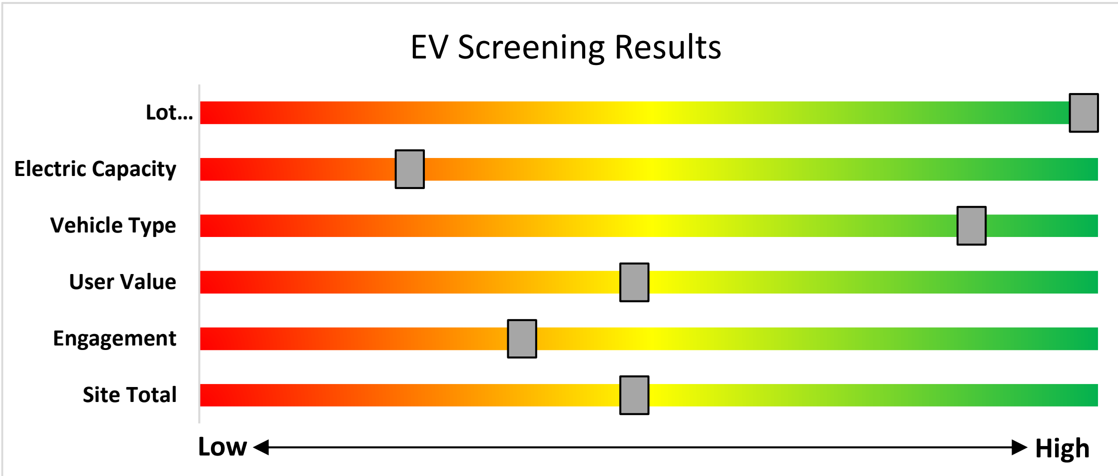
The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

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

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

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

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



EV Charger Screening

Electric Vehicle Programs Available

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

NJCEP offers a variety of EV programs for vehicles, charging stations, and fleets. Certain EV charging stations that receive electric utility service from Atlantic City Electric Company (ACE), 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 ACE, PSE&G or JCP&L 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[16]

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	≤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
Fuel Cells ≥60%	>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

16

[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[17]. 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[18].

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.

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

[18] 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.

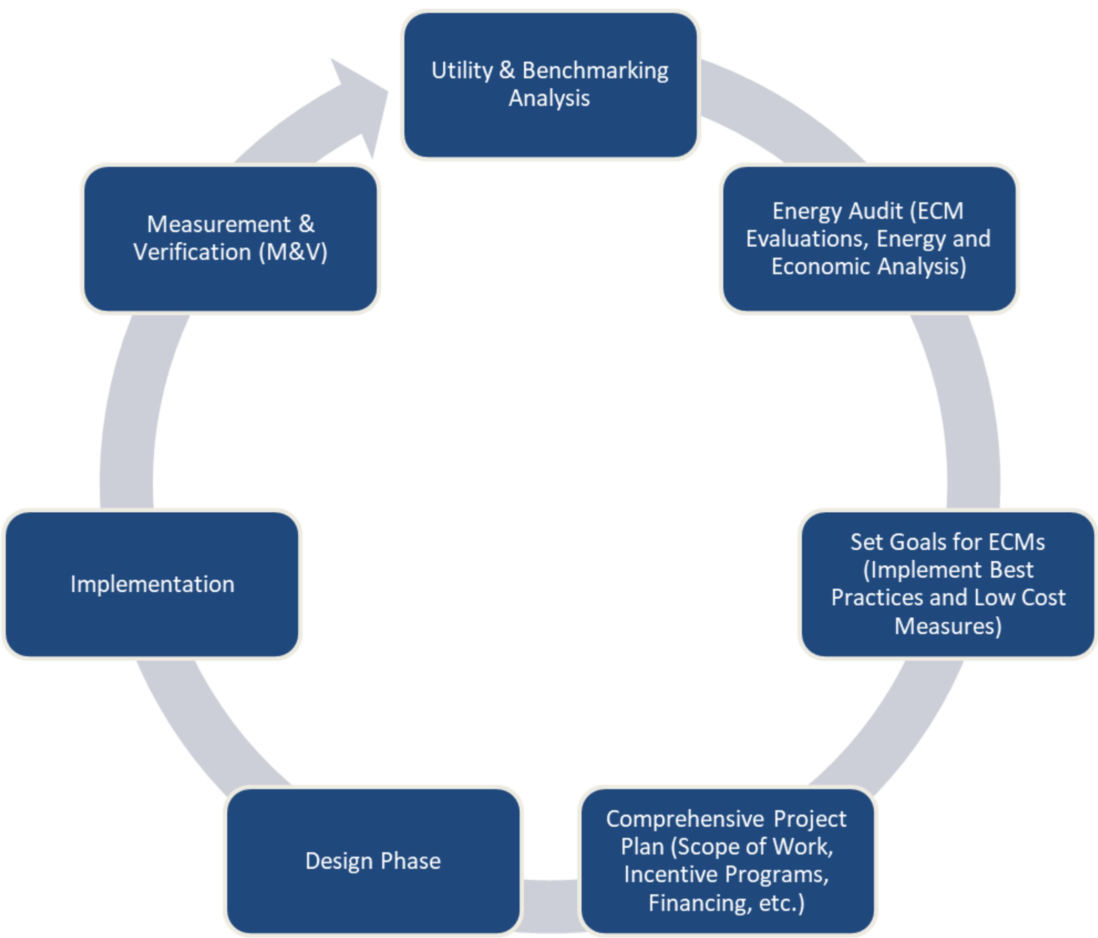
Engineered Solutions

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[19].

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[20].

