Local Government Energy Audit Report

Community Center and Splash Pad

August 10, 2023

Prepared for:

Piscataway Township

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Disclaimer

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

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

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

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

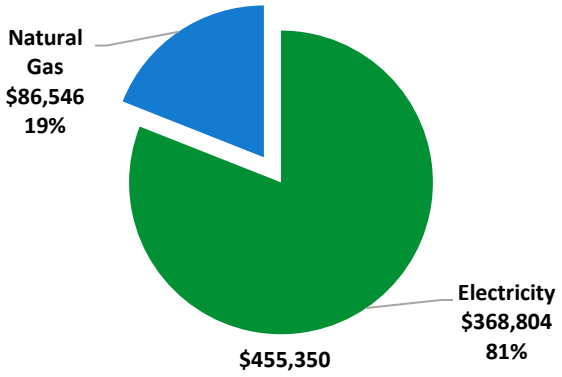
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $455,350 Electricity: 2,594,983 kWh Natural Gas: 92,568 Therms	
ENERGY STAR® Benchmarking Score	N/A *(1-100 scale)*	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.

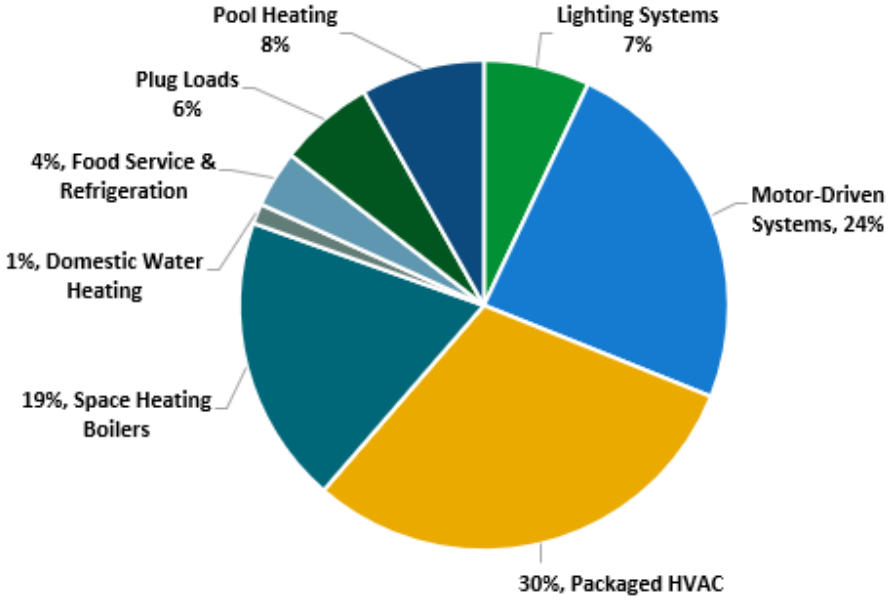


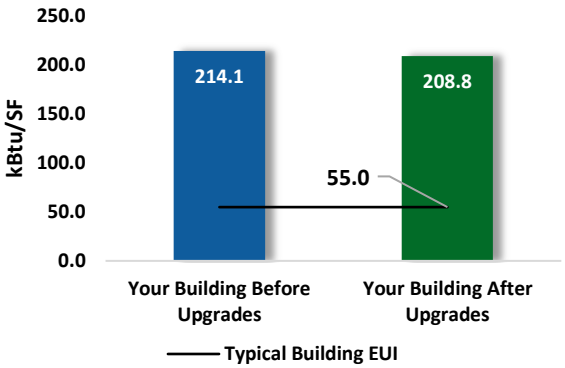
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

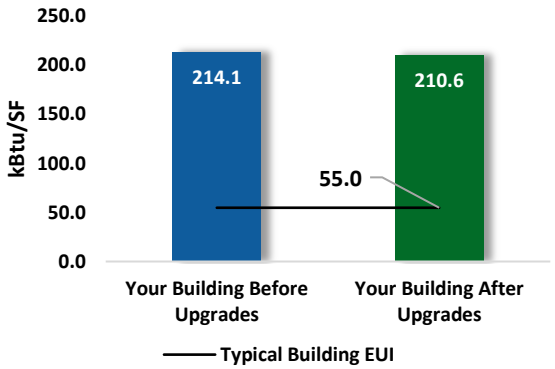
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$37,918
Potential Rebates & Incentives[1]	$5,385
Annual Cost Savings	$11,792
Annual Energy Savings	Electricity: 68,818 kWh Natural Gas: 2,151 Therms
Greenhouse Gas Emission Savings	47 Tons
Simple Payback	2.8 Years
Site Energy Savings (All Utilities)	2%



Scenario 2: Cost Effective Package[2]

Installation Cost	$33,969
Potential Rebates & Incentives	$5,385
Annual Cost Savings	$12,707
Annual Energy Savings	Electricity: 90,389 kWh Natural Gas: -149 Therms
Greenhouse Gas Emission Savings	45 Tons
Simple Payback	2.2 Years
Site Energy Savings (all utilities)	2%



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			**467**	**0.1**	**0**	**$65**	**$138**	**$8**	**$130**	**2.0**	**458**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	467	0.1	0	$65	$138	$8	$130	2.0	458
Lighting Control Measures			**75,889**	**10.6**	**-16**	**$10,634**	**$20,221**	**$3,965**	**$16,256**	**1.5**	**74,528**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	72,556	10.1	-15	$10,167	$17,746	$2,355	$15,391	1.5	71,254
ECM 3	Install High/Low Lighting Controls	Yes	3,333	0.5	-1	$467	$2,475	$1,610	$865	1.9	3,273
Variable Frequency Drive (VFD) Measures			**14,033**	**1.5**	**0**	**$1,994**	**$13,567**	**$1,400**	**$12,167**	**6.1**	**14,131**
ECM 4	Install VFDs on Water Supply Pump	Yes	11,528	1.4	0	$1,638	$8,846	$1,200	$7,646	4.7	11,609
ECM 5	Install VFDs on Process/Pool Filtration Pumps	Yes	2,505	0.0	0	$356	$4,721	$200	$4,521	12.7	2,523
Domestic Water Heating Upgrade			**0**	**0.0**	**1**	**$13**	**$43**	**$12**	**$31**	**2.4**	**163**
ECM 6	Install Low-Flow DHW Devices	Yes	0	0.0	1	$13	$43	$12	$31	2.4	163
Custom Measures			**-21,571**	**0.0**	**230**	**-$915**	**$3,950**	**$0**	**$3,950**	**-4.3**	**5,208**
ECM 7	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-21,571	0.0	230	-$915	$3,950	$0	$3,950	-4.3	5,208
TOTALS (ALL MEASURES)			**68,818**	**12.1**	**215**	**$11,792**	**$37,918**	**$5,385**	**$32,533**	**2.8**	**94,489**

* - 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 4.5.

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

For facilities wishing to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the Prescriptive and Custom Rebates program. To participate, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval may be required for some incentives. Contact your utility company for more details prior to project installation.

Direct Install

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

Engineered Solutions

The Engineered Solutions program provides tailored energy-efficiency assistance and turnkey engineering services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. The program provides all professional services from audit, design, construction administration, to commissioning and measurement and verification for custom whole-building energy-efficiency projects. Engineered Solutions allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs.

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

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

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

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Community Center and Splash Pad. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

2.1 Site Overview

On March 23, 2023, TRC performed an energy audit at Community Center and Splash Pad located in Piscataway Township, New Jersey. TRC met with Jim Ferratti to review the facility operations and help focus our investigation on specific energy-using systems.

Community Center and Splash Pad is a two-story, 84,600 square foot complex built in 2020. Spaces include offices, multipurpose rooms, locker rooms, restrooms, child watch center, teen center, fitness gym, gymnasium, indoor pool area, indoor track area, reception area, outdoor "splash" fountain, and electrical and mechanical spaces. The Community Center is 100% heated and cooled by two heating hot water boilers, seven roof top units (RTUs), two air handling units (AHUs), and smaller supplemental systems. Pools are heated by dedicated gas-fired pool heaters.

Aerial View of Facilities

Recent Improvements and Facility Concerns

There have been no recent facility improvements at neither the Community Center nor the Splash Pad. Facility staff are concerned with failing light fixtures located in the indoor pool area.

2.2 Building Occupancy

The Community Center is occupied year-round, Monday through Sunday with extended business hours. Janitorial services are performed during operational hours. An average of 126 staff works at the Senior Center with a varying visitor population estimated to be between 100 and 800 patrons.

The Splash Pad operates from May to September from 12:00 PM to 6:00 PM.

Building Name	Weekday/Weekend	Operating Schedule
Community Center Operation	Weekday	5:30 AM - 10:00 PM
	Weekend	7:00 AM - 4:00 PM
Splash Pad Operation	Weekday	12:00 PM - 6:00 PM
	Weekend	12:00 PM - 6:00 PM

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Community Center is comprised of concrete masonry units (CMUs) with a terracotta tile façade at the first-floor level. Paneling covers the upper portions of the center. Two different roof systems are present: a pitched standing seam metal roof and a flat white membrane roof. The metal roof covers half of the facility. The membrane roof houses all the RTUs, AHUs, heat pumps, and exhaust fans. The building envelope and both roof sections are in good condition.

Facility windows are non-operable, double-paned glass windows with aluminum frames. All windows are in good condition. Exterior doors consist of a mix of solid metal and aluminum framed glass units; both types are in good condition.

Exterior Walls

Upper Floor Panel Façade

Terracotta Tiling System

Standing Seam Metal Roof

White Membrane Roof

Facility Windows

Glass Doors and Facility Windows

Metal Doors

The Splash Pad building is comprised of concrete masonry units (CMUs). A pitched standing seam metal roof covers the building. The building envelope and the roof are good condition.

Facility windows are non-operable, double-paned glass privacy windows with aluminum frames. All windows are in good condition. Exterior doors consist of solid metal units and a motorized overhead door. Both door types are in good condition.

