Local Government Energy Audit Report

City Hall

August 26, 2022

Prepared for:

City of Vineland
640 East Wood Street
Vineland, New Jersey 08360

Prepared by:

TRC
317 George Street
New Brunswick, New Jersey 08901

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 of 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

ENERGY EFFICIENCY INCENTIVE & REBATE TRANSITION

For the purposes of your LGEA, estimated incentives and rebates are included as placeholders for planning purposes. New Jersey utilities are rolling out their own energy efficiency programs, which your project may be eligible for depending on individual measures, quantities, and size of the building.

In 2018, Governor Murphy signed into law the landmark legislation known as the Clean Energy Act. The law called for a significant overhaul of New Jersey's clean energy systems by building sustainable infrastructure in order to fight climate change and reduce carbon emissions, which will in turn create well-paying local jobs, grow the state's economy, and improve public health while ensuring a cleaner environment for current and future residents.

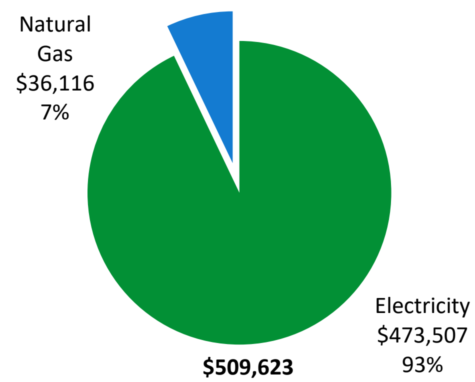
These next generation energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and incentives directly to customers like you. NJCEP will still offer programs for new construction, renewable energy, the Energy Savings Improvement Program (ESIP), and large energy users.

New utility programs are under development. Keep up to date with developments by visiting the NJCEP website.

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for City Hall. 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: $509,623 Electricity: 3,331,800 kWh Natural Gas: 27,444 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.

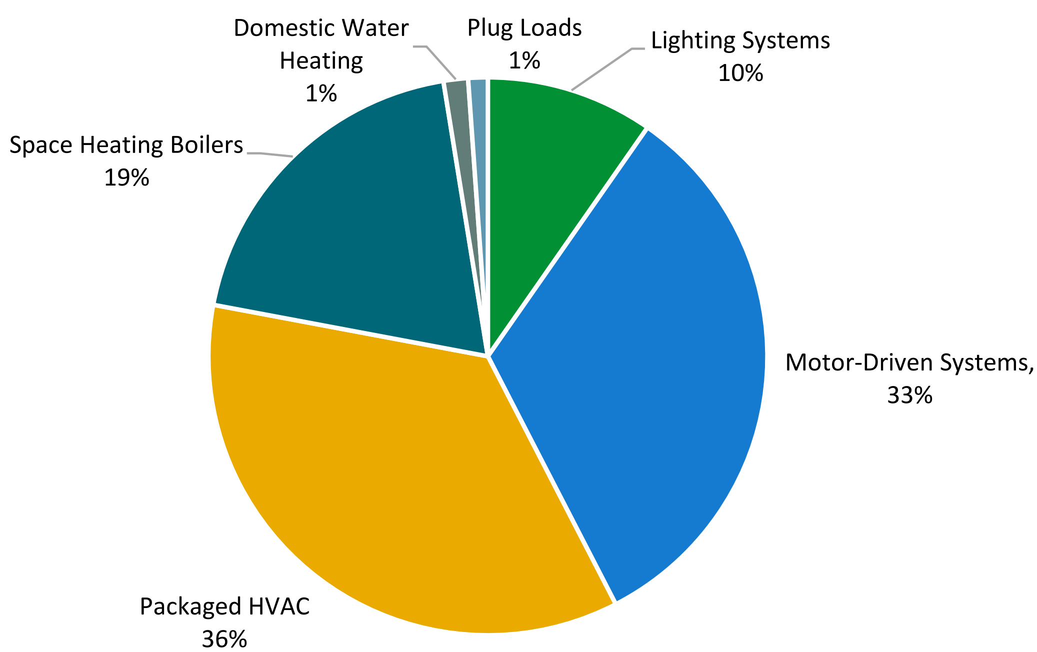


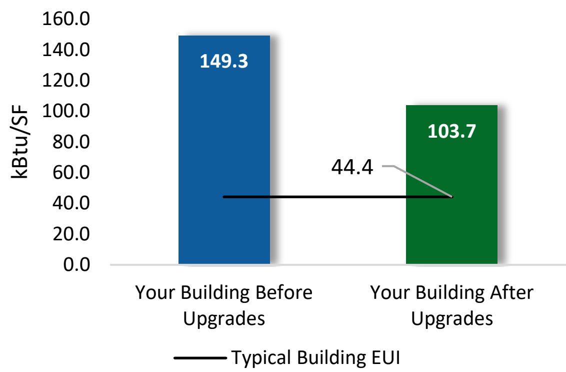
Figure 1 - Energy Use by System

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.

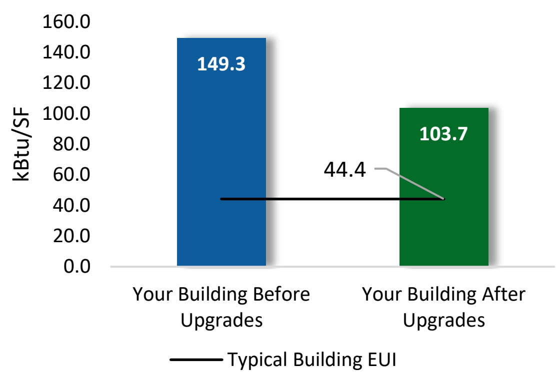
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$460,874
Potential Rebates & Incentives[1]	$31,850
Annual Cost Savings	$180,518
Annual Energy Savings	Electricity: 1,273,600 kWh Natural Gas: -367 Therms
Greenhouse Gas Emission Savings	639 Tons
Simple Payback	2.4 Years
Site Energy Savings (All Utilities)	31%



Scenario 2: Cost Effective Package[2]

Installation Cost	$460,874
Potential Rebates & Incentives	$31,850
Annual Cost Savings	$180,518
Annual Energy Savings	Electricity: 1,273,600 kWh Natural Gas: -367 Therms
Greenhouse Gas Emission Savings	639 Tons
Simple Payback	2.4 Years
Site Energy Savings (all utilities)	31%



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			**165,023**	**23.6**	**-34**	**$22,999**	**$54,883**	**$0**	**$54,883**	**2.4**	**162,143**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	158,259	22.9	-33	$22,057	$53,941	$0	$53,941	2.4	155,497
ECM 2	Install LED Exit Signs	Yes	6,764	0.7	-1	$943	$941	$0	$941	1.0	6,646
Lighting Control Measures			**76,558**	**9.4**	**-16**	**$10,670**	**$34,136**	**$0**	**$34,136**	**3.2**	**75,219**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	75,782	9.3	-16	$10,561	$32,786	$0	$32,786	3.1	74,456
ECM 4	Install High/Low Lighting Controls	Yes	777	0.1	0	$108	$1,350	$0	$1,350	12.5	763
Motor Upgrades			**9,591**	**2.1**	**0**	**$1,363**	**$11,280**	**$0**	**$11,280**	**8.3**	**9,658**
ECM 5	Premium Efficiency Motors	Yes	9,591	2.1	0	$1,363	$11,280	$0	$11,280	8.3	9,658
Variable Frequency Drive (VFD) Measures			**382,179**	**51.8**	**0**	**$54,314**	**$104,111**	**$0**	**$104,111**	**1.9**	**384,851**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	320,176	45.8	0	$45,503	$51,533	$0	$51,533	1.1	322,415
ECM 7	Install VFDs on Chilled Water Pumps	Yes	35,197	6.1	0	$5,002	$11,576	$0	$11,576	2.3	35,443
ECM 8	Install VFDs on Heating Water Pumps	Yes	10,668	0.8	0	$1,516	$18,061	$0	$18,061	11.9	10,743
ECM 9	Install VFDs on Cooling Tower Fans	Yes	16,137	-0.9	0	$2,293	$22,942	$0	$22,942	10.0	16,250
Electric Chiller Replacement			**616,171**	**39.2**	**0**	**$87,569**	**$246,310**	**$0**	**$246,310**	**2.8**	**620,480**
ECM 10	Install High Efficiency Chillers	Yes	616,171	39.2	0	$87,569	$246,310	$0	$246,310	2.8	620,480
HVAC System Improvements			**1,914**	**0.0**	**0**	**$272**	**$72**	**$0**	**$72**	**0.3**	**1,928**
ECM 11	Install Pipe Insulation	Yes	1,914	0.0	0	$272	$72	$0	$72	0.3	1,928
Domestic Water Heating Upgrade			**4,072**	**0.0**	**14**	**$760**	**$452**	**$104**	**$348**	**0.5**	**5,712**
ECM 12	Install Low-Flow DHW Devices	Yes	4,072	0.0	14	$760	$452	$104	$348	0.5	5,712
Food Service & Refrigeration Measures			**1,209**	**0.1**	**0**	**$172**	**$230**	**$0**	**$230**	**1.3**	**1,217**
ECM 13	Vending Machine Control	Yes	1,209	0.1	0	$172	$230	$0	$230	1.3	1,217
Custom Measures			**16,882**	**0.0**	**0**	**$2,399**	**$9,400**	**$0**	**$9,400**	**3.9**	**17,000**
ECM 14	Install Heat Pump Water Heater	Yes	16,882	0.0	0	$2,399	$9,400	$0	$9,400	3.9	17,000
TOTALS (COST EFFECTIVE MEASURES)			**1,273,600**	**126.2**	**-37**	**$180,518**	**$460,874**	**$104**	**$460,770**	**2.6**	**1,278,208**
TOTALS (ALL MEASURES)			**1,273,600**	**126.2**	**-37**	**$180,518**	**$460,874**	**$104**	**$460,770**	**2.6**	**1,278,208**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

Utility-run energy efficiency programs, such as 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.