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19 www.state.nj.us/bpu/commercial/shopping.html

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 100 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 101 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 102 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 103 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 104 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 105 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 107 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 108 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 109 - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.5	2,279	0	$443	$1,210	$240	2.2
Classroom 110 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 111 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 112 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 113 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 114 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 115 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 116 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 117 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 118 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom 119 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Classroom bio lab - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.5	2,279	0	$443	$1,210	$240	2.2
Classroom chem lab - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.5	2,279	0	$443	$1,210	$240	2.2
Classroom ml1 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom ml2 - DePaul HS	2	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	2,800	2, 4	Relamp	Yes	2	LED Lamps: (2) 19W Plug-In Lamps	Occupancy Sensor	37	1,932	0.0	163	0	$32	$230	$20	6.6
Classroom ml2 - DePaul HS	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.5	2,328	0	$452	$1,090	$220	1.9
Classroom ml3 - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.5	1,940	0	$377	$960	$190	2.0

	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
Closet - DePaul HS	1	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	500	2	Relamp	No	1	LED Lamps: (2) 19W Plug-In Lamps	Wall Switch	37	500	0.0	8	0	$2	$40	$0	25.0
Conference Admissions - DePaul HS	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.3	1,164	0	$226	$710	$130	2.6
Conference Chapel - DePaul HS	1	Incandescent: (4) 60W A19 Screw-In Lamps	Wall Switch	S	240	2,800	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	36	2,800	0.1	628	0	$122	$90	$0	0.7
Conference Chapel - DePaul HS	12	LED Lamps: (1) 10W BR30 Screw-In Lamp	Wall Switch	S	10	2,800	4	None	Yes	12	LED Lamps: (1) 10W BR30 Screw-In Lamp	Occupancy Sensor	10	1,932	0.0	115	0	$22	$330	$40	13.0
Conference Chapel - DePaul HS	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	2,800	0.0	85	0	$16	$60	$10	3.0
Corridor 6 - DePaul HS	6	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	6	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,966	0	$382	$530	$0	1.4
Corridor 6 - DePaul HS	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,680		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,680	0.0	0	0	$0	$0	$0	0.0
Corridor 6 - DePaul HS	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 5	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,539	0.9	5,099	-1	$991	$2,390	$1,000	1.4
Corridor flarity m - DePaul HS	4	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,310	0	$255	$350	$0	1.4
Corridor flarity m - DePaul HS	1	Incandescent: (2) 60W A19 Screw-In Lamps	Wall Switch	S	120	3,680	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	3,680	0.1	413	0	$80	$40	$0	0.5
Corridor flarity m - DePaul HS	11	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,680	5	None	Yes	11	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	32	2,539	0.1	442	0	$86	$560	$390	2.0
Corridor Kitchen - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2, 5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,539	0.1	599	0	$116	$460	$110	3.0
Corridor link - DePaul HS	3	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	983	0	$191	$270	$0	1.4
Corridor link - DePaul HS	19	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,680	5	None	Yes	19	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	32	2,539	0.1	763	0	$148	$1,130	$670	3.1
Corridor Lobby - DePaul HS	6	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	6	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,966	0	$382	$530	$0	1.4
Corridor Lobby - DePaul HS	14	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,680	5	None	Yes	14	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,539	0.1	703	0	$137	$850	$490	2.6
Corridor Lobby - DePaul HS	9	LED - Fixtures: Flood Fixture	Wall Switch	S	14	3,680	5	None	Yes	9	LED - Fixtures: Flood Fixture	High/Low Control	14	2,539	0.0	158	0	$31	$560	$320	7.8
Corridor Lobby - DePaul HS	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,680		None	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,680	0.0	0	0	$0	$0	$0	0.0
Corridor Lobby - DePaul HS	8	Linear Fluorescent - EST12: 4' T12 (34W) - 1L	Wall Switch	S	43	3,680	1, 5	Relamp & Reballast	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,539	0.2	1,069	0	$208	$1,070	$320	3.6
Corridor Lobby - DePaul HS	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,680	2, 5	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,539	0.4	2,137	0	$415	$1,740	$960	1.9
Corridor Lobby - DePaul HS	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,680	0.1	601	0	$117	$190	$50	1.2
Corridor main east DePaul HS	4	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,310	0	$255	$350	$0	1.4
Corridor main east DePaul HS	25	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,680	5	None	Yes	25	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,539	0.2	1,255	0	$244	$1,410	$880	2.2
Corridor main west - DePaul HS	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	655	0	$127	$180	$0	1.4
Corridor main west - DePaul HS	16	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,680	5	None	Yes	16	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,539	0.1	803	0	$156	$850	$560	1.9