Exterior Walls

Standing Seam Metal Roof

Facility Windows

Solid Metal Door

Motorized Overhead Door

2.4 Lighting Systems

The primary lighting system for Community Center consists of LED lighting. Common indoor lighting includes ambient 2-foot x 2-foot LED, downlight recessed, linear strip, and high bay fixtures. Emergency exit signs are up to date with LED technology. Other lighting technology includes T8 equivalent LED linear tubes, downlight pendant, and decorative pendant fixtures. A few CFLs are present.

LED high bay fixtures illuminate the gymnasium and indoor pool area. The gymnasium lights are in good condition; however, the pool area lights are in poor condition. At the time of the audit, many of the pool area lights were failing. According to facility staff, the LED heatsinks were poorly implemented which have led to the lights overheating and failing.

Manual wall switches control most of the indoor lighting except for locker rooms, some storage areas, and corridors which use wall and ceiling mounted occupancy sensors. Overall, the current lighting system is in good condition with adequate light levels.

Exterior lighting is provided by LED wall packs, LED downlight recessed fixtures, and various LED screw-in lamps. Single and double cobra head pole lights illuminate the parking lot. A photocell controls the lights, and the fixtures are in good condition.

Decorative Pendant

Ambient 2x2 LED Fixture

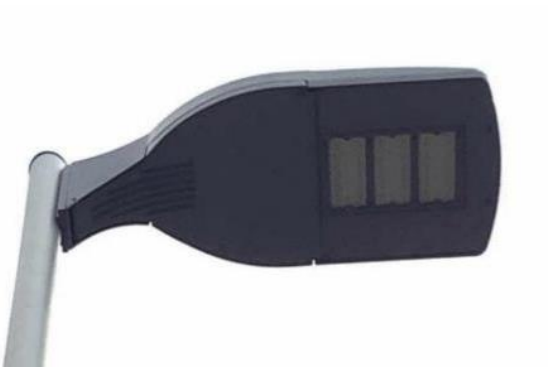
LED Exit Sign

Wall Mounted Occupancy Sensor

Pool Area High Bay Fixture

Gymnasium High Bay Fixture

Exterior LED Wall Packs



LED Cobra Head

The Splash Pad's lighting system consists of LED lighting. T8 equivalent LED linear tubes provide all indoor lighting. Fixtures use a single lamp each.

Manual wall switches control all the indoor lighting. Overall, the current lighting system is in good condition with adequate light levels.

Exterior lighting is provided by pole mounted LED lamps and LED downlight recessed fixtures. A photocell controls the lights, and the fixtures are in good condition.

Indoor T8 Equivalent LED Linear Tube

LED Pole Mounted Light

Photocell

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

The Community Center uses five air source heat pumps. The units can provide 1 ton of cooling and 14.4 MBh of heating. The units have an energy efficiency ratio (EER) of 13 and a heating seasonal performance factor (HSPF) of 12.5. The units are in good condition.

Air Source Heat Pump

Unitary Heating Equipment

The Community Center mechanical rooms are heated by electric resistance unit heaters. The heaters provide an estimated 34 MBh (10 kW) of heating and are in good condition. A dial thermostat controls the equipment.

Electric Resistance Heater

Dial Thermostat

The Splash Pad storage room and mechanical room are heated by electric resistance unit heaters. The heaters provide an estimated 25 MBh (7 kW) of heating and are in good condition. A dial thermostat controls the equipment.

Electric Resistance Heater

Packaged Units

Seven RTUs located on the roof condition various spaces throughout the Community Center. Every unit is equipped with direct expansion (DX) coils, gas-fired heating, enthalpy wheel, and supply and return fans. Variable frequency drives (VFDs) are installed in every system. Cooling capacities range from 10 tons to 70 tons of cooling and from 120 MBh to 864 MBh of heating. A BAS controls the units, and they are operating within their rated life. The RTUs are in good condition.

A single make up air unit (MUA) serves the Community Center and provides 240 MBh of heating. The unit does not provide cooling. A 2 hp supply motor equipped with a VFD drives the unit. The equipment is operating within its useful life, is in good condition, and is controlled by a BAS.

Unit	Area Served	DX Cooling Coil	Hot Water Coil	Gas Heating	Supply Fan (hp)	Return/Exhaust Fan (hp)	Variable Frequency Drive
RTU - 1	First Floor	Yes	No	Yes	15.0	15.0	Yes
RTU - 2	Fitness Center	Yes	No	Yes	7.5	3.0	Yes
RTU - 3	Locker Room	Yes	No	Yes	7.5	5.0	Yes
RTU - 4	Gym & Track	Yes	No	Yes	10.0	5.0	Yes
RTU - 5	Gym & Track	Yes	No	Yes	10.0	5.0	Yes
RTU - 6	Fitness Rooms & Office	Yes	No	Yes	3.0	2.0	Yes
RTU - 7	Kitchen	Yes	No	Yes	3.0	3.0	Yes
MUA - 1	Community Center	No	No	Yes	2.0	N/A	Yes

Refer to Appendix A for detailed information about each unit.

RTU - 5

VFD

Enthalpy Wheel

Air Handling Units (AHUs)

Two AHUs located on the roof provide dehumidification for the Community Center's indoor pool. Every unit is equipped with a condenser and direct expansion (DX) coils, heating hot water (HHW) coils, and supply and return fans. The supply and return fans for AHU-1 and AHU-2 were not accessible during the audit and have been confirmed using name plate data. It is unknown if the motors are equipped with VFDs. Both units provide 128 tons of cooling and 900 MBh of heating. A building automation system (BAS) controls the units, which are operating within their rated life. The AHUs are in good condition.

Unit	Area Served	DX Cooling Coil	Hot Water Coil	Gas Heating	Supply Fan (hp)	Return/Exhaust Fan (hp)	Variable Frequency Drive
AHU-1	Indoor Pool	Yes	Yes	No	25.0 (2x)	5.0 (2x)	UNK
AHU-2	Indoor Pool	Yes	Yes	No	25.0 (2x)	5.0 (2x)	UNK

AHU

Condenser

2.6 Heating Hot Water Systems

Two, 1880 MBh Aerco BMK 2000 condensing hot water boilers serve the Community Center. The boilers run on a lead-lag scheme at a nominal efficiency of 94%. The units are new and in good condition.

Two, 10 hp heating hot water (HHW) pumps located in the mechanical room distribute hot water to AHUs and RTUs. VFDs control the pumps. All pumps appear in good condition.

The BAS controls the boilers; at the time of the audit boilers one and two were set to a supply water temperature setpoint of 165°F and 76°F, respectively.

Overall, the system is in good condition, pipes are well insulated, and equipment is operating within its rated useful life.

HHW Boiler

Pipe Insulation

HHW Supply Pumps

HHW Supply Pump VFDs

2.7 Building Automation System (BAS)

A HCT BAS system with Honeywell hardware controls the HVAC equipment, boilers, heat pumps, RTUs, and AHUs. The system provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity levels, VFD and motor status, and water loop temperatures. At the time of the audit the BAS was not accessible.

2.8 Domestic Hot Water

Four Bradford White 100-gallon, natural gas water heaters serve the domestic hot water (DHW) demand of the Community Center. The tanks are 80% efficient.

A fractional horsepower DHW return circulation pump operates continuously for all four boilers. At the time of the audit, the DHW tanks were set to supply water at 140°F. The heaters are in good condition and operating within their useful life. The water supply pipes are insulated.

DHW Tanks

2.9 Food Service Equipment

The kitchen uses gas equipment to prepare food for visitors. Most cooking is done using a gas griddle and two gas large vat fryers. A gas convection oven is also used to prepare food. These units are standard efficiency and are in good condition.

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

Gas Fryer

Gas Griddle

2.10 Refrigeration

The kitchen uses several stand-up refrigerators and freezers with solid metal and glass doors along with freezer chests. The stand-up refrigerators are standard efficiency and are in good condition.

An ice machine located in the kitchen can produce an estimated 350 pounds of ice per day and is not ENERGY STAR labeled. Overall, the ice machine is in good condition.

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

Solid Door Refrigerator

Ice Machine

2.11 Plug Load and Vending Machines

Plug loads at the Community Center include office, exercise, and pool equipment. Typical office loads include computers, server room, printers, coffee machines, microwaves, and televisions. There are 17 desktops throughout the building. Exercise equipment includes body ergometers and Stair Masters. Miscellaneous minor pool equipment accounted for in this load includes chemistry controllers, chlorine feeder systems, and ultraviolet light systems.

There is one full-size residential-style refrigerator, and two mini refrigerators present at the Community Center. Equipment condition and efficiencies vary.

Stair Master

UV Water Treatment System

The Splash Park plug loads include a chemistry controller as well as solenoids to control the interactable water features.

Splash Park Solenoid System

2.12 Water-Using Systems

There are numerous restrooms and locker rooms with toilets, urinals, sinks, and showers at the Community center. Faucet flow rates are 2.0 gallons (gpm) or lower. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf.

Locker rooms are frequently used, and the showerheads are rated at 2.5 gpm.

Restroom Faucet

Kitchen Faucet

There are two restrooms with toilets, urinals, and sinks, at the Splash Pad. Faucet flow rates are 2.0 gpm or lower. Toilets are rated at 2.5 gpf and urinals are rated at 2.5 gpf.

Restroom Faucet

2.13 Pool Equipment

The Community Center features three indoor pools: the competition pool, exercise pool, and activity pool. These pools vary in size and capacity.

Pool Name	Dimensions (Decimal Feet)	Approximate Gallons
Competition Pool	Length: 75 Width: 59 Shallow Depth: 3.5 Deep Depth: 9.5	220,000
Exercise Pool	Length: 60 Width: 21 Shallow Depth: 3.5 Deep Depth: 5	41,000
Activity Pool	Length: 59.5 Width: 30.5 Shallow Depth: 0 Deep Depth: 3	16,500

Three Lochinvar natural gas heaters warm the indoor pools. The units each have an input capacity of 650 MBh and a thermal efficiency rating of 85%. All three pools have a temperature set point of 78°F. When the temperature drops two degrees below the set point, the pool heaters turn on.