For details on these programs please visit New Jersey's Clean Energy Program website or contact your utility provider.

Options from Around the State

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

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

Resiliency with Return on Investment through Combined Heat 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 designed to promote self-investment in energy efficiency and combined heat and power or fuel cell projects. 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.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for City Hall. 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 9, 2022, TRC performed an energy audit at City Hall located in Vineland, New Jersey. TRC met with Herman Torres to review the facility operations and help focus our investigation on specific energy-using systems.

City Hall is a six-story, 94,497 square foot building built in 1971. Spaces include offices, lobbies, stairwells, and basement mechanical space.

2.2 Building Occupancy

The facility is occupied year-round. Typical weekday occupancy is about 120 staff.

Building Name	Weekday/Weekend	Operating Schedule
City Hall	Weekday	8:30 AM - 5:00 PM
	Weekend	Closed

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

The walls are made of poured concrete with a combination of gypsum drywall with painted CMU interior finish. The flat roof is supported with steel trusses and covered with PVC roofing membrane. Most of the windows are double glazed and have aluminum frames. The glass-to-frame seals are in good condition.

The operable window weather seals are in fair condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. Degraded window and door seals increase drafts and outside air infiltration.

Back of Building

Roof

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL) and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 2-lamp or 4-lamp, 4-foot long recessed and surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition. All exit signs are incandescent units. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually and the remainder by occupancy sensors.

CFL

Exit Sign

Fluorescent U-Bend Fixture

Fluorescent Linear T8 Fixture

Exterior fixtures include CFL canopy lights and ground mounted flood lights with LED lamps. The pole mounted flood fixtures use LED sources. Exterior fixtures are timer controlled.

Ground Mounted LED Flood Light

LED Pole Light

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

Various areas are conditioned by rooftop mounted unitary electric HVAC equipment including split air conditioning (AC) systems, mini-split ACs, and heat pump units. These are all within their useful life, in good condition, and range from standard and high efficiency. Cooling capacities ranges between 1 ton and 5 tons with energy efficiency ratings between 10 EER and 15 EER. These systems are controlled by remote controls and thermostats within the spaces served. The split air source heat pump (HP) system has a heating capacity of 18 MBh and a heating seasonal performance factor (HSPF) of 10.

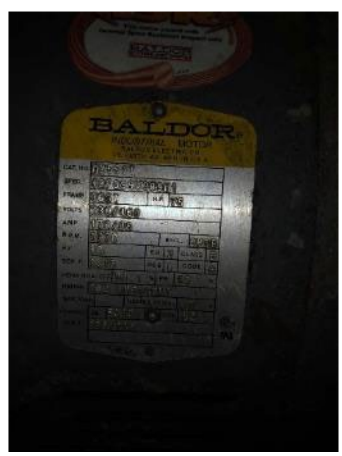
Condensing Units

Condensing Units

Air Distribution Equipment

Two, 75 hp ventilation fans supply most of the conditioned air to the building. Heating and cooling are provided by coils supplied by the boilers and chiller, respectively. For this multi-story office building, reheat coils are used on each floor to maintain the temperature of a specific zone.

Ventilation Main Fans



Ventilation Fan Nameplate

2.6 Heating Hot Water Systems

Four RBI 850 MBh hot water boilers serve the building heating load with a nominal efficiency of 85%. The boilers are configured in a lead-lag control scheme. Installed in 2011, they are in good condition. The hydronic distribution system is a heating-only system. The boilers serve a primary/secondary distribution system with four constant speed 1.0 hp pumps circulating the primary loop and two constant speed 1.0 hp heating hot water pumps operating in lead/lag fashion on the secondary loop.

The boilers provide hot water to heating coils located in the air stream of the two large ventilation fans described above. The restrooms are equipped with convectors that are also served by the boilers. The supply and return piping are insulated, and the insulation is in good condition.

Hydronic Boiler Plant

2.7 Chilled Water Systems

The chiller plant consists of a single 500-ton, Trane, water-cooled centrifugal chiller. The chiller is configured with a primary distribution, 30 hp, constant speed, chilled water pump. The condenser water system consists of two cooling towers. Each tower has a 25 hp fan motor. Condenser water is supplied to the chillers by two, 40 hp, constant flow pumps.

The chiller plant supplies chilled water to coils located in the air stream of the two large ventilation fans previously described.

Water-Cooled Centrifugal Chiller

Cooling Tower

2.8 Domestic Hot Water

Hot water is produced by a 119-gallon, 18 kW electric storage water heater and a 61 MBh capacity gas-fired indirect system with a 120-gallon storage tank. Four, 1.5 hp circulation pumps distribute water to end uses. The circulation pumps operate continuously. The domestic hot water pipes are partially insulated, and the insulation is in fair condition.

Storage Water Heater

Gas-Fired Indirect System

2.9 Plug Load and Vending Machines

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

There are 71 computer workstations throughout the facility. Plug loads throughout the building include general cafe and office equipment.

There are several residential-style refrigerators throughout the building. These vary in condition and efficiency.

There is a refrigerated beverage vending machine which is not equipped with occupancy-based controls.

Small Printer

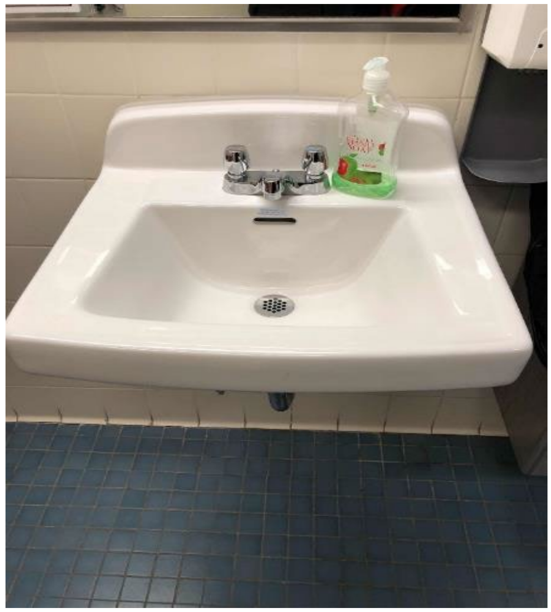
Residential Refrigerator

Toaster Oven

Refrigerated Vending Machine

2.10 Water-Using Systems

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

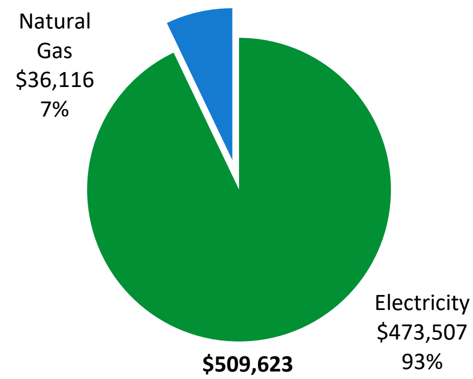


Restroom Faucet

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	3,331,800 kWh	$473,507
Natural Gas	27,444 Therms	$36,116
Total		**$509,623**



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.