	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
Corridor main west - DePaul HS	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 5	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,539	0.1	765	0	$149	$470	$160	2.1
Corridor Men's Locker - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Corridor Men's Locker - DePaul HS	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2, 5	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,539	0.2	898	0	$175	$550	$170	2.2
Dining Area Main - DePaul HS	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	655	0	$127	$180	$0	1.4
Dining Area Main - DePaul HS	24	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,680	5	None	Yes	24	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	2,539	0.2	1,205	0	$234	$1,130	$840	1.2
Dining Area Staff - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2, 5	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,539	0.2	1,198	0	$233	$630	$220	1.8
Dining Area Staff - DePaul HS	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,680	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,680	0.0	235	0	$46	$180	$20	3.5
Ground floor - DePaul HS	30	Compact Fluorescent: (1) 26W Plug-In Lamp	Photocell		26	4,380	2	Relamp	No	30	LED Lamps: (1) 19W Plug-In Lamp	Photocell	19	4,380	0.0	920	0	$181	$380	$30	1.9
Ground floor - DePaul HS	4	LED Lamps: (3) 6.5W Screw-In Lamp	Photocell		20	4,380		None	No	4	LED Lamps: (3) 6.5W Screw-In Lamp	Photocell	20	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Photocell		10	4,380		None	No	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Photocell	10	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	36	LED - Fixtures: Downlight Recessed	Photocell		10	4,380		None	No	36	LED - Fixtures: Downlight Recessed	Photocell	10	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	1	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Photocell		120	4,380		None	No	1	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Photocell	120	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	1	LED - Fixtures: Display Case Lighting	Photocell		12	4,380		None	No	1	LED - Fixtures: Display Case Lighting	Photocell	12	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	1	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Photocell		180	4,380		None	No	1	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Photocell	180	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	3	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Photocell		180	4,380		None	No	3	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Photocell	180	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		40	4,380		None	No	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	40	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	18	LED - Fixtures: Bollard Fixture	Photocell		10	4,380		None	No	18	LED - Fixtures: Bollard Fixture	Photocell	10	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	12	LED - Fixtures: Wall Pack	Photocell		35	4,380		None	No	12	LED - Fixtures: Wall Pack	Photocell	35	4,380	0.0	0	0	$0	$0	$0	0.0
Ground floor - DePaul HS	6	LED - Fixtures: Wall Pack	Photocell		65	4,380		None	No	6	LED - Fixtures: Wall Pack	Photocell	65	4,380	0.0	0	0	$0	$0	$0	0.0
Gymnasium - DePaul HS	2	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	2,800	2, 4	Relamp	Yes	2	LED Lamps: (2) 19W Plug-In Lamps	Occupancy Sensor	37	1,932	0.0	163	0	$32	$230	$20	6.6
Gymnasium - DePaul HS	6	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	6	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,966	0	$382	$530	$0	1.4
Gymnasium - DePaul HS	20	LED - Fixtures: High-Bay	Wall Switch	S	75	2,800	4	None	Yes	20	LED - Fixtures: High-Bay	Occupancy Sensor	75	1,932	0.3	1,432	0	$278	$660	$70	2.1
Gymnasium - DePaul HS	30	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	2,800	4	None	Yes	30	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	1,932	0.2	917	0	$178	$660	$70	3.3
Gymnasium - DePaul HS	8	LED - Fixtures: Downlight Pendant	Wall Switch	S	10	2,800	4	None	Yes	8	LED - Fixtures: Downlight Pendant	Occupancy Sensor	10	1,932	0.0	76	0	$15	$330	$40	19.5
Gymnasium - DePaul HS	4	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	2,800	1, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	1,932	0.3	1,335	0	$259	$990	$120	3.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Gymnasium Weight Room - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Gymnasium Weight Room - DePaul HS	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.7	3,104	-1	$603	$1,670	$310	2.3
Gymnasium Wrestling - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Gymnasium Wrestling - DePaul HS	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.7	2,910	-1	$565	$1,280	$270	1.8
Janitorial 1 - DePaul HS	1	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	2,000	2	Relamp	No	1	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	2,000	0.0	15	0	$3	$10	$0	3.3
Janitorial locker room - DePaul HS	1	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	2,000	2	Relamp	No	1	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	2,000	0.0	15	0	$3	$10	$0	3.3
Kitchen - DePaul HS	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,800	2, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,242	0.4	1,081	0	$210	$990	$170	3.9
Kitchen 2 - DePaul HS	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	10	1,800		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	10	1,800	0.0	0	0	$0	$0	$0	0.0
Kitchen 2 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,800	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,800	0.0	65	0	$13	$50	$10	3.2
Locker Room Men - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Locker Room Men - DePaul HS	3	LED Lamps: (1) 10W BR30 Screw-In Lamp	Wall Switch	S	10	2,000	4	None	Yes	3	LED Lamps: (1) 10W BR30 Screw-In Lamp	Occupancy Sensor	10	1,380	0.0	20	0	$4	$330	$40	72.9
Locker Room Men - DePaul HS	6	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,000	4	None	Yes	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,380	0.1	164	0	$32	$330	$40	9.1
Locker Room Men - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	739	0	$144	$730	$120	4.2
Locker Room women - DePaul HS	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	647	0	$126	$680	$110	4.5
Locker Room women 2 - DePaul HS	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	647	0	$126	$680	$110	4.5
Lounge 1 - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.1	510	0	$99	$280	$50	2.3
Mailroom - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.1	259	0	$50	$250	$40	4.2
Mechanical 5 - DePaul HS	2	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	3,680	2	Relamp	No	2	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	3,680	0.0	57	0	$11	$30	$0	2.7
Mechanical 5 - DePaul HS	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	655	0	$127	$180	$0	1.4
Mechanical 5 - DePaul HS	2	LED Lamps: (1) 10W BR30 Screw-In Lamp	Wall Switch	S	10	3,680		None	No	2	LED Lamps: (1) 10W BR30 Screw-In Lamp	Wall Switch	10	3,680	0.0	0	0	$0	$0	$0	0.0
Mechanical 5 - DePaul HS	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	3,680	1	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	3,680	0.1	348	0	$68	$160	$20	2.1
Mechanical 5 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,680	0.0	134	0	$26	$50	$10	1.5
Office - admissions (1) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - admissions (2) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - admissions (3) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office - admissions (4) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - admissions (5) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - Coach - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,800	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,932	0.1	517	0	$101	$530	$80	4.5
Office - Enclosed Chaplain - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.1	456	0	$89	$330	$60	3.0
Office - Enclosed main - DePaul HS	24	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	2,800	4	None	Yes	24	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,932	0.2	756	0	$147	$660	$70	4.0
Office - Enclosed main principal - DePaul HS	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	2,800	4	None	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,932	0.0	189	0	$37	$330	$40	7.9
Office - Enclosed main printer - DePaul HS	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	2,800	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,932	0.0	126	0	$24	$330	$40	11.8
Office - Enclosed main vice principal - DePaul HS	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	2,800	4	None	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,932	0.0	126	0	$24	$330	$40	11.8
Office - Enclosed president - DePaul HS	8	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,800	4	None	Yes	8	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,932	0.0	76	0	$15	$330	$40	19.5
Office - Enclosed Reception - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.1	388	0	$75	$280	$50	3.1
Office - Enclosed VP - DePaul HS	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	2,800		None	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,800	0.0	0	0	$0	$0	$0	0.0
Office - Enclosed VP - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.1	388	0	$75	$280	$50	3.1
Office - flarity - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - guidance (1) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - guidance (2) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - guidance (3) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - guidance (4) - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.1	388	0	$75	$280	$50	3.1
Office - guidance (5) - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - guidance (6) - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.1	388	0	$75	$280	$50	3.1
Office - Nurse - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.2	776	0	$151	$580	$100	3.2
Office - Open Plan Admissions - DePaul HS	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.3	1,164	0	$226	$710	$130	2.6
Office - Open Plan business and athletics - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.4	1,823	0	$354	$1,040	$200	2.4
Office - Open Plan IT - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Office - Trainer - DePaul HS	6	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	2,800	4	None	Yes	6	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	1,932	0.0	183	0	$36	$330	$40	8.1
Restroom - Coach - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8