Each pool uses a Neptune Benson Defender filtration system. A panel located on each unit allows for equipment scheduling and control. An air compressor which runs approximately four hours a day controls the pool filters' pneumatic valves. The filters are served by three pool filtration pumps which vary from 7.5 hp to 15 hp and are all controlled by VFDs. Numerous chlorine pumps run continuously to ensure that the pool chemical balance remains within acceptable levels. Multiple UV light sanitation systems are also present in the pool mechanical room and are accounted for in Section 2.11 Plug Loads.

Operations for the Splash Pad water features are housed in the Splash Pad mechanical room and include a water supply and filtration pumps, both of which operate seasonally.

Pool Mechanical Room

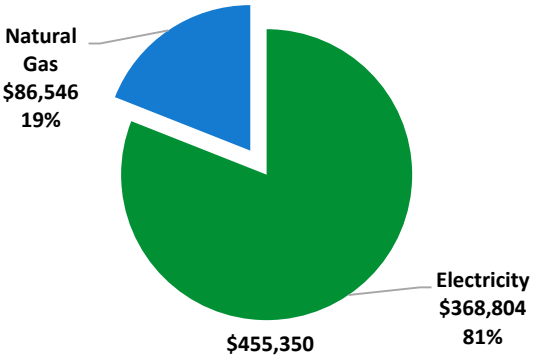
Pool Filter

Filter Pump

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	2,594,983 kWh	$368,804
Natural Gas	92,568 Therms	$86,546
Total		**$455,350**



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

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

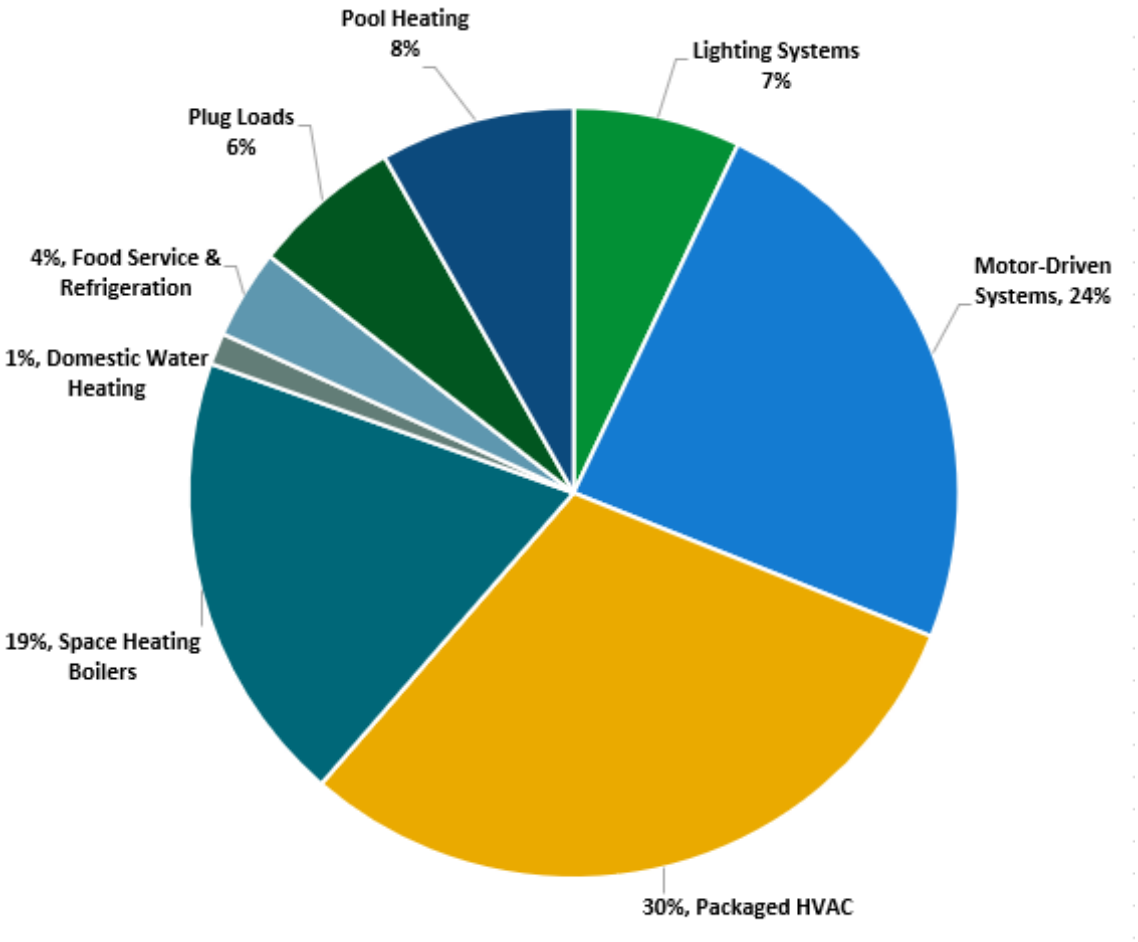
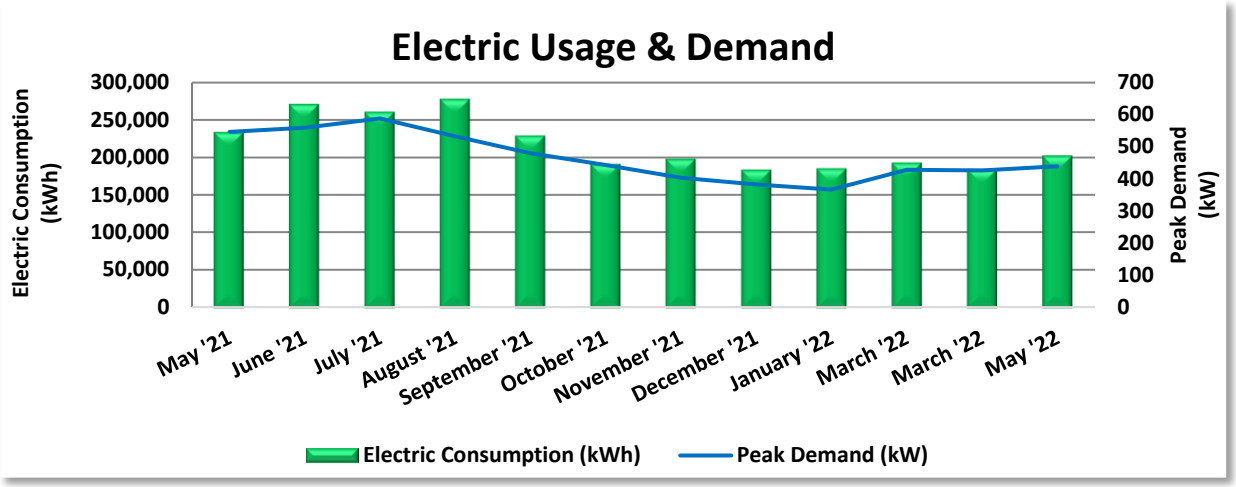


Figure 4 - Energy Balance

3.1 Electricity

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



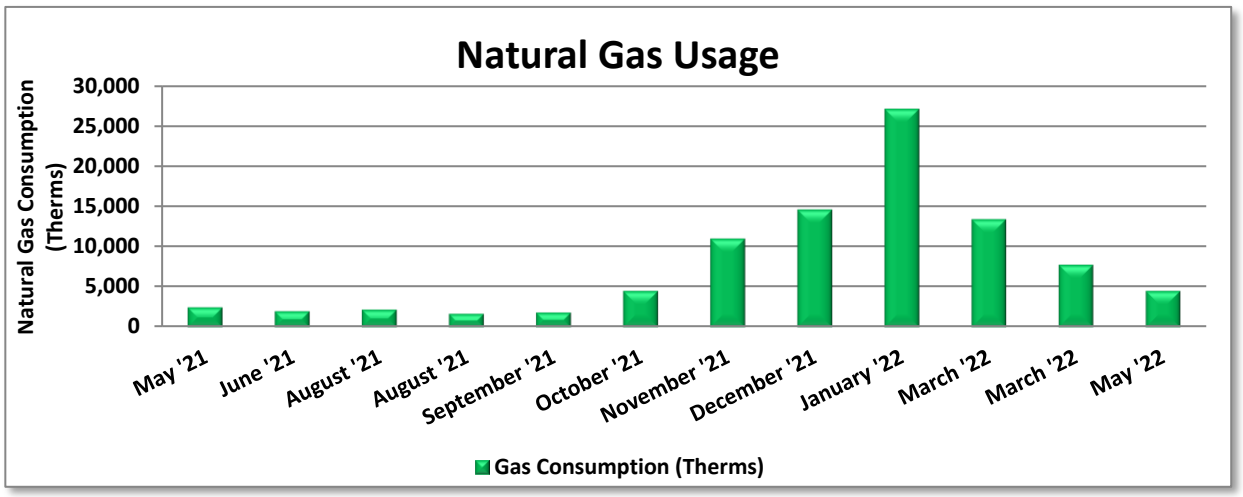
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/15/21	32	233,322	546	$6,984	$30,087
7/15/21	30	270,454	559	$7,151	$32,528
8/15/21	31	260,214	588	$7,222	$41,820
9/14/21	30	277,342	532	$6,809	$43,609
10/13/21	29	228,857	480	$1,815	$32,303
11/11/21	29	191,271	443	$1,678	$27,327
12/14/21	33	198,168	403	$1,527	$28,087
1/14/22	31	183,855	382	$1,446	$26,115
2/14/22	31	185,443	366	$1,386	$26,262
3/16/22	30	193,128	428	$1,620	$27,508
4/13/22	28	184,682	426	$1,614	$26,386
5/16/22	33	202,466	439	$1,665	$28,793
Totals	**367**	**2,609,202**	**588**	**$40,917**	**$370,824**
Annual	**365**	**2,594,983**	**588**	**$40,694**	**$368,804**

Notes:

- Peak demand of 588 kW occurred in July '21.
- Average demand over the past 12 months was 466 kW.
- The average electric cost over the past 12 months was $0.142/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.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/15/21	32	2,471	$1,678
7/15/21	30	2,004	$1,463
8/17/21	33	2,204	$1,715
9/14/21	28	1,688	$1,422
10/13/21	29	1,853	$2,006
11/13/21	31	4,522	$4,674
12/14/21	31	11,010	$11,380
1/14/22	31	14,604	$13,374
2/14/22	31	27,060	$27,646
3/16/22	30	13,387	$14,872
4/13/22	28	7,771	$1,924
5/16/22	33	4,502	$4,866
Totals	**367**	**93,075**	**$87,020**
Annual	**365**	**92,568**	**$86,546**

Notes:

- The average gas cost for the past 12 months is $0.935/therm, which is the blended rate used throughout the analysis.
- Natural gas consumption in February is unusually high for the building's average consumption in the heating months. This could potentially be caused by an unoptimized BAS. Section 4.6, Measures for Future Consideration, expands on possible next steps such as a retro commissioning study which can re-optimize a building's BAS and help avoid excessive gas consumption.