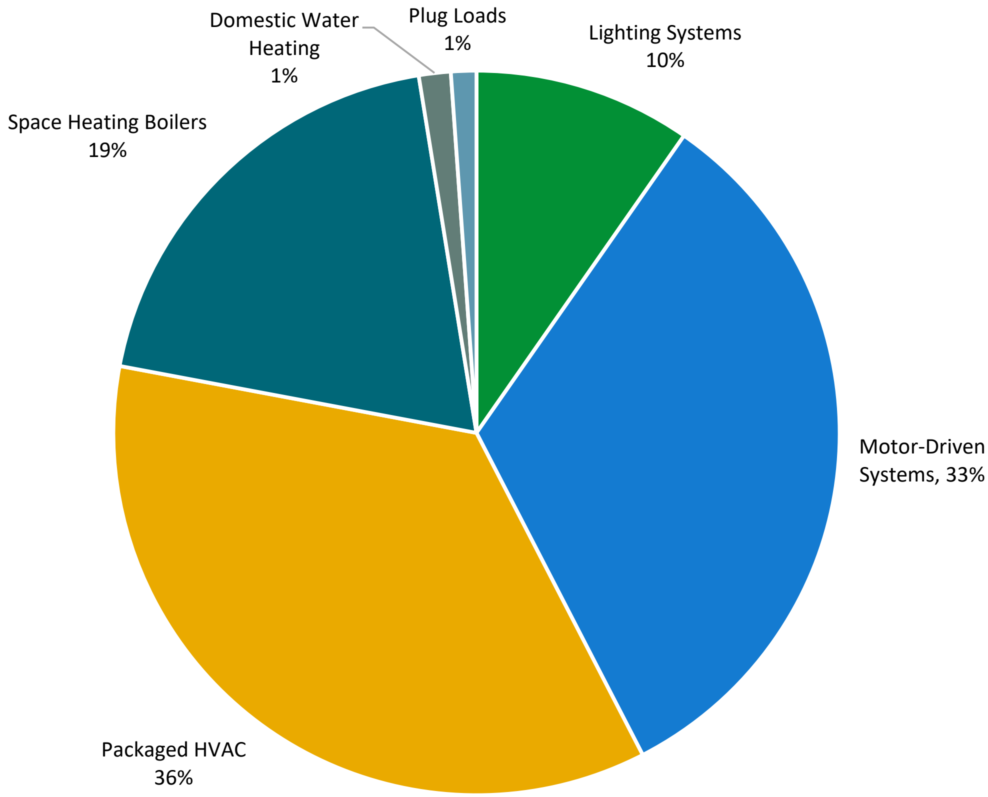
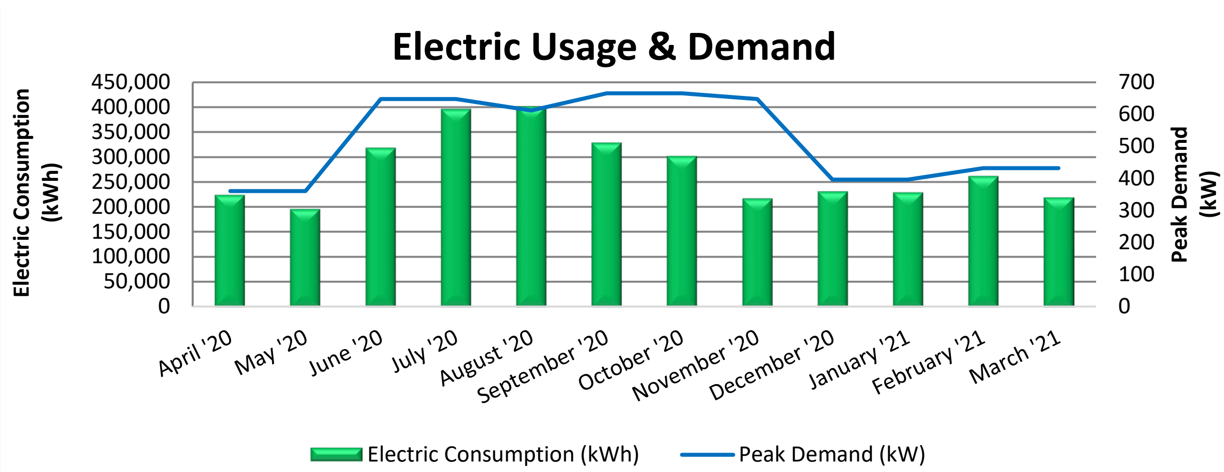


Figure 4 - Energy Balance

3.1 Electricity

City of Vineland delivers electricity under rate class Ind Service Rate 31 Primary Winter/Summer.



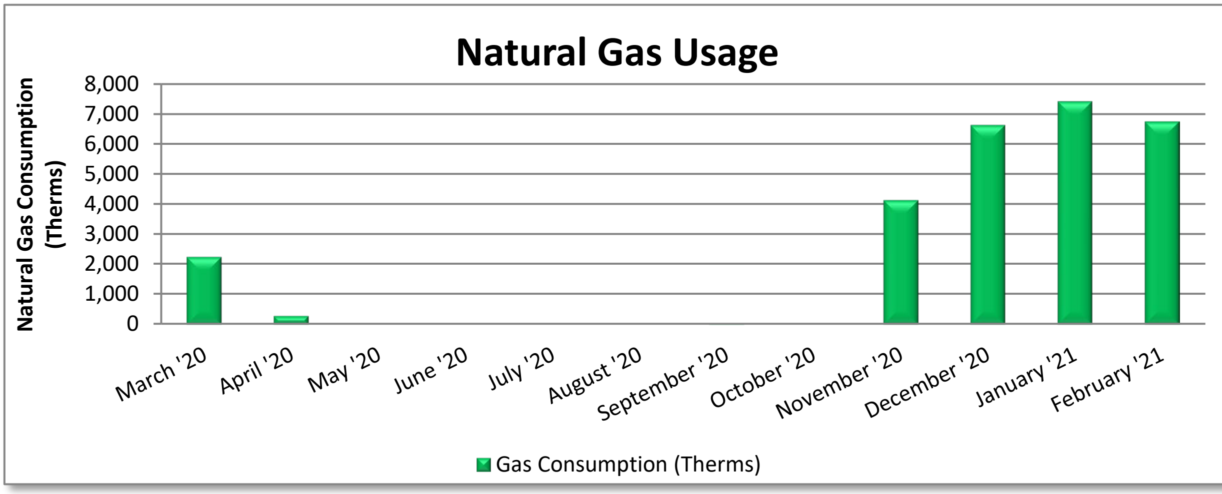
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
4/24/20	31	225,000	360	$4,900	$31,420
5/22/20	28	196,200	360	$4,900	$28,246
6/22/20	31	318,600	648	$7,471	$46,916
7/24/20	32	396,000	648	$7,439	$56,226
8/25/20	32	401,400	612	$7,041	$56,480
9/23/20	29	329,400	666	$7,697	$48,446
10/23/20	30	302,400	666	$7,360	$42,409
11/20/20	28	217,800	648	$6,960	$32,686
12/22/20	32	232,200	396	$4,910	$32,223
1/22/21	31	230,400	396	$4,910	$32,025
2/24/21	33	262,800	432	$4,910	$35,595
3/24/21	28	219,600	432	$4,910	$30,835
Totals	**365**	**3,331,800**	**666**	**$73,406**	**$473,507**
Annual	**365**	**3,331,800**	**666**	**$73,406**	**$473,507**

Notes:

- Peak demand of 666 kW occurred in September 2020.
- Average demand over the past 12 months was 522 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

South Jersey Gas delivers natural gas under rate class GSGFT, with natural gas supply provided by UGI, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
4/13/20	32	2,252	$2,666
5/12/20	29	288	$369
6/12/20	31	0	$33
7/14/20	32	0	$34
8/17/20	34	0	$36
9/15/20	29	0	$31
10/15/20	30	10	$47
11/13/20	29	0	$36
12/16/20	33	4,124	$5,444
1/14/21	29	6,622	$8,711
2/10/21	27	7,414	$9,776
3/12/21	30	6,734	$8,933
Totals	**365**	**27,444**	**$36,116**
Annual	**365**	**27,444**	**$36,116**

Notes:

- The average gas cost for the past 12 months is $1.316/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	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.

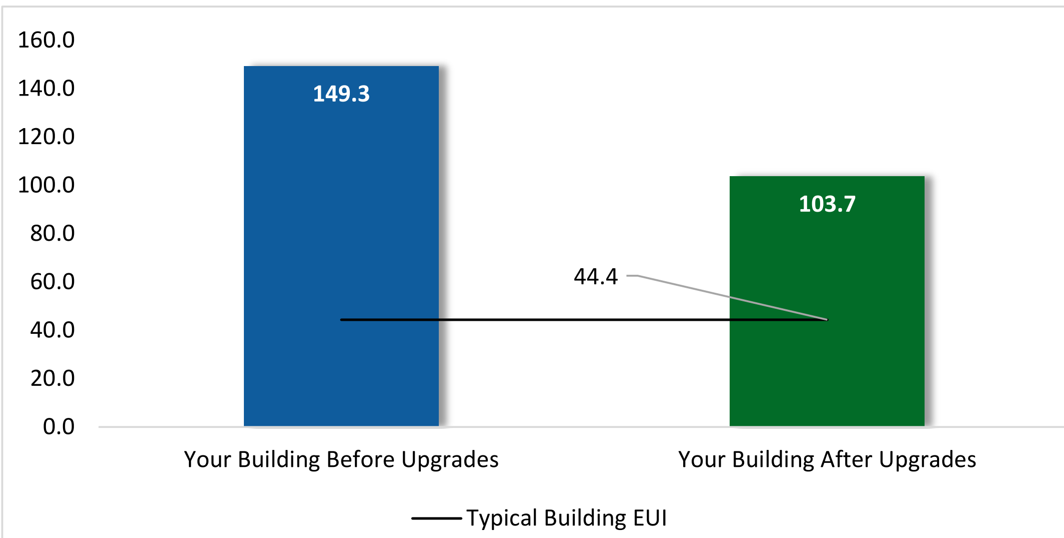


Figure 5 - Energy Use Intensity Comparison[3]

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.