	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 3 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Male 4 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Unisex kitchen - DePaul HS	2	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2, 4	Relamp	Yes	2	LED Lamps: A19 Lamps	Occupancy Sensor	9	690	0.1	118	0	$23	$200	$20	7.8
Restroom - Unisex main - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Restroom - Unisex main 2 - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Restroom - Unisex Nurse - DePaul HS	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	1,000	2	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,000	0.0	15	0	$3	$30	$0	10.4
Restroom - Unisex principal - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Restroom - Unisex staff - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Restroom - Unisex vp - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Roof - DePaul HS	1	LED - Fixtures: (1) 3.5W Plug-In Lamp	Wall Switch		4	100		None	No	1	LED - Fixtures: (1) 3.5W Plug-In Lamp	Wall Switch	4	100	0.0	0	0	$0	$0	$0	0.0
Server Room - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.0	73	0	$14	$50	$10	2.8
Stairs 4 - DePaul HS	2	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	3,680	2, 5	Relamp	Yes	2	LED Lamps: (2) 19W Plug-In Lamps	High/Low Control	37	2,539	0.0	214	0	$42	$360	$70	7.0
Stairs 4 - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Stairs 4 - DePaul HS	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,680	0.1	601	0	$117	$190	$50	1.2
Stairs 5 - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Stairs 5 - DePaul HS	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 5	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,539	0.2	1,275	0	$248	$600	$260	1.4
Stairs gym 1 - DePaul HS	2	LED - Fixtures: Downlight Pendant	Wall Switch	S	10	3,680	5	None	Yes	2	LED - Fixtures: Downlight Pendant	High/Low Control	10	2,539	0.0	25	0	$5	$280	$70	43.1
Stairs gym 2 - DePaul HS	2	LED - Fixtures: Downlight Pendant	Wall Switch	S	10	3,680	5	None	Yes	2	LED - Fixtures: Downlight Pendant	High/Low Control	10	2,539	0.0	25	0	$5	$280	$70	43.1
Stairs men’s locker - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Stairs men’s locker - DePaul HS	2	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	3,680	2, 5	Relamp	Yes	2	LED Lamps: A19 Lamps	High/Low Control	9	2,539	0.1	435	0	$85	$330	$70	3.1
Stairs men’s locker - DePaul HS	2	LED - Fixtures: Downlight Pendant	Wall Switch	S	10	3,680		None	No	2	LED - Fixtures: Downlight Pendant	Wall Switch	10	3,680	0.0	0	0	$0	$0	$0	0.0
Stairs men’s locker - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,680	0.1	453	0	$88	$180	$40	1.6
Stairs stage - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Stairs stage - DePaul HS	2	LED - Fixtures: Downlight Pendant	Wall Switch	S	10	3,680		None	No	2	LED - Fixtures: Downlight Pendant	Wall Switch	10	3,680	0.0	0	0	$0	$0	$0	0.0
Stairs stage - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,680	0.1	453	0	$88	$180	$40	1.6

	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
Storage 2 - DePaul HS	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	1,000	2	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,000	0.0	30	0	$6	$60	$10	8.5
Storage 4 - DePaul HS	2	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	1,000	2	Relamp	No	2	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,000	0.0	61	0	$12	$130	$20	9.4
Storage 5 - DePaul HS	1	Incandescent: (2) 60W A19 Screw-In Lamps	Wall Switch	S	120	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	1,000	0.1	112	0	$22	$40	$0	1.8
Storage kitchen - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$7	$50	$10	5.7
Storage lab - DePaul HS	4	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	1,000	2	Relamp	No	4	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	1,000	0.0	31	0	$6	$50	$0	8.4
Storage men's - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage men's 2 - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage president - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	2	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.0	62	0	$12	$90	$20	5.8
Storage Prop - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage safe - DePaul HS	1	Incandescent: (2) 60W A19 Screw-In Lamps	Wall Switch	S	120	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	18	1,000	0.1	112	0	$22	$40	$0	1.8
Storage stage - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage stage 2 - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage stage 3 - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage stage 4 - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage store - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.2	246	0	$48	$350	$80	5.6
Storage trainer - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Storage wrestling - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Classroom 200 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom 201 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom 202 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom 203 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom 205 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom 207 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom 209 - DePaul HS	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.3	1,164	0	$226	$710	$130	2.6
Classroom 211 - DePaul HS	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.3	1,164	0	$226	$710	$130	2.6

	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
Classroom 212 - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,800	2, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,932	0.1	456	0	$89	$330	$60	3.0
Classroom UL1 - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.5	1,940	0	$377	$960	$190	2.0
Classroom UL2 - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.5	1,940	0	$377	$960	$190	2.0
Classroom UL3 - DePaul HS	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.5	1,940	0	$377	$960	$190	2.0
Closet 2 - DePaul HS	1	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	500	2	Relamp	No	1	LED Lamps: (2) 19W Plug-In Lamps	Wall Switch	37	500	0.0	8	0	$2	$40	$0	25.0
Corridor 5 - DePaul HS	3	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	983	0	$191	$270	$0	1.4
Corridor 5 - DePaul HS	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 5	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,539	0.8	4,589	-1	$892	$1,990	$900	1.2
Corridor 5 - DePaul HS	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,680	2, 5	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,539	0.0	159	0	$31	$370	$50	10.4
Corridor flarity u - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Corridor flarity u - DePaul HS	11	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,680	5	None	Yes	11	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	32	2,539	0.1	442	0	$86	$560	$390	2.0
Office - flarity 1 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - flarity 2 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - flarity 3 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - flarity 4 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - flarity 5 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - flarity 6 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,800	0.0	152	0	$30	$60	$20	1.4
Office - Gym - DePaul HS	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,800	1	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,800	0.0	182	0	$35	$90	$10	2.3
Office - Gym - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,800	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,800	0.0	102	0	$20	$50	$10	2.0
Office - Gym 2 - DePaul HS	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,800	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,932	0.0	76	0	$15	$150	$20	8.8
Restroom - Female 1 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Female 4 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Gym - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8
Restroom - Gym 2 - DePaul HS	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,000		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,000	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 1 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Unisex - DePaul HS	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,000	2	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	9	1,000	0.0	56	0	$11	$30	$0	2.8