3.3 Benchmarking

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

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

Benchmarking Score	**N/A**

Due to its unique characteristics, this building type is not able to receive a benchmarking score. This report contains suggestions about how to improve building performance and reduce energy costs.

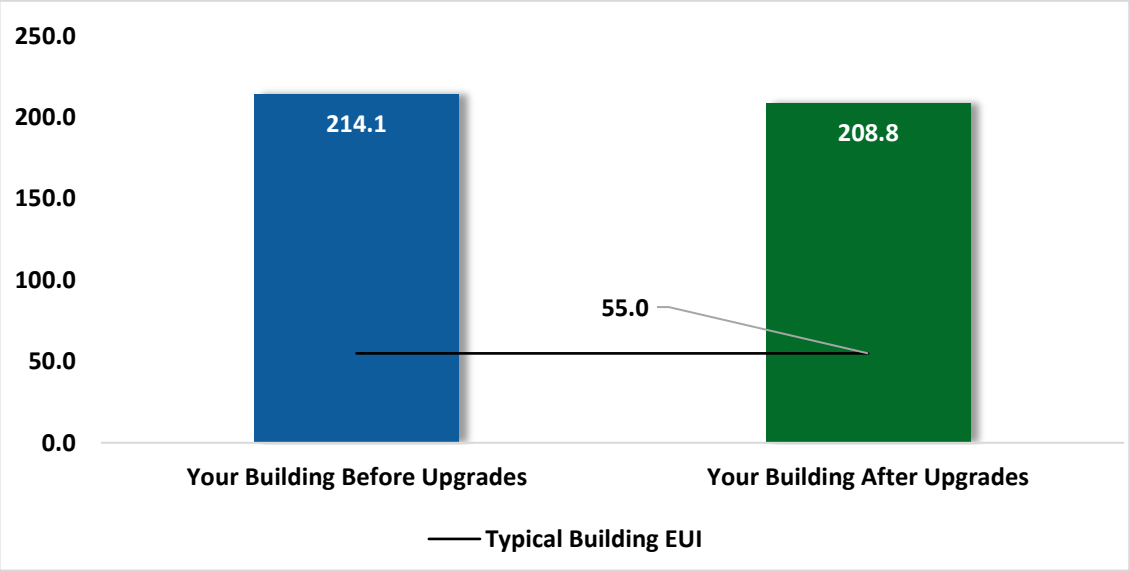


Figure 5 - Energy Use Intensity Comparison[3]

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**467**	**0.1**	**0**	**$65**	**$138**	**$8**	**$130**	**2.0**	**458**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	467	0.1	0	$65	$138	$8	$130	2.0	458
Lighting Control Measures			**75,889**	**10.6**	**-16**	**$10,634**	**$20,221**	**$3,965**	**$16,256**	**1.5**	**74,528**
ECM 2	Install Occupancy Sensor Lighting Controls	Yes	72,556	10.1	-15	$10,167	$17,746	$2,355	$15,391	1.5	71,254
ECM 3	Install High/Low Lighting Controls	Yes	3,333	0.5	-1	$467	$2,475	$1,610	$865	1.9	3,273
Variable Frequency Drive (VFD) Measures			**14,033**	**1.5**	**0**	**$1,994**	**$13,567**	**$1,400**	**$12,167**	**6.1**	**14,131**
ECM 4	Install VFDs on Water Supply Pump	Yes	11,528	1.4	0	$1,638	$8,846	$1,200	$7,646	4.7	11,609
ECM 5	Install VFDs on Process/Pool Filtration Pumps	Yes	2,505	0.0	0	$356	$4,721	$200	$4,521	12.7	2,523
Domestic Water Heating Upgrade			**0**	**0.0**	**1**	**$13**	**$43**	**$12**	**$31**	**2.4**	**163**
ECM 6	Install Low-Flow DHW Devices	Yes	0	0.0	1	$13	$43	$12	$31	2.4	163
Custom Measures			**-21,571**	**0.0**	**230**	**-$915**	**$3,950**	**$0**	**$3,950**	**-4.3**	**5,208**
ECM 7	Replace Gas Fired Water Heater with Heat Pump Water Heater	No	-21,571	0.0	230	-$915	$3,950	$0	$3,950	-4.3	5,208
TOTALS			**68,818**	**12.1**	**215**	**$11,792**	**$37,918**	**$5,385**	**$32,533**	**2.8**	**94,489**

* - 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 4.5.

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**467**	**0.1**	**0**	**$65**	**$138**	**$8**	**$130**	**2.0**	**458**
ECM 1	Retrofit Fixtures with LED Lamps	467	0.1	0	$65	$138	$8	$130	2.0	458
Lighting Control Measures		**75,889**	**10.6**	**-16**	**$10,634**	**$20,221**	**$3,965**	**$16,256**	**1.5**	**74,528**
ECM 2	Install Occupancy Sensor Lighting Controls	72,556	10.1	-15	$10,167	$17,746	$2,355	$15,391	1.5	71,254
ECM 3	Install High/Low Lighting Controls	3,333	0.5	-1	$467	$2,475	$1,610	$865	1.9	3,273
Variable Frequency Drive (VFD) Measures		**14,033**	**1.5**	**0**	**$1,994**	**$13,567**	**$1,400**	**$12,167**	**6.1**	**14,131**
ECM 4	Install VFDs on Water Supply Pump	11,528	1.4	0	$1,638	$8,846	$1,200	$7,646	4.7	11,609
ECM 5	Install VFDs on Process/Pool Filtration Pumps	2,505	0.0	0	$356	$4,721	$200	$4,521	12.7	2,523
Domestic Water Heating Upgrade		**0**	**0.0**	**1**	**$13**	**$43**	**$12**	**$31**	**2.4**	**163**
ECM 6	Install Low-Flow DHW Devices	0	0.0	1	$13	$43	$12	$31	2.4	163
TOTALS		**90,389**	**12.1**	**-15**	**$12,707**	**$33,969**	**$5,385**	**$28,584**	**2.2**	**89,281**

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

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

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**467**	**0.1**	**0**	**$65**	**$138**	**$8**	**$130**	**2.0**	**458**
ECM 1	Retrofit Fixtures with LED Lamps	467	0.1	0	$65	$138	$8	$130	2.0	458

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

ECM 1: Retrofit Fixtures with LED Lamps

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

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

Note that replacement of LED pool lamps or fixtures is not likely to result in a payback based on energy savings because LED lamps are an efficient light source. Replacement of failed fixtures is good practice and may result in maintenance savings, will improve visibility, and can have a positive impact on safety.

Affected Building Areas: CFLs in the café kitchen.

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		**75,889**	**10.6**	**-16**	**$10,634**	**$20,221**	**$3,965**	**$16,256**	**1.5**	**74,528**
ECM 2	Install Occupancy Sensor Lighting Controls	72,556	10.1	-15	$10,167	$17,746	$2,355	$15,391	1.5	71,254
ECM 3	Install High/Low Lighting Controls	3,333	0.5	-1	$467	$2,475	$1,610	$865	1.9	3,273

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

ECM 2: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: basketball court, break room, café area, child watch, emergency exit, files room, fitness area, IT room, laundry room, locker rooms, multipurpose room, offices, reception area, reception center area, restrooms, studio 1, studio 2, studio 3A, studio 3B, swimming pool, teen center, ticket area, and upstairs track.

ECM 3: 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: gym corridor, pool corridor, fitness gym side corridor, studio corridor, and track staircase.

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		**14,033**	**1.5**	**0**	**$1,994**	**$13,567**	**$1,400**	**$12,167**	**6.1**	**14,131**
ECM 4	Install VFDs on Water Supply Pump	11,528	1.4	0	$1,638	$8,846	$1,200	$7,646	4.7	11,609
ECM 5	Install VFDs on Process/Pool Filtration Pumps	2,505	0.0	0	$356	$4,721	$200	$4,521	12.7	2,523

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 4: Install VFDs on Water Supply Pump

Install VFDs to control water supply pumps. Since water supply systems become an open system whenever and end-use valve or fixture is opened, the VFD will need to be controlled to maintain sufficient pressure in the distribution system to deliver water to the furthest point in the system.

Energy savings result from reducing the pump speed during low demand periods. Ensure that your control system includes the sensors and inputs required to optimize water flow in your water supply.

ECM 5: Install VFDs on Process/Pool Filtration Pumps

Install a VFD to control the Splash Pad pool filtration pump. Regulations require that pool water be circulated through filtering systems so that that pool water is regularly replaced by filtered water, measured by turnover. The turnover rate of a swimming pool is the amount of time it takes for the pumping and filtration systems to cycle all of the water in the pool one time, meaning all of the water in the pool has been filtered and cleaned. In cases where the turnover is higher than required by state laws or local ordinance, variable speed drives can often be used to control the speed of the circulation pumps, saving energy. In some jurisdictions, the turnover rate can be reduced when the pool is not occupied for a significant period of time.