The bar graphs suggest this building has a very high EUI as compared to the typical case. We needed to estimate long hours of equipment operation to account for all the billed electricity use. We recommend you review building systems operations and consider a control measure as indicated in Section 4.10. If the City Hall meter shared service with any of the surrounding buildings during the billing reporting period submitted for this study, that could also explain the high EUI.

[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 we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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

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

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 are based on previously run state rebate programs. New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website. Some measures and proposed upgrades may be eligible for higher incentives than those shown below.

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			**165,023**	**23.6**	**-34**	**$22,999**	**$54,883**	**$0**	**$54,883**	**2.4**	**162,143**
ECM 1	Retrofit Fixtures with LED Lamps	Yes	158,259	22.9	-33	$22,057	$53,941	$0	$53,941	2.4	155,497
ECM 2	Install LED Exit Signs	Yes	6,764	0.7	-1	$943	$941	$0	$941	1.0	6,646
Lighting Control Measures			**76,558**	**9.4**	**-16**	**$10,670**	**$34,136**	**$0**	**$34,136**	**3.2**	**75,219**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	75,782	9.3	-16	$10,561	$32,786	$0	$32,786	3.1	74,456
ECM 4	Install High/Low Lighting Controls	Yes	777	0.1	0	$108	$1,350	$0	$1,350	12.5	763
Motor Upgrades			**9,591**	**2.1**	**0**	**$1,363**	**$11,280**	**$0**	**$11,280**	**8.3**	**9,658**
ECM 5	Premium Efficiency Motors	Yes	9,591	2.1	0	$1,363	$11,280	$0	$11,280	8.3	9,658
Variable Frequency Drive (VFD) Measures			**382,179**	**51.8**	**0**	**$54,314**	**$104,111**	**$0**	**$104,111**	**1.9**	**384,851**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	320,176	45.8	0	$45,503	$51,533	$0	$51,533	1.1	322,415
ECM 7	Install VFDs on Chilled Water Pumps	Yes	35,197	6.1	0	$5,002	$11,576	$0	$11,576	2.3	35,443
ECM 8	Install VFDs on Heating Water Pumps	Yes	10,668	0.8	0	$1,516	$18,061	$0	$18,061	11.9	10,743
ECM 9	Install VFDs on Cooling Tower Fans	Yes	16,137	-0.9	0	$2,293	$22,942	$0	$22,942	10.0	16,250
Electric Chiller Replacement			**616,171**	**39.2**	**0**	**$87,569**	**$246,310**	**$0**	**$246,310**	**2.8**	**620,480**
ECM 10	Install High Efficiency Chillers	Yes	616,171	39.2	0	$87,569	$246,310	$0	$246,310	2.8	620,480
HVAC System Improvements			**1,914**	**0.0**	**0**	**$272**	**$72**	**$0**	**$72**	**0.3**	**1,928**
ECM 11	Install Pipe Insulation	Yes	1,914	0.0	0	$272	$72	$0	$72	0.3	1,928
Domestic Water Heating Upgrade			**4,072**	**0.0**	**14**	**$760**	**$452**	**$104**	**$348**	**0.5**	**5,712**
ECM 12	Install Low-Flow DHW Devices	Yes	4,072	0.0	14	$760	$452	$104	$348	0.5	5,712
Food Service & Refrigeration Measures			**1,209**	**0.1**	**0**	**$172**	**$230**	**$0**	**$230**	**1.3**	**1,217**
ECM 13	Vending Machine Control	Yes	1,209	0.1	0	$172	$230	$0	$230	1.3	1,217
Custom Measures			**16,882**	**0.0**	**0**	**$2,399**	**$9,400**	**$0**	**$9,400**	**3.9**	**17,000**
ECM 14	Install Heat Pump Water Heater	Yes	16,882	0.0	0	$2,399	$9,400	$0	$9,400	3.9	17,000
TOTALS			**1,273,600**	**126.2**	**-37**	**$180,518**	**$460,874**	**$104**	**$460,770**	**2.6**	**1,278,208**

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

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**165,023**	**23.6**	**-34**	**$22,999**	**$54,883**	**$0**	**$54,883**	**2.4**	**162,143**
ECM 1	Retrofit Fixtures with LED Lamps	158,259	22.9	-33	$22,057	$53,941	$0	$53,941	2.4	155,497
ECM 2	Install LED Exit Signs	6,764	0.7	-1	$943	$941	$0	$941	1.0	6,646
Lighting Control Measures		**76,558**	**9.4**	**-16**	**$10,670**	**$34,136**	**$0**	**$34,136**	**3.2**	**75,219**
ECM 3	Install Occupancy Sensor Lighting Controls	75,782	9.3	-16	$10,561	$32,786	$0	$32,786	3.1	74,456
ECM 4	Install High/Low Lighting Controls	777	0.1	0	$108	$1,350	$0	$1,350	12.5	763
Motor Upgrades		**9,591**	**2.1**	**0**	**$1,363**	**$11,280**	**$0**	**$11,280**	**8.3**	**9,658**
ECM 5	Premium Efficiency Motors	9,591	2.1	0	$1,363	$11,280	$0	$11,280	8.3	9,658
Variable Frequency Drive (VFD) Measures		**382,179**	**51.8**	**0**	**$54,314**	**$104,111**	**$0**	**$104,111**	**1.9**	**384,851**
ECM 6	Install VFDs on Constant Volume (CV) Fans	320,176	45.8	0	$45,503	$51,533	$0	$51,533	1.1	322,415
ECM 7	Install VFDs on Chilled Water Pumps	35,197	6.1	0	$5,002	$11,576	$0	$11,576	2.3	35,443
ECM 8	Install VFDs on Heating Water Pumps	10,668	0.8	0	$1,516	$18,061	$0	$18,061	11.9	10,743
ECM 9	Install VFDs on Cooling Tower Fans	16,137	-0.9	0	$2,293	$22,942	$0	$22,942	10.0	16,250
Electric Chiller Replacement		**616,171**	**39.2**	**0**	**$87,569**	**$246,310**	**$0**	**$246,310**	**2.8**	**620,480**
ECM 10	Install High Efficiency Chillers	616,171	39.2	0	$87,569	$246,310	$0	$246,310	2.8	620,480
HVAC System Improvements		**1,914**	**0.0**	**0**	**$272**	**$72**	**$0**	**$72**	**0.3**	**1,928**
ECM 11	Install Pipe Insulation	1,914	0.0	0	$272	$72	$0	$72	0.3	1,928
Domestic Water Heating Upgrade		**4,072**	**0.0**	**14**	**$760**	**$452**	**$104**	**$348**	**0.5**	**5,712**
ECM 12	Install Low-Flow DHW Devices	4,072	0.0	14	$760	$452	$104	$348	0.5	5,712
Food Service & Refrigeration Measures		**1,209**	**0.1**	**0**	**$172**	**$230**	**$0**	**$230**	**1.3**	**1,217**
ECM 13	Vending Machine Control	1,209	0.1	0	$172	$230	$0	$230	1.3	1,217
Custom Measures		**16,882**	**0.0**	**0**	**$2,399**	**$9,400**	**$0**	**$9,400**	**3.9**	**17,000**
ECM 14	Install Heat Pump Water Heater	16,882	0.0	0	$2,399	$9,400	$0	$9,400	3.9	17,000
TOTALS		**1,273,600**	**126.2**	**-37**	**$180,518**	**$460,874**	**$104**	**$460,770**	**2.6**	**1,278,208**

* - 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 ECM

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		**165,023**	**23.6**	**-34**	**$22,999**	**$54,883**	**$0**	**$54,883**	**2.4**	**162,143**
ECM 1	Retrofit Fixtures with LED Lamps	158,259	22.9	-33	$22,057	$53,941	$0	$53,941	2.4	155,497
ECM 2	Install LED Exit Signs	6,764	0.7	-1	$943	$941	$0	$941	1.0	6,646

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

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

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes and CFL lamps.

ECM 2: Install LED Exit Signs

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

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**76,558**	**9.4**	**-16**	**$10,670**	**$34,136**	**$0**	**$34,136**	**3.2**	**75,219**
ECM 3	Install Occupancy Sensor Lighting Controls	75,782	9.3	-16	$10,561	$32,786	$0	$32,786	3.1	74,456
ECM 4	Install High/Low Lighting Controls	777	0.1	0	$108	$1,350	$0	$1,350	12.5	763

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas: office spaces and conference rooms on all floors, and electrical rooms.