	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
Storage 1 - DePaul HS	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	1,000	2	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,000	0.0	30	0	$6	$60	$10	8.5
Storage book - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.2	246	0	$48	$350	$80	5.6
Classroom II1 - DePaul HS	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.4	1,552	0	$302	$840	$160	2.3
Classroom II2 - DePaul HS	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.3	1,164	0	$226	$710	$130	2.6
Classroom II3 - DePaul HS	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,800	2, 4	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,932	0.5	2,134	0	$415	$1,030	$210	2.0
Corridor flarity I - DePaul HS	2	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	655	0	$127	$180	$0	1.4
Corridor flarity I - DePaul HS	11	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,680	5	None	Yes	11	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	32	2,539	0.1	442	0	$86	$560	$390	2.0
Electrical Room Communications - DePaul HS	1	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	2,000	2	Relamp	No	1	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	2,000	0.0	15	0	$3	$10	$0	3.3
Elevator 1 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,680	0.0	134	0	$26	$50	$10	1.5
Janitorial Basement - DePaul HS	2	LED Lamps: (1) 10W BR30 Screw-In Lamp	Wall Switch	S	10	3,680	4	None	Yes	2	LED Lamps: (1) 10W BR30 Screw-In Lamp	Occupancy Sensor	10	2,539	0.0	25	0	$5	$150	$20	26.7
Janitorial Basement - DePaul HS	1	Linear Fluorescent - EST12: 4' T12 (34W) - 1L	Wall Switch	S	43	3,680	1	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,680	0.0	115	0	$22	$60	$10	2.2
Mechanical Boiler - DePaul HS	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,680	0.1	401	0	$78	$150	$30	1.5
Mechanical elevator - DePaul HS	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,680	0.0	267	0	$52	$100	$20	1.5
Mechanical sprinkler - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,680	0.0	134	0	$26	$50	$10	1.5
Mechanical WW - DePaul HS	2	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	3,680	2	Relamp	No	2	LED Lamps: (2) 19W Plug-In Lamps	Wall Switch	37	3,680	0.0	121	0	$24	$80	$0	3.4
Restroom - Female 2 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Male 2 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Restroom - Male 3 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,680	2, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,539	0.2	1,020	0	$198	$580	$100	2.4
Stairs flarity 1 - DePaul HS	1	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	3,680	2	Relamp	No	1	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	3,680	0.0	28	0	$6	$10	$0	1.8
Stairs flarity 1 - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Stairs flarity 1 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,539	0.1	680	0	$132	$480	$180	2.3
Stairs flarity 2 - DePaul HS	1	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	3,680	2	Relamp	No	1	LED Lamps: (1) 19W Plug-In Lamp	Wall Switch	19	3,680	0.0	28	0	$6	$10	$0	1.8
Stairs flarity 2 - DePaul HS	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Stairs flarity 2 - DePaul HS	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,680	2, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,539	0.1	680	0	$132	$480	$180	2.3
Storage 3 - DePaul HS	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$7	$50	$10	5.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior 1 - Art Annex	2	LED Lamps: (1) 10W Screw-In Lamp	Photocell		20	4,380		None	No	2	LED Lamps: (1) 10W Screw-In Lamp	Photocell	20	4,380	0.0	0	0	$0	$0	$0	0.0
Interior Classroom - Art Annex	1	Exit Signs: Incandescent	None		40	8,760	3	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.0	328	0	$64	$90	$0	1.4
Interior Classroom - Art Annex	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2, 4	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,539	0.5	2,995	-1	$582	$1,210	$240	1.7
Mechanical - Art Annex	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,680	2	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,680	0.0	227	0	$44	$90	$20	1.6
Exterior 1 - Snack Stand	1	LED - Fixtures: Other	Wall Switch		200	1,000		None	No	1	LED - Fixtures: Other	Wall Switch	200	1,000	0.0	0	0	$0	$0	$0	0.0
Exterior 1 - Snack Stand	56	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch		600	185		None	No	56	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	600	185	0.0	0	0	$0	$0	$0	0.0
Exterior 1 - Snack Stand	2	LED - Fixtures: Wall Pack	Wall Switch		45	1,000		None	No	2	LED - Fixtures: Wall Pack	Wall Switch	45	1,000	0.0	0	0	$0	$0	$0	0.0
Interior - Snack Stand	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,500	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	54	0	$11	$50	$10	3.8
Press box - Snack Stand	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,500	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	277	0	$54	$530	$80	8.4
Exterior 1 - Maintenance Garage	1	LED Lamps: (2) 10W PAR38 Screw-In Lamps	Photocell		20	4,380		None	No	1	LED Lamps: (2) 10W PAR38 Screw-In Lamps	Photocell	20	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 1 - Maintenance Garage	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch		10	1,800		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,800	0.0	0	0	$0	$0	$0	0.0
Interior - Maintenance Garage	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	2, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$112	$580	$90	4.4