A pool expert can measure the turnover and evaluate whether the filtration system can accommodate reduced flow. Typically, a simple timeclock and VFD can be used to operate the pool filter pump at low speed when the pool is not in use for an extended period and then return the filter pump to full speed while the pool is in use. Energy savings accrue from the hours the pump can be operated at reduced speed.

4.4 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**1**	**$13**	**$43**	**$12**	**$31**	**2.4**	**163**
ECM 6	Install Low-Flow DHW Devices	0	0.0	1	$13	$43	$12	$31	2.4	163

ECM 6: Install Low-Flow DHW Devices

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

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

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

Additional cost savings may result from reduced water usage.

4.5 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**-21,571**	**0.0**	**230**	**-$915**	**$3,950**	**$0**	**$3,950**	**-4.3**	**5,208**
ECM 7	Replace Gas Fired Water Heater with Heat Pump Water Heater	-21,571	0.0	230	-$915	$3,950	$0	$3,950	-4.3	5,208

ECM 7: Replace Gas Fired Water Heater with Heat Pump Water Heater

We evaluated replacing the gas fired water heaters with a heat pump water heater. A gas fired water heater uses a burner to heat water. Air source heat pump water heaters (HPWH) 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.*[4]

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation[5]. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room. The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

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

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank in order 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.

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

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

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[6] 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.

4.6 Measures for Future Consideration

There are additional opportunities for improvement that Piscataway Township 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.

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

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

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

Retro-Commissioning Study

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

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

[6] 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.

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.

Pool Heating System Upgrades

The facility includes a pool for which several energy savings options could be further investigated. In general, there are a few options to improve the pool water heating system. These measures are beyond the scope of this LGEA report, and it is recommended that a contractor who specializes in pool water heating systems be consulted.

Consider the installation of a solar pool hot water system to supplement or supplant existing heating. Solar hot water heating systems are used to preheat pool water using solar panels and heat exchangers. Because the water is pre-heated, less heating energy is required by fossil fuel sources to bring pool water up to the required temperatures.

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[7]. 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.

[7] 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.

Economizer Maintenance

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

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

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

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

Boiler Maintenance

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

Furnace Maintenance

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

Label HVAC Equipment

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

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

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.

Compressed Air System Maintenance

Compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan for compressed air systems should include:

- Inspection, cleaning, and replacement of inlet filter cartridges.
- Cleaning of drain traps.
- Daily inspection of lubricant levels to reduce unwanted friction.
- Inspection of belt condition and tension.
- Check for leaks and adjust loose connections.
- Overall system cleaning.
- Reduce pressure setting to minimum needed for air operated equipment.
- Turn off compressor if not routinely needed.
- Use low pressure blower air rather than high pressure compressed air.

Contact a qualified technician for help with setting up periodic maintenance schedule.

Refrigeration Equipment Maintenance

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

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

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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense website[8] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[9] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

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

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

Procurement Strategies

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

6 On-site Generation

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

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

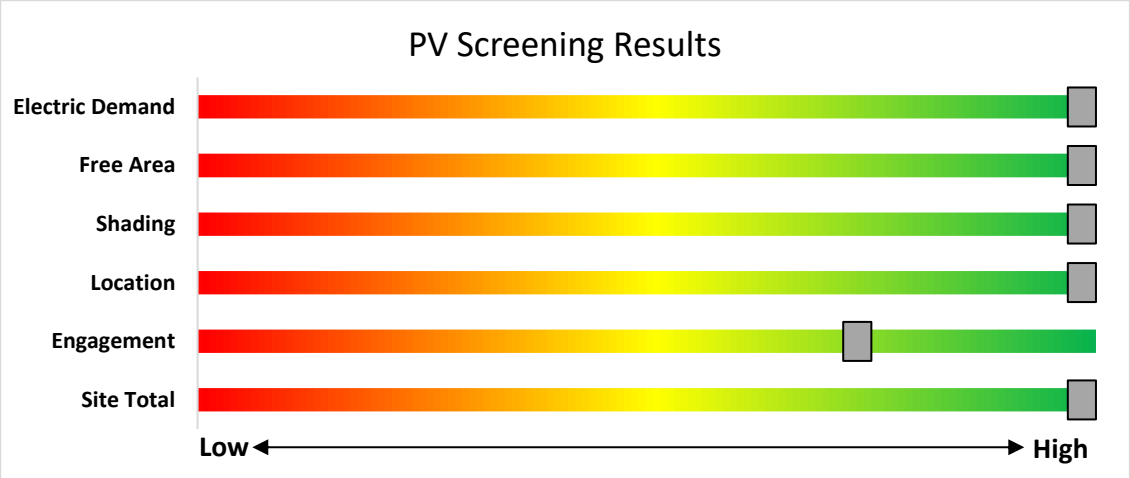
6.1 Solar Photovoltaic

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

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

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

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



Potential	High	
System Potential	466	kW DC STC
Electric Generation	555,178	kWh/yr
Displaced Cost	$78,900	/yr
Installed Cost	$1,211,600	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

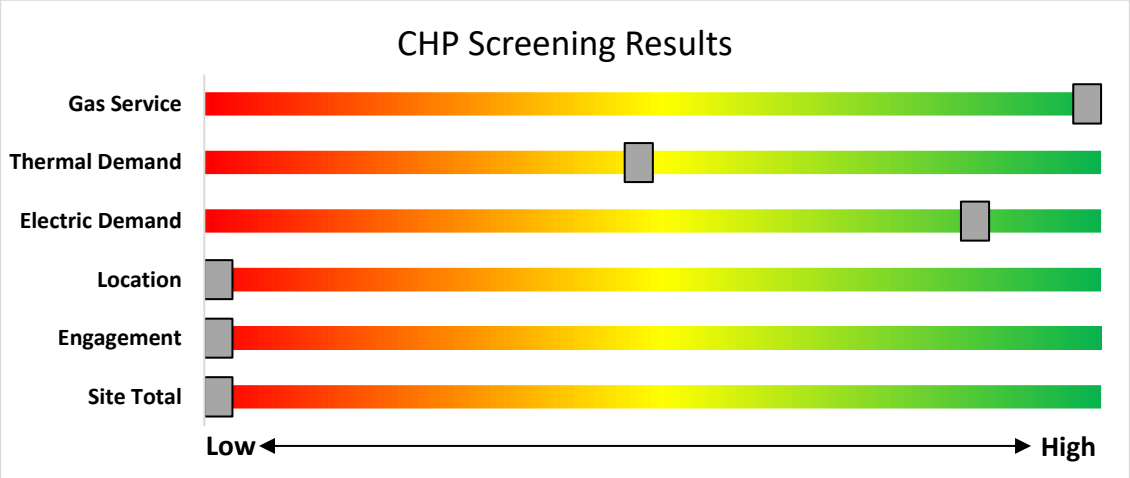


Figure 9 - Combined Heat and Power Screening

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

7 Electric Vehicles (EV)

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

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

7.1 Electric Vehicle Charging

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

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

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

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

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

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

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

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

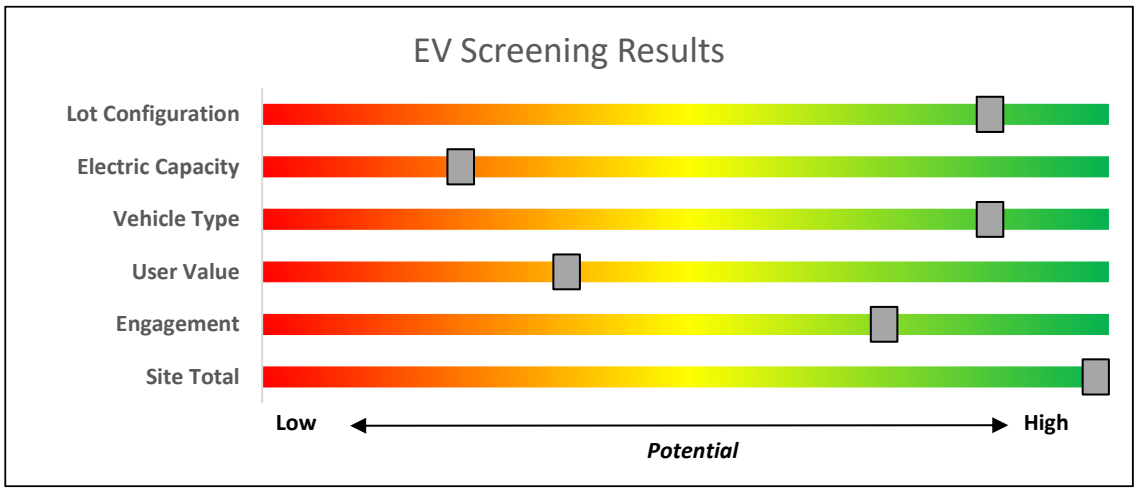


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

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

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

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

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

8 PROJECT FUNDING AND INCENTIVES

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

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

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

Equipment Examples

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

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

Direct Install

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

Incentives

The program pays up to 70% of the total installed cost of eligible measures.

How to Participate

To participate in Direct Install, you will work with a participating contractor. The contractor will be paid the measure incentives directly by the program, which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the Direct Install program, subject to program rules and eligibility, while the remaining percent of the cost is paid to the contractor by the customer.