ECM 4: Install High/Low Lighting Controls

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

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

The controller lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be considered when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as occupants approach the area.

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

Affected Building Areas: stairwells.

4.3 Motors

#	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)
Motor Upgrades		**9,591**	**2.1**	**0**	**$1,363**	**$11,280**	**$0**	**$11,280**	**8.3**	**9,658**
ECM 5	Premium Efficiency Motors	9,591	2.1	0	$1,363	$11,280	$0	$11,280	8.3	9,658

ECM 5: Premium Efficiency Motors

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

Affected Motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Basement	Process Pump	1	Process Pump	5.0	water distribution pump
Basement	Process Pump	2	Condenser Water Pump	40.0	
Basement	Process Pump	1	Process Pump	3.0	water distribution pump
Basement	Process Pump	2	Process Pump	3.0	

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

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**382,179**	**51.8**	**0**	**$54,314**	**$104,111**	**$0**	**$104,111**	**1.9**	**384,851**
ECM 6	Install VFDs on Constant Volume (CV) Fans	320,176	45.8	0	$45,503	$51,533	$0	$51,533	1.1	322,415
ECM 7	Install VFDs on Chilled Water Pumps	35,197	6.1	0	$5,002	$11,576	$0	$11,576	2.3	35,443
ECM 8	Install VFDs on Heating Water Pumps	10,668	0.8	0	$1,516	$18,061	$0	$18,061	11.9	10,743
ECM 9	Install VFDs on Cooling Tower Fans	16,137	-0.9	0	$2,293	$22,942	$0	$22,942	10.0	16,250

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

ECM 6: Install VFDs on Constant Volume (CV) Fans

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

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

VAV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g., 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

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

Affected Systems: main building ventilation fans.

ECM 7: Install VFDs on Chilled Water Pumps

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

For systems with variable chilled water flow through the chiller, the minimum flow to prevent the chiller from tripping off will need to be determined during the final project design. The control system should be programmed to maintain the minimum flow through the chiller and to prevent pump cavitation.

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

ECM 8: Install VFDs on Heating Water Pumps

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

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

ECM 9: Install VFDs on Cooling Tower Fans

Install a VFD to control the cooling tower fan motor. The VFD will allow the cooling tower fan to operate at the minimum speed necessary to maintain the temperature of the condenser water returning to the chiller.

Energy savings result from reducing fan speed (and power) when there is a reduced load on the chiller and outside air wet bulb temperatures are depressed. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.5 Electric Chillers

#	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)
Electric Chiller Replacement		**616,171**	**39.2**	**0**	**$87,569**	**$246,310**	**$0**	**$246,310**	**2.8**	**620,480**
ECM 10	Install High Efficiency Chillers	616,171	39.2	0	$87,569	$246,310	$0	$246,310	2.8	620,480

ECM 10: Install High Efficiency Chillers

Replace older inefficient electric chillers with new high efficiency chillers. The type of chiller to be installed depends on the magnitude of the cooling load and variability of the cooling load profile, for example:

- Positive displacement chillers are usually under 600 tons of cooling capacity, and centrifugal chillers generally start at 150 tons of cooling capacity.
- Constant speed chillers should be used to meet cooling loads with little or no variation, while variable speed chillers are more efficient for variable cooling load profiles.
- Water cooled chillers are more efficient than air cooled chillers but require cooling towers and additional pumps to circulate the cooling water.
- In any given size range, variable speed chillers tend to have better partial load efficiency, but worse full load efficiency, than constant speed chillers.

Energy savings result from the improvement in chiller efficiency and matching the right type of chiller to the cooling load. The energy savings are calculated based on the cooling capacity of the new chiller, the improvement in efficiency compared with the base case equipment, the cooling load profile, and the estimated annual operating hours of the chiller before and after the upgrade.

For the purposes of this analysis, we evaluated the replacement of chillers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your design team to select chillers that are sized appropriately for the cooling load. In some cases, the plant energy use can be reduced by selecting multiple chillers that match the facility load profile, rather than one or two large chillers. This can also improve the chiller plant reliability through increased redundancy. Energy savings are maximized by proper selection of new equipment based on the cooling load profile.

Chiller replacement is projected to have a relatively short payback, based mainly on a long estimate of runtime (4,000 hrs. per year) that we assumed in order to help account for all the electricity used at this site. Before you replace the chiller, we suggested that the chiller run times are evaluated and better controlled. When the chiller is eventually replaced, consider purchasing equipment that exceed the minimum efficiency required by building codes.

4.6 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**1,914**	**0.0**	**0**	**$272**	**$72**	**$20**	**$52**	**0.2**	**1,928**
ECM 11	Install Pipe Insulation	1,914	0.0	0	$272	$72	$20	$52	0.2	1,928

ECM 11: Install Pipe Insulation

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

Affected Systems: domestic hot water piping.

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**4,072**	**0.0**	**14**	**$760**	**$452**	**$104**	**$348**	**0.5**	**5,712**
ECM 12	Install Low-Flow DHW Devices	4,072	0.0	14	$760	$452	$104	$348	0.5	5,712

ECM 12: 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

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

Additional cost savings may result from reduced water usage.

4.8 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**1,209**	**0.1**	**0**	**$172**	**$230**	**$0**	**$230**	**1.3**	**1,217**
ECM 13	Vending Machine Control	1,209	0.1	0	$172	$230	$0	$230	1.3	1,217

ECM 13: Vending Machine Control

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

4.9 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**16,882**	**0.0**	**0**	**$2,399**	**$9,400**	**$0**	**$9,400**	**3.9**	**17,000**
ECM 14	Install Heat Pump Water Heater	16,882	0.0	0	$2,399	$9,400	$0	$9,400	3.9	17,000

ECM 14: Install Heat Pump Water Heater

A typical electric water heater uses electric resistance coils to heat water at a coefficient of performance (COP) of 1. Heat pump water heaters (HPWH) use a refrigeration cycle to transfer heat from the air to the domestic water. The typical average COP for a HPWH is about 2.5, so they require significantly less electricity to produce the same amount of hot water as a traditional electric water heater. HPWH also reject cold air. As such, they need to be in an unconditioned space with good ventilation. Ideal locations are garages or large enclosed, unconditioned storage areas.

Most HPHW 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 recommended 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.

4.10 Measures for Future Consideration

There are additional opportunities for improvement that City of Vineland 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.

City of Vineland 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.

Installation of an Energy Management System

Most larger facilities have some type of energy management system (EMS), which provides for centralization, remote control, and monitoring of HVAC equipment and sometimes lighting or other building systems. An EMS utilizes a system of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems that adjust HVAC system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatics controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

Often smaller facilities are not equipped with central controls. For many small sites, it has been less costly to install distributed local controls, such as programmable thermostats and timeclocks, rather than centralized DDC. Local controls do a reasonably good job of scheduling equipment and maintaining operating conditions by relying on controls integral to HVAC units, such as logic for compressor staging, to manage the equipment operating algorithms.

Even for smaller sites, inefficiencies arise when temperature sensors and thermostat schedules are not maintained, when there are separate systems for heating and cooling, and especially when equipment is added, or the facility is reconfigured or repurposed.

Based on our survey, it appears that the installation of an EMS at your site could increase the efficiency of your building HVAC system operation.

A controls upgrade would enable automated equipment start and stop times, temperature setpoints, and lockouts and deadbands to be programmed remotely using a graphic interface. Controls can be configured to optimize ventilation and outside air intake by adjusting economizer position, damper function, and fan speed. Existing chilled and hot water distribution system controls are typically tied in, including associated pumps and valves. Coordinated control of HVAC systems is dependent on a network of sensors and status points. A comprehensive building control system provides monitoring and control for all HVAC systems, so operators can adjust system programming for optimal comfort and energy savings.

It is recommended that an HVAC engineer or contractor who specializes in EMS be contacted for a detailed evaluation and implementation costs. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

5 Energy Efficient Best Practices

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

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

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

Energy Tracking with ENERGY STAR® Portfolio Manager®

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

Weatherization

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

Doors and Windows

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

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

Window Treatments/Coverings

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

Lighting Maintenance

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

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

Lighting Controls

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

Motor Controls

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

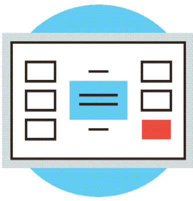
Motor Maintenance

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

Fans to Reduce Cooling Load

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

Thermostat Schedules and Temperature Resets



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

Chiller Maintenance

Service chillers regularly to keep them operating properly. Chillers are responsible for a substantial portion of a commercial building's overall energy usage, and when they do not work well, there is usually a noticeable increase in energy bills and increased occupant complaints. Regular diagnostics and service can save 5% to 10% of the cost of operating your chiller. If you already have a maintenance contract in place, your existing service company should be able to provide these services.

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.