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Boiler - DePaul HS	Combustion Air Fan	1	Combustion Air Fan	0.75	70.0%	No	Marathon Electric	CPK 56C34D1219D	W	1,800		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No	Dayton	4HZ376	W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler - DePaul HS	Heating Hot Water Pump	1	Heating Hot Water Pump	0.08	65.0%	No	Bell & Gossett	1C91	W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler - DePaul HS	Heating Hot Water Pump	1	Heating Hot Water Pump	3.00	84.0%	No	Marathon Electric	CVK 182TTDR5337AAP	B	2,700	6	No	89.5%	Yes	1	0.4	2,996	0	$588	$5,100	$200	8.3
Classroom chem lab - DePaul HS	Fume Hood Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	Kitchen Hood Exhaust Fan	1	Kitchen Hood Exhaust Fan	1.50	86.5%	No			W	2,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Gymnasium - DePaul HS	Basketball Hoop Motor	2	Other	0.25	65.0%	No			W	5		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Stairs men's locker - DePaul HS	Sump Pump Motor	1	Other	0.10	65.0%	No			W	1,200		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Janitorial Basement - DePaul HS	Sump Pump Motor	1	Other	0.10	65.0%	No			W	1,200		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler - DePaul HS	Sump Pump Motor	1	Other	0.10	65.0%	No			W	1,200		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical elevator - DePaul HS	Elevator Motor	1	Other	20.00	92.0%	No	ThyssenKrupp Elevator	590AF3	W	500		No	92.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical sprinkler - DePaul HS	Air Compressor System for Sprinkler Systems	1	Air Compressor	0.50	70.0%	No	General Air Products	OLR86050AC-LP	W	500		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Coach - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Female 3 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Male 4 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex kitchen - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex main - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex main 2 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex Nurse - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex principal - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		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
Restroom - Unisex staff - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex vp - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage 2 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage president - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Female 1 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Female 4 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Male 1 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Unisex - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage 1 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Male 2 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Restroom - Male 3 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage 3 - DePaul HS	Exhaust Fan	1	Exhaust Fan	0.25	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Corridor flarity m - DePaul HS	Fan Coil Unit	1	Fan Coil Unit	0.10	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Corridor link - DePaul HS	Fan Coil Unit	2	Fan Coil Unit	0.10	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Corridor flarity l - DePaul HS	Fan Coil Unit	1	Fan Coil Unit	0.10	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler - DePaul HS	Fan Coil Unit	1	Fan Coil Unit	0.10	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom ml1 - DePaul HS	Unit Ventilator	2	Supply Fan	0.15	65.0%	No	EMI	FHP24D820AA0A0A	W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom ml2 - DePaul HS	Unit Ventilator	6	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom ml3 - DePaul HS	Unit Ventilator	2	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Lounge 1 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		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
Office - flarity - DePaul HS	Unit Ventilator	2	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom UL1 - DePaul HS	Unit Ventilator	2	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom UL2 - DePaul HS	Unit Ventilator	2	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom UL3 - DePaul HS	Unit Ventilator	2	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - flarity 1 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - flarity 2 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - flarity 3 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - flarity 4 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - flarity 5 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - flarity 6 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom II1 - DePaul HS	Unit Ventilator	1	Supply Fan	0.50	70.0%	No	Magic Aire	36-BVX-D	W	2,700		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom II2 - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom II3 - DePaul HS	Unit Ventilator	1	Supply Fan	0.50	70.0%	No	Magic Aire	36-BVX-D	W	2,700		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical elevator - DePaul HS	Unit Ventilator	1	Supply Fan	0.15	65.0%	No			W	2,700		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 107 - DePaul HS	Miter Saw	1	Other	1.00	77.0%	No			W	35		No	77.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 107 - DePaul HS	Scroll Saw	1	Other	0.25	65.0%	No			W	80		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 107 - DePaul HS	Drill Press	1	Other	0.50	70.0%	No			W	65		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 107 - DePaul HS	Band Saw	1	Other	1.00	77.0%	No			W	100		No	77.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom 107 - DePaul HS	Belt & Disc Sander	1	Other	0.50	70.0%	No			W	100		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
West Wing Roof - DePaul HS	RTU-1 Supply Fan	1	Supply Fan	10.00	89.5%	No			B	3,400		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0

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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
West Wing Roof - DePaul HS	RTU-2 Supply Fan	1	Supply Fan	10.00	89.5%	No			B	3,400		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof west hall - DePaul HS	RTU-3 Supply Fan	1	Supply Fan	15.00	91.0%	No			B	3,400		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof east wing hall - DePaul HS	RTU-4 Supply Fan	1	Supply Fan	20.00	91.0%	No			B	3,400		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof east wing hall - DePaul HS	RTU-8 Supply Fan	1	Supply Fan	1.50	84.0%	No			B	3,400		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof east wing hall - DePaul HS	RTU-8 Exhaust Fan	1	Exhaust Fan	0.50	65.0%	No			B	3,400		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof west hall - DePaul HS	RTU-9 Supply Fan	1	Supply Fan	1.00	82.5%	No			B	3,400		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof east wing hall - DePaul HS	RTU-10 Supply Fan	1	Supply Fan	1.00	82.5%	No			B	3,400		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof east wing hall - DePaul HS	RTU-11 Supply Fan	1	Supply Fan	1.00	82.5%	No			B	3,400		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - DePaul HS	RTU-12 Supply Fan	1	Supply Fan	1.00	82.5%	No			B	3,400		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof west hall - DePaul HS	RTU-5 Supply Fan	1	Supply Fan	10.00	89.5%	No			B	3,400		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof Gym - DePaul HS	RTU-6 Supply Fan	1	Supply Fan	10.00	89.5%	No			B	3,400		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof Gym - DePaul HS	RTU-7 Supply Fan	1	Supply Fan	10.00	89.5%	No			B	3,400		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Interior - Maintenance Garage	Garage Door Motor	3	Other	0.50	70.0%	No			W	5		No	70.0%	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
Roof - DePaul HS	RTU-12 - Hallways	1	Package Unit	5.00	80.00	12.00	0.8 AFUE	Trane		B	7	Yes	1	Package Unit	5.00	80.00	16.00	0.82 AFUE	0.6	550	3	$135	$13,000	$500	92.4
Roof - DePaul HS	Split-System Air-Source HP	3	Split-System Air-Source HP	1.50	18.00	10.30	7 HSPF	EMI	SCC18EF0000AA0B	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - DePaul HS	Condensing Unit	10	Split-System	2.50		10.00		Trane	2TTA0030A4000AA	B	7	Yes	10	Split-System	2.50		16.00		5.6	4,950	0	$972	$50,600	$2,600	49.4
Roof - DePaul HS	Condensing Unit	4	Split-System	3.00		10.00		Trane	2TTA0036A4000AA	B	7	Yes	4	Split-System	3.00		16.00		2.7	2,376	0	$466	$24,100	$1,300	48.9
Roof - DePaul HS	Condensing Unit	1	Split-System	3.50		10.00		Trane	2TTA0042A4000AA	B	7	Yes	1	Split-System	3.50		16.00		0.8	693	0	$136	$7,000	$400	48.5
Roof - DePaul HS	Split-System Air-Source HP	8	Split-System Air-Source HP	0.79	9.00	10.50	7.1 HSPF	EMI	SCC09EA0000AA0B	W		No							0.0	0	0	$0	$0	$0	0.0
Corridor 6 - DePaul HS	Electric Resistance Heat	2	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Corridor Kitchen - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Corridor Men's Locker - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical 5 - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical 5 - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Office - Coach - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Stairs 4 - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Stairs 5 - DePaul HS	Electric Resistance Heat	1	Electric Resistance Heat		5.11		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Stairs flarity 1 - DePaul HS	Electric Resistance Heat	3	Electric Resistance Heat		3.41		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Stairs flarity 2 - DePaul HS	Electric Resistance Heat	3	Electric Resistance Heat		3.41		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Roof Gym - DePaul HS	RTU-6	1	Package Unit	30.00		10.00		Trane	RAUCC304BX03000000000	B	7	Yes	1	Package Unit	30.00		12.50		3.6	3,168	0	$622	$38,300	$2,600	57.4
Exterior Roof Gym - DePaul HS	RTU-7	1	Package Unit	30.00		10.50		Trane	RAUCC304BX03000000001	B	7	Yes	1	Package Unit	30.00		12.50		2.7	2,414	0	$474	$38,300	$2,600	75.4
Roof east wing hall - DePaul HS	RTU-10 Chapel	1	Package Unit	3.00	80.00	10.50	0.8 AFUE	Trane		B	7	Yes	1	Package Unit	3.00	80.00	16.00	0.82 AFUE	0.6	519	3	$129	$9,700	$300	72.8
Roof east wing hall - DePaul HS	RTU-11 Link	1	Package Unit	3.00	80.00	10.50	0.8 AFUE	Trane		B	7	Yes	1	Package Unit	3.00	80.00	16.00	0.82 AFUE	0.6	519	3	$129	$9,700	$300	72.8