Engineered Solutions

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

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

8.2 New Jersey's Clean Energy Programs

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

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

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

Competitive Solar Incentive Program

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

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 PROJECT DEVELOPMENT

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

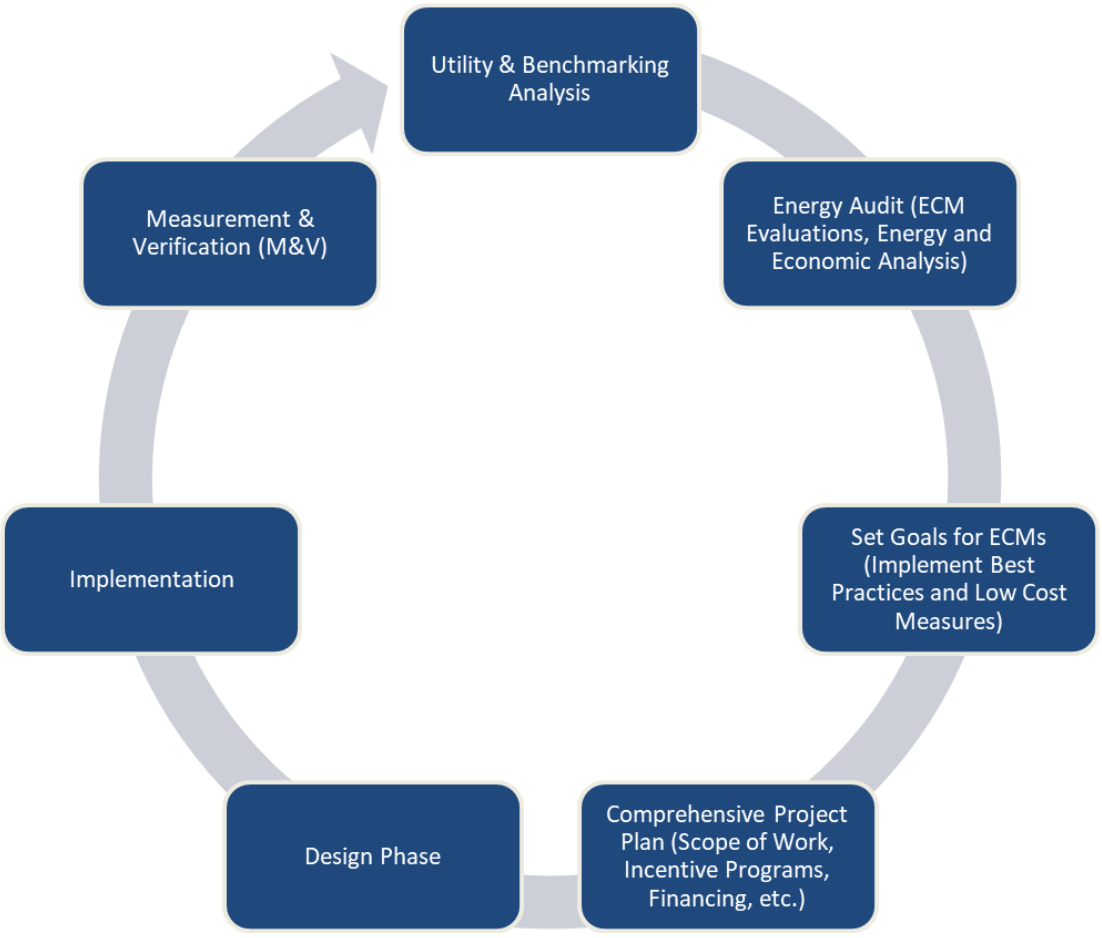


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

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

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

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

10.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[11].

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

[11] 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
ADA Restroom - Community Center	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	23	3,500		None	No	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	3,500	0.0	0	0	$0	$0	$0	0.0
Aquatic Center Director - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	3,500	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	2,415	0.0	68	0	$10	$116	$20	10.1
Basketball Court - Community Center	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Basketball Court - Community Center	30	LED - Fixtures: High-Bay	Wall Switch	S	130	6,000	2	None	Yes	30	LED - Fixtures: High-Bay	Occupancy Sensor	130	4,140	1.1	7,834	-2	$1,098	$810	$105	0.6
Boys Locker Room - Community Center	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Boys Locker Room - Community Center	19	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	19	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.1	878	0	$123	$540	$70	3.8
Boys Locker Room - Community Center	8	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	8	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.0	289	0	$41	$116	$20	2.4
Break Room - Community Center	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000	2	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	4,140	0.0	233	0	$33	$270	$35	7.2
Cafe Area - Community Center	14	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	2	None	Yes	14	LED - Fixtures: Downlight Recessed	Occupancy Sensor	37	4,140	0.1	1,041	0	$146	$270	$35	1.6
Cafe Area - Community Center	5	LED - Fixtures: Decorative Pendant	Wall Switch	S	81	6,000	2	None	Yes	5	LED - Fixtures: Decorative Pendant	Occupancy Sensor	81	4,140	0.1	814	0	$114	$270	$35	2.1
Cafe Kitchen - Community Center	8	Compact Fluorescent: (1) 32W A19 Screw-In Lamp	Wall Switch	S	32	6,000	1	Relamp	No	8	LED Lamps: A19 Lamps	Wall Switch	23	6,000	0.1	467	0	$65	$138	$8	2.0
Cafe Kitchen - Community Center	8	LED Lamps: (1) 10.5W Plug-In Lamp	Wall Switch	S	11	6,000		None	No	8	LED Lamps: (1) 10.5W Plug-In Lamp	Wall Switch	11	6,000	0.0	0	0	$0	$0	$0	0.0
Cafe Kitchen - Community Center	9	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	6,000		None	No	9	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	6,000	0.0	0	0	$0	$0	$0	0.0
Child Watch - Community Center	3	LED - Fixtures: Downlight Pendant	Wall Switch	S	244	6,000	2	None	Yes	3	LED - Fixtures: Downlight Pendant	Occupancy Sensor	244	4,140	0.2	1,470	0	$206	$116	$20	0.5
Child Watch - Community Center	13	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	13	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.1	601	0	$84	$270	$35	2.8
Children's Watch Restroom - Community Center	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	29	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	3,500	0.0	0	0	$0	$0	$0	0.0
Children's Watch Storage - Community Center	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	29	2,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	2,500	0.0	0	0	$0	$0	$0	0.0
Corridor Gym - Community Center	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Gym - Community Center	19	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	3	None	Yes	19	LED - Fixtures: Downlight Recessed	High/Low Control	37	4,140	0.2	1,412	0	$198	$900	$665	1.2
Corridor Gym - Community Center	3	LED - Fixtures: Decorative Pendant	Wall Switch	S	65	6,000	3	None	Yes	3	LED - Fixtures: Decorative Pendant	High/Low Control	65	4,140	0.1	392	0	$55	$225	$105	2.2
Corridor Pool - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Pool - Community Center	9	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	37	3,500	3	None	Yes	9	LED - Fixtures: Downlight Recessed	High/Low Control	37	2,415	0.1	390	0	$55	$450	$315	2.5
Corridor Side Fitness Gym - Community Center	2	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	3	None	Yes	2	LED - Fixtures: Downlight Recessed	High/Low Control	37	4,140	0.0	149	0	$21	$225	$70	7.4
Corridor Studio - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Studio - Community Center	9	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	3	None	Yes	9	LED - Fixtures: Downlight Recessed	High/Low Control	37	4,140	0.1	669	0	$94	$450	$315	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
Electrical Room - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Electrical Room - Community Center	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,500		None	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,500	0.0	0	0	$0	$0	$0	0.0
Elevator Room - Community Center	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	2,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,500	0.0	0	0	$0	$0	$0	0.0
Emergency Exit - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Emergency Exit - Community Center	2	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	2	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.0	92	0	$13	$116	$20	7.4
Executive Director Office - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,600	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	1,794	0.0	50	0	$7	$116	$20	13.6
Exterior Double Cobra Head - Community Center	4	LED - Fixtures: Cobrahead Pole Mount	Photocell		206	4,380		None	No	4	LED - Fixtures: Cobrahead Pole Mount	Photocell	206	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Cobra Head - Community Center	24	LED - Fixtures: Cobrahead Pole Mount	Photocell		103	4,380		None	No	24	LED - Fixtures: Cobrahead Pole Mount	Photocell	103	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed - Community Center	6	LED - Fixtures: Downlight Recessed	Photocell		34	4,380		None	No	6	LED - Fixtures: Downlight Recessed	Photocell	34	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed - Community Center	11	LED - Fixtures: Downlight Recessed	Photocell		23	4,380		None	No	11	LED - Fixtures: Downlight Recessed	Photocell	23	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack - Community Center	4	LED - Fixtures: Wall Pack	Photocell		40	4,380		None	No	4	LED - Fixtures: Wall Pack	Photocell	40	4,380	0.0	0	0	$0	$0	$0	0.0
Facility Director Office - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,600	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	1,794	0.0	50	0	$7	$116	$20	13.6
Family Locker Room - Community Center	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Family Locker Room - Community Center	32	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	32	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.2	1,478	0	$207	$810	$105	3.4
Family Locker Room - Community Center	24	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	24	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.1	868	0	$122	$810	$105	5.8
Files Room - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	29	2,500	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	1,725	0.0	49	0	$7	$116	$20	14.1
Fire Alarm Panel Room - Community Center	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	2,500		None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,500	0.0	0	0	$0	$0	$0	0.0
Fitness Area - Community Center	69	LED - Fixtures: Linear Strip	Wall Switch	S	58	6,000	2	None	Yes	69	LED - Fixtures: Linear Strip	Occupancy Sensor	58	4,140	1.1	8,039	-2	$1,127	$1,350	$175	1.0
Fitness Area Electrical Room - Community Center	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	2,500		None	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.0	0	0	$0	$0	$0	0.0
Fitness Gym Storage - Community Center	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,500		None	No	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	29	2,500	0.0	0	0	$0	$0	$0	0.0
General Office - Community Center	12	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,600	2	None	Yes	12	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	1,794	0.1	303	0	$42	$270	$35	5.5
