Local Government Energy Audit Report

Public Safety Building and Town Hall

August 10, 2023

Prepared for:

Piscataway Township
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Piscataway, New Jersey 08854

Prepared by:

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Disclaimer

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

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

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

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

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

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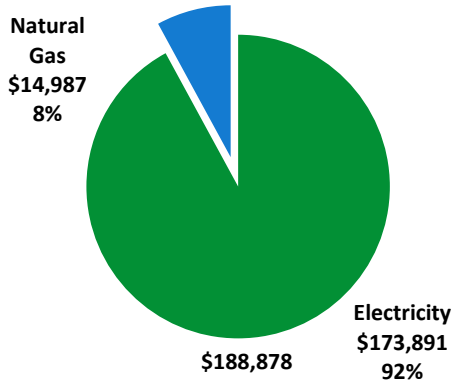
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Public Safety Building and Town 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: $188,878 Electricity: 1,139,864 kWh Natural Gas: 15,881 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.

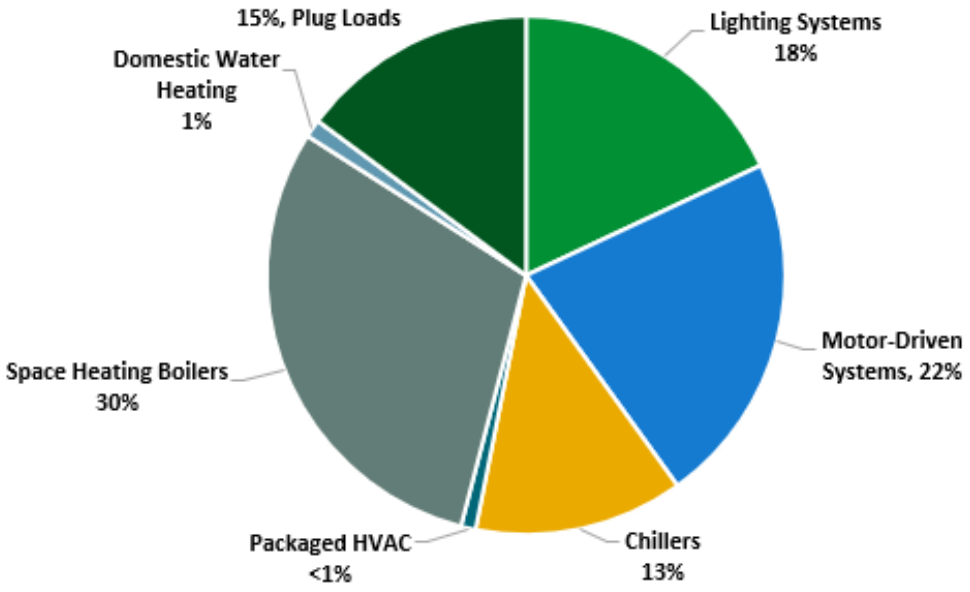


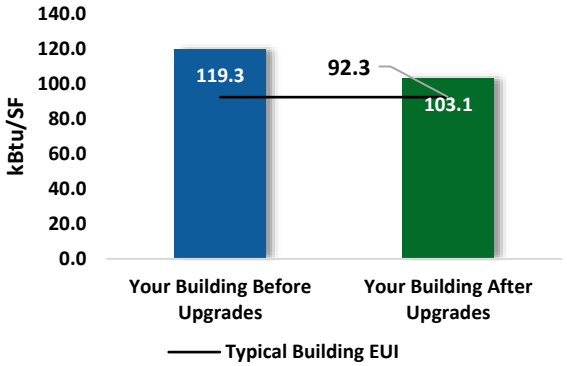
Figure 1 - Energy Use by System

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.

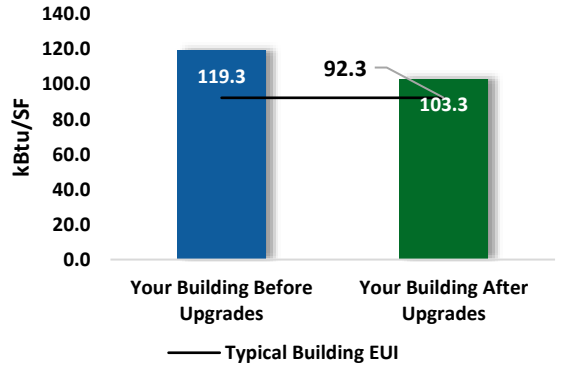
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$194,139
Potential Rebates & Incentives[1]	$22,869
Annual Cost Savings	$34,329
Annual Energy Savings	Electricity: 226,898 kWh Natural Gas: -303 Therms
Greenhouse Gas Emission Savings	112 Tons
Simple Payback	5.0 Years
Site Energy Savings (All Utilities)	14%



Scenario 2: Cost Effective Package[2]