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof east wing hall - DePaul HS	RTU-4	1	Package Unit	30.00	320.00	10.00	0.8 AFUE	McQuay	RPS030CLA	B	7	Yes	1	Package Unit	30.00	320.00	12.50	0.82 Et	3.6	3,168	12	$731	$49,600	$2,600	64.3
Roof east wing hall - DePaul HS	RTU-8 Lobby	1	Package Unit	5.00	98.75	10.00	0.8 AFUE	Lennox	LGA060HH2Y	B	7	Yes	1	Package Unit	5.00	98.75	16.00	0.82 AFUE	1.1	990	4	$228	$13,000	$500	54.8
Roof west hall - DePaul HS	RTU-3	1	Package Unit	30.00	320.00	10.00	0.8 AFUE	McQuay	RPS030CLA	B	7	Yes	1	Package Unit	30.00	320.00	12.50	0.82 Et	3.6	3,168	12	$731	$49,600	$2,600	64.3
Roof west hall - DePaul HS	RTU-5	1	Package Unit	40.00		10.00		Trane	RAUCC404BX030 00000000	B	7	Yes	1	Package Unit	40.00		12.50		4.8	4,224	0	$829	$54,800	$3,400	62.0
Roof west hall - DePaul HS	RTU-9 Lobby	1	Package Unit	5.00	80.00	10.40	0.8 AFUE	Trane	YSC060A3RHA26 H200A	B	7	Yes	1	Package Unit	5.00	80.00	16.00	0.82 AFUE	1.0	888	3	$202	$13,000	$500	62.0
West Wing Roof - DePaul HS	RTU-1	1	Package Unit	30.00	320.00	10.00	0.8 AFUE	McQuay	RPS030CLA	B	7	Yes	1	Package Unit	30.00	320.00	12.50	0.82 Et	3.6	3,168	12	$731	$49,600	$2,600	64.3
West Wing Roof - DePaul HS	RTU-2	1	Package Unit	20.00	200.00	10.00	0.8 AFUE	McQuay	RPS020CSA	B	7	Yes	1	Package Unit	20.00	200.00	12.50	0.82 Et	2.4	2,112	7	$483	$28,700	$1,700	55.9
Office - Trainer - DePaul HS	Split-System Air-Source Heat Pump	1	Split-System Air-Source HP	1.25	18.00	22.00	12 HSPF	Mitsubishi	MUZ-FH15NA	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 212 - DePaul HS	Window Air Conditioner	1	Window AC	0.42		11.00		Midea	MAW05M1WBL	W		No							0.0	0	0	$0	$0	$0	0.0
Office - Gym - DePaul HS	Window Air Conditioner	1	Window AC	0.67		10.80		Electrolux	FAA087P7A2	W		No							0.0	0	0	$0	$0	$0	0.0
Office - Gym 2 - DePaul HS	Window Air Conditioner	1	Window AC	0.50		10.50				W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1 - Art Annex	Condensing Unit	1	Split-System	3.00		13.00		Armstrong Air	4SCU13LE136P-5	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical - Art Annex	Forced Hot Air Furnace	1	Forced Air Furnace		45.50		0.85 AFUE	Armstrong Air		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 Boiler - DePaul HS	Hydronic Boiler	1	Non-Condensing Hot Water Boiler	963	Smith Cast Boilers	19 Series - 10	B	8	Yes	1	Non-Condensing Hot Water Boiler	963	85.00%	Et	0.0	0	92	$861	$33,800	$1,700	37.3

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical 5 - DePaul HS	DHW Pipes	9	35	1.00	0.0	0	15	$144	$480	$70	2.9
Mechanical Boiler - DePaul HS	DHW Pipes	9	45	1.00	0.0	0	20	$185	$610	$90	2.8
Mechanical WW - DePaul HS	DHW Pipes	9	30	1.00	0.0	496	0	$97	$410	$60	3.6
Interior - Snack Stand	DHW Pipes	9	20	1.00	0.0	496	0	$97	$270	$40	2.4

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 5 - DePaul HS	Storage Water Heater	1	Storage Tank Water Heater (> 50 Gal)	RUUD	G100-200	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Boiler - DePaul HS	Storage Water Heater	1	Storage Tank Water Heater (≤ 50 Gal)	Rheem	PROG40-38N RH62	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical WW - DePaul HS	Storage Water Heater	1	Storage Tank Water Heater (≤ 50 Gal)	GE	PE50M09AAH	B		No						0.0	0	0	$0	$0	$0	0.0
Mechanical - Art Annex	Storage Water Heater	1	Storage Tank Water Heater (≤ 50 Gal)	GE	GE20P06SAG	W		No						0.0	0	0	$0	$0	$0	0.0
Interior - Snack Stand	Storage Water Heater	1	Storage Tank Water Heater (≤ 50 Gal)	A.O. Smith	E6-19C15SV	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommendation Inputs					Energy Impact & Financial Analysis						
Location	**ECM #**	**Device Quantity**	**Device Type**	**Existing Flow Rate (gpm)**	**Proposed Flow Rate (gpm)**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Restroom Style Faucets - DePaul HS	10	39	Faucet Aerator (Lavatory)	1.50	0.50	0.0	0	11	$102	$330	$160	1.7
Showerhead - DePaul HS	10	19	Showerhead	1.80	1.50	0.0	0	4	$42	$1,990	$290	40.7