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 EMS building equipment list. Use weatherproof or heatproof labeling or stickers for permanence, but do not cover over original equipment nameplates, which should be kept clean and readable whenever possible. Besides equipment, label piping for service and direction of flow when possible. Ideally, maintain a log of HVAC equipment, including nameplate information, asset tag designation, areas served, installation year, service dates, and other pertinent information.

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

Optimize HVAC Equipment Schedules

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

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

Water Heater Maintenance

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

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

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

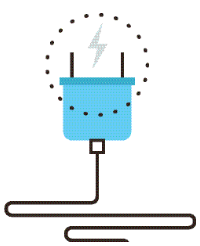
Compressed Air System Maintenance

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.

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

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[5]. Your local utility may offer incentives or rebates for this equipment.

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

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

Water Conservation

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

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

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

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

6 ON-SITE GENERATION

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

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

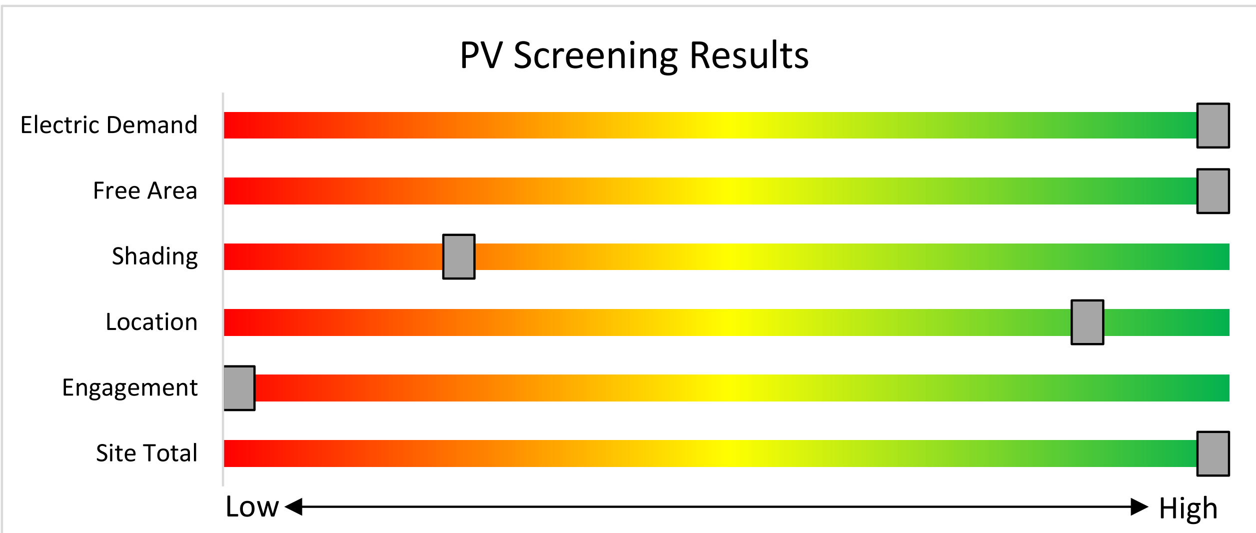
6.1 Solar Photovoltaic

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

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

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

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



Potential	High	
System Potential	107	kW DC STC
Electric Generation	80,512	kWh/yr
Displaced Cost	$11,440	/yr
Installed Cost	$306,000	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The low or infrequent thermal load is the most significant factor 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.

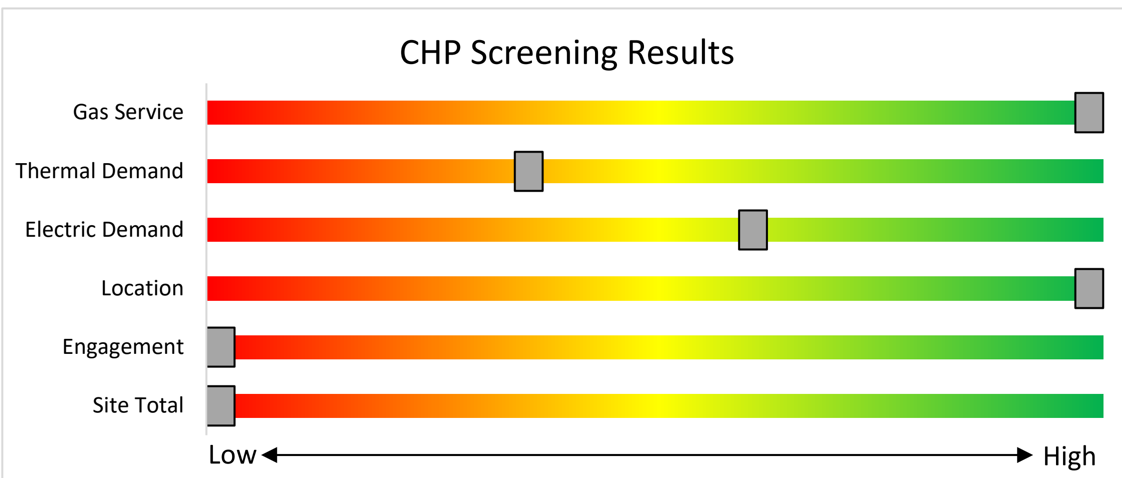


Figure 9 - Combined Heat and Power Screening

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 Project Funding and Incentives

Ready to improve your building's performance? Your utility provider may be able to help.

7.1 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.

These new utility programs are rolling out in the spring and summer of 2021. Keep up to date with developments by visiting:

https://www.njcleanenergy.com/transition

8 New Jersey's Clean Energy Programs

New Jersey's Clean Energy Program will continue to offer some energy efficiency programs.

8.1 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.

8.2 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.

8.3 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 effective August 28, 2021.

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. The program is currently under development with the goal of holding the first solicitation by early-to-mid 2022. 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.

8.4 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.

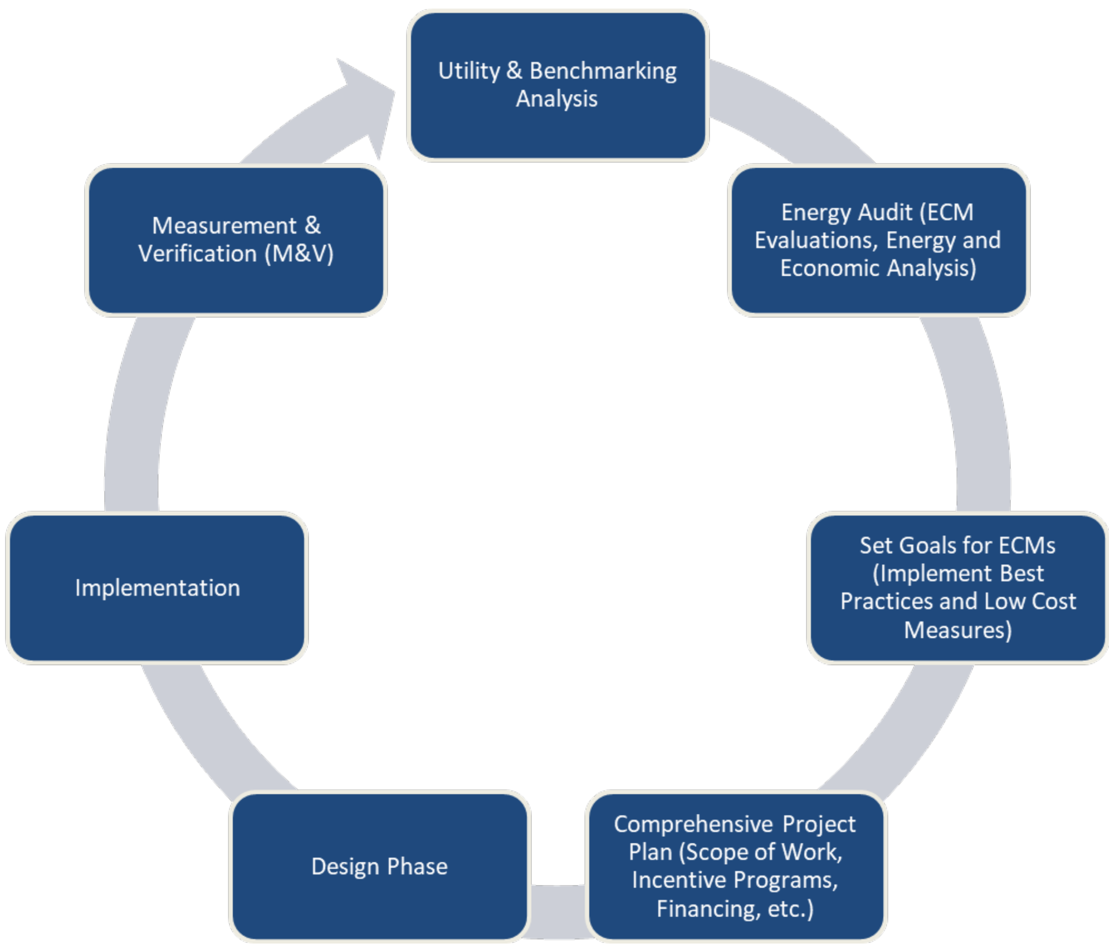


Figure 10 – Project Development Cycle

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[8].