Girls Locker Room - Community Center	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Girls Locker Room - Community Center	19	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	19	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.1	878	0	$123	$540	$70	3.8
Girls Locker Room - Community Center	8	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	8	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.0	289	0	$41	$270	$35	5.8
Gym Storage - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,500		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	29	2,500	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Gym Storage 2 - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,500		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	29	2,500	0.0	0	0	$0	$0	$0	0.0
IT Room - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	4,140	0.0	117	0	$16	$116	$20	5.9
Laundry Room - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	29	3,500	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	2,415	0.0	68	0	$10	$116	$20	10.1
Life Guard Area - Community Center	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	29	6,000	0.0	0	0	$0	$0	$0	0.0
Main Foyer - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Foyer - Community Center	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	25	6,000		None	No	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	25	6,000	0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Community Center	16	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	6,000		None	No	16	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	6,000	0.0	0	0	$0	$0	$0	0.0
Men's Locker Room - Community Center	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Men's Locker Room - Community Center	19	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	19	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.1	878	0	$123	$540	$70	3.8
Men's Locker Room - Community Center	8	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	8	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.0	289	0	$41	$270	$35	5.8
Men's Restroom - Community Center	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000	2	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	4,140	0.0	233	0	$33	$116	$20	2.9
Men's Restroom - Community Center	8	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	8	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.0	289	0	$41	$270	$35	5.8
Multipurpose Room - Community Center	28	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000	2	None	Yes	28	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	4,140	0.2	1,631	0	$229	$540	$70	2.1
Office 1 - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,600	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	1,794	0.0	50	0	$7	$270	$35	33.2
Pool Janitor Closet - Community Center	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	23	2,000		None	No	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	2,000	0.0	0	0	$0	$0	$0	0.0
Pool Janitor Closet 2 - Community Center	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	23	2,000		None	No	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	2,000	0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	24	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	S	40	6,000		None	No	24	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	40	6,000	0.0	0	0	$0	$0	$0	0.0
Pool Storage 1 - Community Center	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	23	2,000		None	No	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	2,000	0.0	0	0	$0	$0	$0	0.0
Pool Storage 2 - Community Center	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	23	2,000		None	No	1	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	2,000	0.0	0	0	$0	$0	$0	0.0
Pool Storage 3 - Community Center	2	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	23	2,000		None	No	2	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	2,000	0.0	0	0	$0	$0	$0	0.0
Reception Area - Community Center	3	LED - Fixtures: Decorative Pendant	Wall Switch	S	27	6,000		None	No	3	LED - Fixtures: Decorative Pendant	Wall Switch	27	6,000	0.0	0	0	$0	$0	$0	0.0
Reception Area - Community Center	9	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	2	None	Yes	9	LED - Fixtures: Downlight Recessed	Occupancy Sensor	37	4,140	0.1	669	0	$94	$270	$35	2.5
Reception Center Area - Community Center	60	LED - Fixtures: Downlight Recessed	Occupancy Sensor	S	41	6,000	2	None	Yes	60	LED - Fixtures: Downlight Recessed	Occupancy Sensor	41	4,140	0.7	4,942	-1	$692	$1,350	$175	1.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Reception Center Area - Community Center	16	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	S	15	6,000	2	None	Yes	16	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	4,140	0.1	466	0	$65	$540	$70	7.2
Roof - Community Center	1	LED Lamps: (1) 25W Corn Bulb Screw-In Lamp	Photocell		25	4,380		None	No	1	LED Lamps: (1) 25W Corn Bulb Screw-In Lamp	Photocell	25	4,380	0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	1	LED Lamps: (1) 15W PAR38 Screw-In Lamp	Photocell		15	4,380		None	No	1	LED Lamps: (1) 15W PAR38 Screw-In Lamp	Photocell	15	4,380	0.0	0	0	$0	$0	$0	0.0
Studio 1 - Community Center	21	LED - Fixtures: Linear Strip	Wall Switch	S	58	6,000	2	None	Yes	21	LED - Fixtures: Linear Strip	Occupancy Sensor	58	4,140	0.3	2,447	-1	$343	$540	$70	1.4
Studio 2 - Community Center	24	LED - Fixtures: Linear Strip	Wall Switch	S	58	6,000	2	None	Yes	24	LED - Fixtures: Linear Strip	Occupancy Sensor	58	4,140	0.4	2,796	-1	$392	$540	$70	1.2
Studio 3A - Community Center	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	3,500	2	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	2,415	0.1	306	0	$43	$270	$35	5.5
Studio 3B - Community Center	9	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	3,500	2	None	Yes	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	2,415	0.1	306	0	$43	$270	$35	5.5
Swimming Pool - Community Center	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Swimming Pool - Community Center	6	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	2	None	Yes	6	LED - Fixtures: Downlight Recessed	Occupancy Sensor	37	4,140	0.1	446	0	$62	$270	$35	3.8
Swimming Pool - Community Center	26	LED - Fixtures: High-Bay	Wall Switch	S	600	6,000		None	No	26	LED - Fixtures: High-Bay	Wall Switch	600	6,000	0.0	0	0	$0	$0	$0	0.0
Teen Center - Community Center	15	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000	2	None	Yes	15	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	4,140	0.1	874	0	$122	$540	$70	3.8
Ticket Area - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Ticket Area - Community Center	4	LED - Fixtures: Downlight Recessed	Wall Switch	S	37	6,000	2	None	Yes	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	37	4,140	0.0	297	0	$42	$270	$35	5.6
Ticket Area Office - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	29	2,600		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	2,600	0.0	0	0	$0	$0	$0	0.0
Township Office - Community Center	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	2,600	2	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	1,794	0.0	50	0	$7	$270	$35	33.2
Track Staircase - Community Center	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Track Staircase - Community Center	4	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	Wall Switch	S	40	6,000	3	None	Yes	4	LED - Fixtures: Ambient - 2' - Direct/Indirect Fixture	High/Low Control	40	4,140	0.0	321	0	$45	$225	$140	1.9
Upstairs Track - Community Center	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Upstairs Track - Community Center	38	LED - Fixtures: High-Bay	Wall Switch	S	175	6,000	2	None	Yes	38	LED - Fixtures: High-Bay	Occupancy Sensor	175	4,140	1.8	13,359	-3	$1,872	$810	$105	0.4
Women's Locker Room - Community Center	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Women's Locker Room - Community Center	19	LED - Fixtures: Downlight Recessed	Wall Switch	S	23	6,000	2	None	Yes	19	LED - Fixtures: Downlight Recessed	Occupancy Sensor	23	4,140	0.1	878	0	$123	$540	$70	3.8
Women's Locker Room - Community Center	23	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	23	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.1	832	0	$117	$540	$70	4.0
Women's Restroom - Community Center	4	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	29	6,000	2	None	Yes	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	29	4,140	0.0	233	0	$33	$270	$35	7.2
Women's Restroom - Community Center	8	LED - Fixtures: Linear Strip	Wall Switch	S	18	6,000	2	None	Yes	8	LED - Fixtures: Linear Strip	Occupancy Sensor	18	4,140	0.0	289	0	$41	$116	$20	2.4
Swimming Pool - Community Center	6	LED - Fixtures: High-Bay	Wall Switch	S	1,200	6,000	2	None	Yes	6	LED - Fixtures: High-Bay	Occupancy Sensor	1,200	4,140	2.0	14,463	-3	$2,027	$270	$35	0.1