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
Location	**Cooler/ Freezer Quantity**	**Case Type/Temperature**	**Manufacturer**	**Model**	**ECM #**	**Install EC Evaporator Fan Motors?**	**Install Electric Defrost Control?**	**Install Evaporator Fan Control?**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Kitchen 2 - DePaul HS	1	Cooler (35F to 55F)	Russell	AA18-66B-AE	11	No	Yes	Yes	0.0	462	0	$91	$2,700	$130	28.3
Kitchen 2 - DePaul HS	1	Medium Temp Freezer (0F to 30F)	Russell	AE26-92B-DE	11	No	Yes	Yes	0.0	1,786	0	$351	$2,700	$130	7.3

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen - DePaul HS	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Traulsen		No	12	Yes	0.1	935	0	$183	$2,700	$100	14.2
Kitchen - DePaul HS	2	Refrigerator Chest			No	12	Yes	0.2	2,018	0	$396	$5,000	$0	12.6
Kitchen - DePaul HS	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Universal Nolin	MC750-1	No	12	Yes	0.1	642	0	$126	$3,200	$100	24.6
Kitchen - DePaul HS	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Imbera	G319	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	Habco	ESM28HCTD	No	12	Yes	0.1	833	0	$164	$5,000	$100	30.0
Interior - Snack Stand	1	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	TRUE	GDM-35EM	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
Kitchen - DePaul HS	1	Ice Making Head (<450 lbs/day), Batch	Manitowoc	ID0302A-161	Yes		No	0.0	0	0	$0	$0	$0	0.0
Office - Trainer - DePaul HS	1	Ice Making Head (<450 lbs/day), Batch	Hoshizaki		Yes		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 - DePaul HS	1	Gas Fryer	Cook Rite		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Insulated Food Holding Cabinet (Full Size)	CresCor		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Southbend		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Gas Griddle (3 Feet Width)	Southbend		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	2	Gas Convection Oven (Full Size)	Garland		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Cold Drop Pan Food Well			Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Hot Drop Pan Food Well			Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen - DePaul HS	1	Food Storage Case			Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
DePaul High School	3	Coffee Machine	900	No		
DePaul High School	25	Desktop	150	No		
DePaul High School	1	Food Heat Lamp	250	No		
DePaul High School	525	Laptop	45	No		
DePaul High School	13	Microwave	1,000	No		
DePaul High School	2	Networking Switches	250	No		
DePaul High School	1	Paper Shredder	150	No		
DePaul High School	1	Phone Networking	125	No		
DePaul High School	5	Printer (Medium/Small)	300	No		
DePaul High School	9	Printer/Copier (Large)	600	No		
DePaul High School	38	Projector	150	No		
DePaul High School	11	Refrigerator (Mini)	226	No		
DePaul High School	6	Refrigerator (Residential)	320	No		
DePaul High School	1	Server	800	No		
DePaul High School	1	Stand Mixer	500	No		
DePaul High School	42	Television	70	No		
DePaul High School	1	Toaster	1,000	No		
DePaul High School	1	Toaster Oven	1,500	No		
DePaul High School	5	Treadmill	600	No		
DePaul High School	5	Water Cooler	500	No		
DePaul High School	14	Water Fountain	350	No		
Interior Classroom - Art Annex	1	Microwave	1,000	No		
Interior Classroom - Art Annex	1	Projector	150	No		
Interior Classroom - Art Annex	1	Refrigerator (Residential)	320	No		
Interior - Snack Stand	2	Coffee Machine	900	No		
Interior - Snack Stand	2	Microwave	1,000	No		
Interior - Snack Stand	2	Food Heat Lamp	250	No		

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Dining Area Main - DePaul HS	2	Non-Refrigerated	13	Yes	0.1	685	0	$134	$540	$0	4.0
Dining Area Main - DePaul HS	3	Refrigerated	13	Yes	0.6	4,836	0	$949	$800	$150	0.7
Dining Area Staff - DePaul HS	1	Refrigerated	13	Yes	0.2	1,612	0	$316	$270	$50	0.7

Custom (High Level) Measure Analysis

Electric Tank Water Heater to HPWH

NOTE: HPWH calculation should not be used for existing water heaters with a storage capacity greater than 120 gal or less than 30 gal.

Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	SF of Area Served	Fuel Type	Input Capacity per Unit (kW)	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)	Mechanical WW - DePaul HS	1,800	Electric	4.5	50	Heat Pump Water Heater	2.5	50	$2,383.17	0.00	2,216	0	$435	$2,900	$0	$0	$0	$2,900	6.67	6.67
			Electric																	
			Electric																	

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]

DePaul Catholic High School (campus)

Primary Property Type: K-12 School
Gross Floor Area (ft²): 74,751
Built: 1956

For Year Ending: January 31, 2024
Date Generated: August 12, 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
DePaul Catholic High School (campus) 1512 Alps Rd Wayne, New Jersey 07470	DePaul Catholic HS 1512 Alps Road Wayne, NJ 07470 908-694-3702 x 228	Chris Iannarone 1512 Alps Road Wayne, NJ 07470 973-694-3702 ex. 228 amuench@trccompanies.com

Property ID: 34311794

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
97 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	4,500,777 (62%)	
Electric - Grid (kBtu)	2,752,062 (38%)	

Source EUI
166.3 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	78.6
National Median Source EUI (kBtu/ft²)	134.7
% Diff from National Median Source EUI	23%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	486

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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Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR Portfolio Manager.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC (II)	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
T5, T8, T12	A reference to a linear lamp diameter. The number represents increments of 1/8th 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.