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[9].

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Basement	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,210	1	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,210	0.2	562	0	$78	$256	$0	3.3
Restroom - Female 7	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Restroom - Male 7	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Customer service	4	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	S	60	6,570	1, 3	Relamp	Yes	4	LED Lamps: LED Lamp	Occupancy Sensor	42	4,533	0.1	897	0	$125	$339	$0	2.7
Customer service	3	Exit Signs: Incandescent	None		60	8,760	2	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.2	1,561	0	$218	$217	$0	1.0
Customer service	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	8,760	3	None	Yes	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	15	6,044	0.4	3,853	-1	$537	$2,160	$0	4.0
Customer service	0	LED Lamps: (1) 50W Corn Bulb Screw-In Lamp	Wall Switch	S	50	6,570		None	No	0	LED Lamps: (1) 50W Corn Bulb Screw-In Lamp	Wall Switch	50	6,570	0.0	0	0	$0	$0	$0	0.0
Customer service	0	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,570		None	No	0	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	6,570	0.0	0	0	$0	$0	$0	0.0
Customer service	0	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,570		None	No	0	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	6,570	0.0	0	0	$0	$0	$0	0.0
Customer service	298	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	298	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,533	11.0	84,488	-18	$11,775	$29,693	$0	2.5
Electrical Room 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,210	1, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,525	0.1	204	0	$28	$189	$0	6.6
Exterior 1	2	Compact Fluorescent: (1) 60W Plug-in Lamps	Timeclock		60	6,570	1	Relamp	No	2	LED Lamps: LED Lamp	Timeclock	42	6,570	0.0	237	0	$34	$34	$0	1.0
Exterior 1	9	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		25	6,570		None	No	9	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	25	6,570	0.0	0	0	$0	$0	$0	0.0
Exterior 1	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		50	6,570		None	No	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	50	6,570	0.0	0	0	$0	$0	$0	0.0
Exterior 1	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		75	6,570		None	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	75	6,570	0.0	0	0	$0	$0	$0	0.0
Restroom - Female 6	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Restroom - Male 6	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Stairs 1	13	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	8,760	4	None	Yes	13	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	6,044	0.0	388	0	$54	$675	$0	12.5
Stairs 2	13	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	8,760	4	None	Yes	13	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	6,044	0.0	388	0	$54	$675	$0	12.5
City Clerk	0	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	S	60	6,570		None	No	0	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	60	6,570	0.0	0	0	$0	$0	$0	0.0
City Clerk	5	Exit Signs: Incandescent	None		60	8,760	2	Fixture Replacement	No	5	LED Exit Signs: 2 W Lamp	None	6	8,760	0.3	2,602	-1	$363	$362	$0	1.0
City Clerk	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	8,760	3	None	Yes	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	15	6,044	0.4	3,853	-1	$537	$2,160	$0	4.0
City Clerk	27	LED Lamps: (1) 50W Corn Bulb Screw-In Lamp	Wall Switch	S	50	6,570	3	None	Yes	27	LED Lamps: (1) 50W Corn Bulb Screw-In Lamp	Occupancy Sensor	50	4,533	0.4	3,024	-1	$422	$540	$0	1.3
City Clerk	0	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,570		None	No	0	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	6,570	0.0	0	0	$0	$0	$0	0.0
City Clerk	0	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,570		None	No	0	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	6,570	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
City Clerk	30	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	30	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,533	1.1	8,505	-2	$1,185	$2,984	$0	2.5
Restroom - Female 5	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Restroom - Male 5	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Information Systems	1	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	S	60	6,570	1, 3	Relamp	Yes	1	LED Lamps: LED Lamp	Occupancy Sensor	42	4,533	0.0	224	0	$31	$287	$0	9.2
Information Systems	2	Exit Signs: Incandescent	None		60	8,760	2	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$145	$145	$0	1.0
Information Systems	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	8,760	3	None	Yes	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	15	6,044	0.4	3,853	-1	$537	$2,160	$0	4.0
Information Systems	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,533	0.3	2,124	0	$296	$526	$0	1.8
Information Systems	0	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,570		None	No	0	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	6,570	0.0	0	0	$0	$0	$0	0.0
Information Systems	289	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	289	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,533	10.7	81,936	-17	$11,419	$29,041	$0	2.5
Restroom - Female 4	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Restroom - Male 4	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Health Department	1	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	S	60	6,570	1, 3	Relamp	Yes	1	LED Lamps: LED Lamp	Occupancy Sensor	42	4,533	0.0	224	0	$31	$287	$0	9.2
Health Department	0	Exit Signs: Incandescent	None		60	8,760		None	No	0	Exit Signs: Incandescent	None	60	8,760	0.0	0	0	$0	$0	$0	0.0
Health Department	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	8,760	3	None	Yes	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	15	6,044	0.4	3,853	-1	$537	$2,160	$0	4.0
Health Department	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,533	0.0	303	0	$42	$307	$0	7.2
Health Department	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,570	1, 3	Relamp	Yes	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,533	1.0	7,485	-2	$1,043	$1,562	$0	1.5
Health Department	26	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	26	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,533	1.0	7,371	-2	$1,027	$2,424	$0	2.4
Restroom - Female 3	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Restroom - Male 3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.1	244	0	$34	$146	$0	4.3
General accounting	2	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	S	60	6,570	1, 3	Relamp	Yes	2	LED Lamps: LED Lamp	Occupancy Sensor	42	4,533	0.1	448	0	$62	$304	$0	4.9
General accounting	2	Exit Signs: Incandescent	None		60	8,760	2	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	1,041	0	$145	$145	$0	1.0
General accounting	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	8,760	3	None	Yes	86	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	15	6,044	0.4	3,853	-1	$537	$2,160	$0	4.0
General accounting	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,533	0.4	2,731	-1	$381	$599	$0	1.6
General accounting	22	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	22	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,533	0.8	6,237	-1	$869	$2,134	$0	2.5
Restroom - Female 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Male 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Mayors Lounge	2	Compact Fluorescent: (1) 60W Plug-in Lamps	Wall Switch	S	60	6,570	1, 3	Relamp	Yes	2	LED Lamps: LED Lamp	Occupancy Sensor	42	4,533	0.1	448	0	$62	$304	$0	4.9
Mayors Lounge	1	Exit Signs: Incandescent	None		60	8,760	2	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.1	520	0	$73	$72	$0	1.0
Mayors Lounge	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,533	0.1	910	0	$127	$380	$0	3.0
Mayors Lounge	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,570	1, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,533	0.1	851	0	$119	$487	$0	4.1
Mechanical 1	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,210	1	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,210	0.2	562	0	$78	$256	$0	3.3
Restroom - Female 1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3
Restroom - Male 1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,680	1	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.2	366	0	$51	$219	$0	4.3

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
Electrical Room 1	Boilers	2	Heating Hot Water Pump	1.0	78.5%	No	Baldor	VM3116	W	4,380	8	No	85.5%	Yes	2	0.3	3,556	0	$505	$6,020	$0	11.9
Electrical Room 1	Boilers	4	Heating Hot Water Pump	1.0	78.5%	No	<not visible>	<not visible>	W	4,380	8	No	85.5%	Yes	4	0.5	7,112	0	$1,011	$12,041	$0	11.9
Exterior 1	Cooling Towers	2	Cooling Tower Fan	25.0	92.0%	No	<not visible>	<not visible>	B	3,500	9	No	93.6%	Yes	2	-0.9	16,137	0	$2,293	$22,942	$0	10.0
Exterior 1	Cooling Towers	2	Condenser Water Pump	2.0	86.5%	No	Baldor	JMEWDM3558T	B	3,500		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Air compressor	2	Air Compressor	3.0	86.5%	No	WEG	00318OP3E182T	W	2,000		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Exhaust Fan	1	Exhaust Fan	0.3	70.0%	No	<not visible>	<not visible>	W	8,760		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Exhaust Fan	1	Exhaust Fan	0.3	70.0%	No	<not visible>	<not visible>	W	8,760		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior 1	Exhaust Fan	3	Exhaust Fan	0.3	70.0%	No	<not visible>	<not visible>	W	8,760		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 1	Elevator	3	Other	30.0	89.0%	No	Marathon Electric	CA 326THTPA8083ABL	W	1,248		No	89.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Process Fan	1	Process Fan	7.5	88.0%	No	<not visible>	<not visible>	W	3,391	6	No	91.0%	Yes	1	2.3	8,565	0	$1,217	$4,738	$0	3.9
Basement	Process Fan	2	Supply Fan	75.0	94.1%	No	Baldor	M2551T	W	8,760	6	No	95.0%	Yes	2	43.5	311,611	0	$44,285	$46,795	$0	1.1
Basement	Process Pump	1	Process Pump	5.0	80.0%	No	Westinghouse	<not visible>	W	2,745	5	Yes	86.5%	No		0.2	721	0	$103	$711	$0	6.9
Basement	Process Pump	2	Process Pump	1.5	78.5%	No	<not visible>	<not visible>	W	2,745		No	78.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Process Pump	1	Process Pump	2.0	84.0%	No	Baldor	M3558T	W	2,745		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Process Pump	1	Process Pump	50.0	80.0%	No	Lincoln	326T	W	52		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Process Pump	2	Process Pump	1.5	78.5%	No	Baldor	VM3154	W	1,095		No	78.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement	Process Pump	2	Condenser Water Pump	40.0	90.0%	No	Allis-Chalmers	O30	B	3,500	5	Yes	94.1%	No		1.6	7,584	0	$1,078	$8,012	$0	7.4
Basement	Process Pump	1	Chilled Water Pump	30.0	90.0%	No	Allis-Chalmers	O40	B	3,500	7	No	94.1%	Yes	1	6.1	35,197	0	$5,002	$11,576	$0	2.3
Basement	Process Pump	1	Process Pump	3.0	80.0%	No	Allis-Chalmers	O20	W	2,745	5	Yes	89.5%	No		0.2	611	0	$87	$805	$0	9.3
Basement	Process Pump	2	Process Pump	3.0	84.0%	No	U.S. Electrical Motors	AD78	W	2,745	5	Yes	89.5%	No		0.2	674	0	$96	$1,753	$0	18.3