	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 Pole LED - Splash Park	6	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell		100	4,380		None	No	6	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed - Splash Park	4	LED - Fixtures: Downlight Recessed	Photocell		37	4,380		None	No	4	LED - Fixtures: Downlight Recessed	Photocell	37	4,380	0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Splash Park	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,500		None	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,500	0.0	0	0	$0	$0	$0	0.0
Men's Restroom - Splash Park	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	800	2	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	552	0.0	12	0	$2	$270	$35	143.9
Storage - Splash Park	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	500		None	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	500	0.0	0	0	$0	$0	$0	0.0
Women's Restroom - Splash Park	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	800	2	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	552	0.0	12	0	$2	$270	$35	143.9

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
Pool Mechanical Room - Community Center	Filter Pneumatic Valves	1	Air Compressor	2.0	82.9%	No			W	5,840		No	82.9%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	EF 1 - Community Center	1	Exhaust Fan	0.3	65.0%	No			W	3,500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	EF - Community Center	3	Exhaust Fan	0.3	65.0%	No			W	3,500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	EF - Community Center	1	Kitchen Hood Exhaust Fan	3.0	65.0%	No			W	3,500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	EF 2 - Community Center	1	Exhaust Fan	0.3	65.0%	No			W	3,500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	EF 4 - Community Center	1	Exhaust Fan	0.3	65.0%	No			W	3,500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	EF 3 - Community Center	1	Exhaust Fan	0.8	65.0%	No			W	3,500		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Community Center	HHW Supply Pump	2	Heating Hot Water Pump	10.0	89.5%	Yes			W	1,500		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Basketball Court - Community Center	Basketball Hoop Motor	6	Other	1.0	70.0%	No			W	50		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room - Community Center	Elevator Motor	1	Other	40.0	78.5%	No			W	1,095		No	78.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Community Center	DHW Return Pump	1	DHW Circulation Pump	0.1	65.0%	No			W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Pool Chemical Pumps	3	Process Pump	0.8	70.0%	No			W	2,500		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Chlorine Pumps	3	Process Pump	1.0	80.4%	No			W	8,760		No	80.4%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Exercise Lap Pool Pump	1	Pool Filtration Pump	7.5	91.7%	Yes			W	8,578		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Competition Pool Pump	1	Pool Filtration Pump	15.0	92.4%	Yes			W	8,578		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Activity Pool Pump	1	Pool Filtration Pump	15.0	92.4%	Yes			W	8,578		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 1 - First Floor	2	Supply Fan	15.0	91.7%	Yes			W	5,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 1 - First Floor	1	Return Fan	15.0	91.7%	Yes			W	5,000		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 2 - Fitness Center	1	Supply Fan	7.5	91.0%	Yes			W	5,000		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 2 - Fitness Center	2	Return Fan	3.0	89.5%	Yes			W	5,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof - Community Center	RTU 3 - Locker Room	1	Supply Fan	7.5	91.0%	Yes			W	5,000		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 3 - Locker Room	1	Exhaust Fan	5.0	87.5%	Yes			W	5,000		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 4 - Gym & Track	2	Supply Fan	10.0	93.0%	Yes			W	5,000		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 4 - Gym & Track	2	Return Fan	5.0	87.5%	Yes			W	5,000		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 5 - Gym & Track	2	Supply Fan	10.0	93.0%	Yes			W	5,000		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 5 - Gym & Track	2	Return Fan	5.0	87.5%	Yes			W	5,000		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 6 - Fitness Rooms & Office	1	Supply Fan	3.0	89.5%	Yes			W	5,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 6 - Fitness Rooms & Office	1	Exhaust Fan	2.0	86.5%	Yes			W	5,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 7 - Kitchen	1	Supply Fan	3.0	89.5%	Yes			W	5,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 7 - Kitchen	1	Exhaust Fan	3.0	89.5%	Yes			W	5,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	Pool AHU - 1 & 2 Condensing Unit Fans	12	Supply Fan	5.0	84.1%	Yes			W	3,700		No	84.1%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 1 - Pool	2	Supply Fan	25.0	93.6%	No			W	3,700		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 1 - Pool	2	Exhaust Fan	5.0	89.5%	No			W	3,700		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 2 - Pool	2	Supply Fan	25.0	93.6%	No			W	3,700		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 2 - Pool	2	Exhaust Fan	5.0	89.5%	No			W	3,700		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Fitness Area - Community Center	Treadmill	16	Other	5.0	89.5%	No			W	3,000		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Media Filter Vacuum	5	Other	5.0	89.5%	No			W	800		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Pool Heater Motor	2	Other	0.3	65.0%	No			W	2,190		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Pool Heater Motor	1	Other	0.5	70.0%	No			W	2,190		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	MUA 1	1	Supply Fan	2.0	86.5%	Yes			W	5,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof - Community Center	AHU 1 - Pool Purge Blowers	2	Other	7.5	91.0%	No			W	1,500		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 1 - Pool Heat Recovery Pump	1	Other	0.8	70.0%	No			W	3,500		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 2 - Pool Purge Blowers	2	Other	7.5	91.0%	No			W	1,500		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 2 - Pool Heat Recovery Pump	1	Other	0.8	70.0%	No			W	3,500		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Storage - Splash Pad	Garage Door Motor	1	Other	0.5	70.0%	No			W	5		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Splash Pad	Splash Pad	1	Pool Filtration Pump	3.0	85.5%	No			W	2,500	5	No	86.5%	Yes	1	0.0	2,505	0	$356	$4,721	$200	12.7
Mechanical Room - Splash Pad	Watter Supply Pump	1	Water Supply Pump	15.0	91.0%	No			W	2,500	4	No	91.0%	Yes	1	1.4	11,528	0	$1,638	$8,846	$1,200	4.7
Storage - Splash Pad	Watter Pressure Booster Pump	1	Other	2.0	85.5%	No			W	2,500		No	85.5%	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 - Community Center	RTU 3 - Locker Room	1	Package Unit	20.00	218.00	15.81	0.81 Et	AAON	RN-020-3-0-EA09-34B	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 5 - Gym & Track	1	Package Unit	40.00	648.00	16.43	0.8 Et	AAON	RN-040-3-0-EB09-34B	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	MUA - 1 Kitchen	1	Forced Air Furnace		240.00		0.8 Et	Captive Aire	A2-IBT-300-20D	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 6 - Fitness Rooms & Office	1	Package Unit	11.00	156.00	18.63	0.8 Et	AAON	RN-011-3-0-EB09-3FB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 2 - Fitness Center	1	Package Unit	20.00	328.00	18.61	0.8098765 43209877 Et	AAON	RN-020-3-0-EB09-38B	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 1 - Pool	1	Split-System	128.00	900.00	12.00		Dectron	LD-282-NB-X-A6FL6303W0E3AFD	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 7 - Kitchen	1	Package Unit	10.00	120.00	14.00	0.8 Et	AAON	RN-010-3-0-EA09-3KB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 4 - Gym & Track	1	Package Unit	40.00	648.00	16.43	0.8 Et	AAON	RN-040-3-0-EB09-34B	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	AHU 2 - Pool	1	Split-System	128.00	900.00	12.00		Dectron	LD-282-NB-X-A6FL6303W0E3AFD	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	RTU 1 - First Floor	1	Package Unit	70.00	864.00	13.98	0.8 Et	AAON	RN-070-3-0-EB09-3EB	W		No							0.0	0	0	$0	$0	$0	0.0
Roof - Community Center	Heat Pump - Community Center	5	Packaged Air-Source HP	1.00	14.40	13.00	12.5 HSPF	Mitsubishi Electric	MUZ-GL09NA	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Community Center	Electric Resistance Heater - Mechanical Room	1	Electric Resistance Heat		34.00		1 COP	Reznor	EGHB 10	W		No							0.0	0	0	$0	$0	$0	0.0
Pool Mechanical Room - Community Center	Electric Resistance Heater - Mechanical Room	2	Electric Resistance Heat		34.00		1 COP	Reznor	EGHB 11	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room - Splash Pad	Electric Resistance Heater - Mechanical Room Splash Pad	1	Electric Resistance Heat		25.00		1 COP	Qmark		W		No							0.0	0	0	$0	$0	$0	0.0
Storage - Splash Pad	Electric Resistance Heater - Storage Room Splash Pad	1	Electric Resistance Heat		25.00		1 COP	Qmark		W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room - Community Center	HHW Boilers	2	Condensing Hot Water Boiler	1,880	Aerco	BMK 2000	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room - Community Center	DHW - Community Center	4	Storage Tank Water Heater (> 50 Gal)	Bradford White	EF100T399E3NA2	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Café Kitchen - Community Center	6	4	Faucet Aerator (Kitchen)	2.00	1.50	0.0	0	1	$10	$29	$8	2.0
Pool Janitor Closet - Community Center	6	2	Faucet Aerator (Kitchen)	2.00	1.50	0.0	0	0	$3	$14	$4	4.0

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Café Kitchen - Community Center	1	Freezer Chest	Hisense	FC50D6EWD	No		No	0.0	0	0	$0	$0	$0	0.0
Break Room - Community Center	1	Freezer Chest	Frigidaire	MFC25M4BW3	No		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Freezer Chest	Frigidaire	FFCS0722AW	No		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Stand-Up Freezer, Solid Door (≤15 cu. ft.)	Atosa	MGF8405GR	Yes		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	2	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Atosa	MGF8503GR	Yes		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)			Yes		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Imbera	G319	Yes		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Atosa	MBF8507GR	Yes		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Atosa	MGF8403GR	Yes		No	0.0	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	Atosa	MPF8201GR	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
Café Kitchen - Community Center	1	Ice Making Head (<450 lbs/day), Continuous	Hoshizaki		No		No	0.0	0	0	$0	$0	$0	0.0

Novelty Cooler Inventory & Recommendations

	Existing Conditions				Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Cooler Description	Manufacturer	Model	ECM #	Install Automatic Shutoff 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
Café Kitchen - Community Center	2	Novelty Cooler	Excellence Industries	VB-4HC-TY		No	0.00	0	0	$0	$0	$0	0.0
Café Kitchen - Community Center	1	Drop Pan Refrigerator	Wells	RCP-300		No	0.00	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
Cafe Kitchen - Community Center	2	Gas Large Vat Fryer	Pitco Frialator	SG14	No		No	0.0	0	0	$0	$0	$0	0.0
Cafe Kitchen - Community Center	2	Gas Griddle (≤2 Feet Width)	Southbend	HDC-24	No		No	0.0	0	0	$0	$0	$0	0.0
Cafe Kitchen - Community Center	1	Gas Convection Oven (Full Size)	Peerless	2324P	No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Community Center	2	Blender	600	No		
Community Center	2	Body Ergometer	1,800	No		
Community Center	3	Chemistry Controller	1,380	No		
Community Center	5	Chlorine Feeder System	204	No		
Community Center	1	Clothes Dryer	5,000	No		
Community Center	1	Clothes Washer	900	No		
Community Center	3	Coffee Machine	900	No		
Community Center	1	Deli Food Slicer	230	No		
Community Center	17	Desktop	270	No		
Community Center	6	EV Car Charger	7,000	No		
Community Center	1	Hot Water Dispenser	1,500	No		
Community Center	1	Juicer	350	No		
Community Center	8	Laptop	125	No		
Community Center	3	Media Filter PSU	31	No		
Community Center	2	Microwave	1,000	No		
Community Center	2	Printer (Medium/Small)	200	No		
Community Center	1	Printer/Copier (Large)	600	No		
Community Center	2	Projector	550	No		
Community Center	2	Refrigerator (Mini)	150	No		
Community Center	1	Refrigerator (Residential)	220	No		
Community Center	1	Server	3,000	No		
Community Center	2	Stair Master	72	No		
Community Center	52	Television	150	No		
Community Center	1	Toaster Oven	1,200	No		
Community Center	3	Ultraviolet Light Process	1,438	No		
Community Center	1	Water Boiler	1,500	No		
Community Center	4	Water Fountain	350	No		
Community Center	1	Drop Pan Food Warmer	900	Yes		
Mechanical Room - Splash Pad	32	Solenoid	40	No		
Mechanical Room - Splash Pad	1	Chemistry Controller	1,380	No		

Miscellaneous Fuel Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Input Capacity per Unit (MBh)	ENERGY STAR Qualified?	Manufacturer	Model
Pool Mechanical Room - Community Center	3	Pool Heater	650.0	No	Lochinvar	CPN0652

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

N/A

ENERGY STAR® Score[1]

Piscataway Community Center (YMCA Campus)

Primary Property Type: Fitness Center/Health Club/Gym
Gross Floor Area (ft²): 84,600
Built: 2020

For Year Ending: April 30, 2022
Date Generated: June 29, 2023

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Piscataway Community Center (YMCA Campus) 520 Hoes Lane Piscataway, New Jersey 08854	Township of Piscataway 455 Hoes Lane Piscataway, NJ 08854 (732) 529-2528	Timothy Dacey 455 Hoes Lane Piscataway, NJ 08854 (732) 529-2528 tdacey@piscatawaynj.org

Property ID: 25140086

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
185.4 kBtu/ft²

Source EUI
378 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	8,859,618 (56%)
Natural Gas (kBtu)	6,827,963 (44%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	55
National Median Source EUI (kBtu/ft²)	112
% Diff from National Median Source EUI	238%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	1,134

Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

Licensed Professional

___ _____
,
(___)___-_____
_____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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