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior 1	City Hall	2	Split-System	5.00		14.00		Liebert	MCL055E1	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	City Hall	1	Ductless Mini-Split HP	1.50	18.00	15.00	10 HSPF	Mitsubishi	MUZ-HM18NA	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 1	Mechanical 1	2	Ductless Mini-Split AC	2.00		10.00		Sanyo	CL2432A	W		No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior 1	City Hall	1	Water-Cooled Centrifugal Chiller	500.00	Trane		B	10	Yes	1	Water-Cooled Centrifugal Chiller	Variable	500.00	0.59	0.37	39.2	616,171	0	$87,569	$246,310	$0	2.8

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
Electrical Room 1	City Hall	4	Non-Condensing Hot Water Boiler	850	RBI	MB1000	W		No						0.0	0	0	$0	$0	$0	0.0

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Basement	DHW	11	10	2.00	0.0	1,914	0	$272	$72	$0	0.3

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
Basement	City Hall	1	Storage Tank Water Heater (> 50 Gal)	Bradford White Corp.	MI1120-18-3SF-042	W		No						0.0	0	0	$0	$0	$0	0.0
Electrical Room 1	City Hall	1	Indirect System	Lochinvar		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
Customer service	12	2	Faucet Aerator (Kitchen)	2.20	1.50	0.0	114	0	$16	$14	$0	0.9
City Clerk	12	2	Faucet Aerator (Kitchen)	2.20	1.50	0.0	114	0	$16	$14	$0	0.9
Information Systems	12	2	Faucet Aerator (Kitchen)	2.20	1.50	0.0	114	0	$16	$14	$0	0.9
Health Department	12	2	Faucet Aerator (Kitchen)	2.20	1.50	0.0	114	0	$16	$14	$0	0.9
Restrooms	12	26	Faucet Aerator (Lavatory)	2.20	0.50	0.0	3,614	0	$514	$186	$0	0.4
Restrooms	12	26	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	12	$162	$186	$93	0.6
Basement	12	1	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	0	$6	$7	$4	0.6
General accounting	12	1	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	0	$6	$7	$4	0.6
Mayors Lounge	12	1	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	0	$6	$7	$4	0.6

Plug Load Inventory

	Existing Conditions					
Location	**Quantity**	**Equipment Description**	**Energy Rate (W)**	**ENERGY STAR Qualified?**	**Manufacturer**	**Model**
Customer service	1	Coffee Machine	900	No		
City Clerk	1	Coffee Machine	900	No		
Health Department	3	Coffee Machine	900	No		
General accounting	1	Coffee Machine	900	No		
Mayors Lounge	1	Coffee Machine	900	No		
Customer service	5	Desktop	145	No		
City Clerk	4	Desktop	145	No		
Information Systems	52	Desktop	145	No		
Health Department	7	Desktop	145	No		
General accounting	2	Desktop	145	No		
Mayors Lounge	1	Desktop	145	No		
Customer service	5	Microwave	900	No		
City Clerk	2	Microwave	900	No		
Information Systems	2	Microwave	900	No		
Health Department	6	Microwave	900	No		
General accounting	4	Microwave	900	No		
Mayors Lounge	1	Microwave	900	No		
Customer service	1	Paper Shredder	200	No		
Information Systems	1	Paper Shredder	200	No		
Health Department	1	Paper Shredder	200	No		
General accounting	1	Paper Shredder	200	No		
Mayors Lounge	1	Paper Shredder	200	No		
Customer service	7	Printer (Medium/Small)	100	No		
City Clerk	3	Printer (Medium/Small)	100	No		
Information Systems	4	Printer (Medium/Small)	100	No		
Health Department	6	Printer (Medium/Small)	100	No		
General accounting	7	Printer (Medium/Small)	100	No		
Customer service	5	Printer/Copier (Large)	250	No		
City Clerk	2	Printer/Copier (Large)	250	No		
Information Systems	3	Printer/Copier (Large)	250	No		
Health Department	4	Printer/Copier (Large)	250	No		
General accounting	2	Printer/Copier (Large)	250	No		
Mayors Lounge	2	Printer/Copier (Large)	250	No		
City Clerk	1	Projector	300	No		
Health Department	1	Projector	300	No		

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
City Clerk	5	Refrigerator (Mini)	60	No		
Health Department	2	Refrigerator (Mini)	60	No		
General accounting	4	Refrigerator (Mini)	60	No		
Mayors Lounge	2	Refrigerator (Mini)	60	No		
Customer service	2	Refrigerator (Residential)	200	No		
Information Systems	2	Refrigerator (Residential)	200	No		
Health Department	2	Refrigerator (Residential)	200	No		
General accounting	1	Refrigerator (Residential)	200	No		
City Clerk	3	Television	80	No		
Information Systems	4	Television	80	No		
Health Department	2	Television	80	No		
Mayors Lounge	1	Television	80	No		
Customer service	2	Toaster Oven	1,200	No		
City Clerk	1	Toaster Oven	1,200	No		
Information Systems	2	Toaster Oven	1,200	No		
Health Department	1	Toaster Oven	1,200	No		
General accounting	2	Toaster Oven	1,200	No		
Customer service	1	Water Cooler	250	No		
Information Systems	1	Water Cooler	250	No		
General accounting	3	Water Cooler	250	No		
Mayors Lounge	2	Water Cooler	250	No		

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Health Department	1	Glass Fronted Refrigerated	13	Yes	0.1	1,209	0	$172	$230	$0	1.3

Custom (High Level) Measure Analysis

Heat Pump Water Heater

Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	SF of Area Served	Fuel Type	Input Capacity per Unit (kW)	Tank Capacity per Unit (Gal)	Description	COP	Tank Capacity per Unit (Gal)	Estimated Unit Cost	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Payback w/ Incentives in Years
Storage Tank Water Heater (>50 Gal)	City Hall	20,000	Electric	18.0	119	Heat Pump Water Heater	2.5	119	$4,544.73	0.00	16,882	0	$2,399	$9,400	$0	$0	$0	$9,400	3.92	3.92

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]

Vineland City Hall

Primary Property Type: Social/Meeting Hall
Gross Floor Area (ft²): 94,497
Built: 1971

For Year Ending: February 28, 2021
Date Generated: March 23, 2022

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
Vineland City Hall 640 E Wood Street Vineland, New Jersey 08360	City of Vineland 640 E Wood Street Vineland, NJ 08360 856 794 4000	Ariana McTamney 640 E Wood Street Vineland, NJ 08360 856 794 4000 amctamney@vinelandcity.org

Property ID: 19061134

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
148.1 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	2,650,594 (19%)	
Electric - Grid (kBtu)	11,349,043 (81%)	

Source EUI
365.7 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	44.4
National Median Source EUI (kBtu/ft²)	109.6
% Diff from National Median Source EUI	234%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,195

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	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
TREC	*Transition Incentive Renewable Energy Certificate:* a factorized renewable energy certificate you can earn from the state for energy produced from a photovoltaic array.
T5, T8, T12	A reference to a linear lamp diameter. The number represents increments of 1/8th of an inch.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
therm	100,000 Btu. Typically used as a measure of natural gas consumption.
tons	A unit of cooling capacity equal to 12,000 Btu/hr.
Turnkey	Provision of a complete product or service that is ready for immediate use.
VAV	*Variable air volume*
VFD	*Variable frequency drive*: a controller used to vary the speed of an electric motor.
WaterSense™	The symbol for water efficiency. The WaterSense™ program is managed by the EPA.
Watt (W)	Unit of power commonly used to measure electricity use.