Installation Cost	$119,709
Potential Rebates & Incentives	$17,919
Annual Cost Savings	$34,089
Annual Energy Savings	Electricity: 225,322 kWh Natural Gas: -303 Therms
Greenhouse Gas Emission Savings	112 Tons
Simple Payback	3.0 Years
Site Energy Savings (all utilities)	13%



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			**126,027**	**24.2**	**-25**	**$18,991**	**$42,374**	**$7,192**	**$35,182**	**1.9**	**123,998**
ECM 1	Install LED Fixtures	Yes	4,700	0.2	-1	$712	$2,572	$150	$2,422	3.4	4,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	279	0.2	0	$42	$257	$40	$217	5.2	274
ECM 3	Retrofit Fixtures with LED Lamps	Yes	121,049	23.9	-24	$18,238	$39,545	$7,002	$32,543	1.8	119,055
Lighting Control Measures			**25,497**	**4.2**	**-5**	**$3,838**	**$20,344**	**$3,955**	**$16,389**	**4.3**	**25,040**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	22,645	3.8	-5	$3,409	$18,094	$2,415	$15,679	4.6	22,239
ECM 5	Install High/Low Lighting Controls	Yes	2,852	0.4	-1	$429	$2,250	$1,540	$710	1.7	2,801
Variable Frequency Drive (VFD) Measures			**54,476**	**8.6**	**0**	**$8,311**	**$50,681**	**$6,600**	**$44,081**	**5.3**	**54,857**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	3,210	0.9	0	$490	$4,555	$200	$4,355	8.9	3,232
ECM 7	Install VFDs on Chilled Water Pumps	Yes	34,343	5.6	0	$5,239	$25,126	$4,000	$21,126	4.0	34,583
ECM 8	Install VFDs on Heating Water Pumps	Yes	16,924	2.1	0	$2,582	$21,000	$2,400	$18,600	7.2	17,042
Unitary HVAC Measures			**671**	**0.3**	**0**	**$102**	**$5,232**	**$0**	**$5,232**	**51.1**	**676**
ECM 9	Install High Efficiency Air Conditioning Units	No	671	0.3	0	$102	$5,232	$0	$5,232	51.1	676
Electric Chiller Replacement			**905**	**-3.1**	**0**	**$138**	**$69,198**	**$4,950**	**$64,248**	**465.4**	**911**
ECM 10	Install High Efficiency Chillers	No	905	-3.1	0	$138	$69,198	$4,950	$64,248	465.4	911
Domestic Water Heating Upgrade			**5,561**	**0.0**	**0**	**$848**	**$143**	**$72**	**$72**	**0.1**	**5,600**
ECM 11	Install Low-Flow DHW Devices	Yes	5,561	0.0	0	$848	$143	$72	$72	0.1	5,600
Food Service & Refrigeration Measures			**3,224**	**0.4**	**0**	**$492**	**$460**	**$100**	**$360**	**0.7**	**3,246**
ECM 12	Vending Machine Control	Yes	3,224	0.4	0	$492	$460	$100	$360	0.7	3,246
Custom Measures			**10,537**	**0.0**	**0**	**$1,608**	**$5,706**	**$0**	**$5,706**	**3.5**	**10,611**
ECM 13	Replace Electric Water Heater with Heat Pump Water Heater	Yes	10,537	0.0	0	$1,608	$5,706	$0	$5,706	3.5	10,611
TOTALS (COST EFFECTIVE MEASURES)			**225,322**	**37.4**	**-30**	**$34,089**	**$119,709**	**$17,919**	**$101,790**	**3.0**	**223,352**
TOTALS (ALL MEASURES)			**226,898**	**34.6**	**-30**	**$34,329**	**$194,139**	**$22,869**	**$171,270**	**5.0**	**224,939**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

Options from Your Utility Company

Prescriptive and Custom Rebates

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

Direct Install

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

Engineered Solutions

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

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

Options from New Jersey's Clean Energy Program

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

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

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

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

Successor Solar Incentive Program (SuSI)

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

Ongoing Electric Savings with Demand Response

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

Large Energy User Program (LEUP)

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

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

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Public Safety Building and Town 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 February 22, 2023, TRC performed an energy audit at the Public Safety Building and Town Hall located in Piscataway, New Jersey. TRC met with Jim Ferratti to review the facility operations and help focus our investigation on specific energy-using systems.

The Public Safety Building and the Town Hall share the same electric meter and will both be accounted for in this report.

The Piscataway Public Safety Building is a single-story, 27,164 square foot building built in 1975. Spaces include offices, meeting rooms, holding cells, corridors, restrooms, server room, dispatch center, and electrical and attic mechanical spaces. A parking lot canopy primed for solar panel installation covers fleet vehicles and is attached to the building's electric meter. The facility is 100% cooled by two air-cooled scroll chillers and supplementary systems such as ductless mini splits and split-system air source heat pumps. Two gas-fired condensing hot water boilers are responsible for 100% of the building's heating.

Town Hall is a single-story, 18,731 square foot building built in 1968. Spaces include offices, meeting rooms, corridors, restrooms, server room, basement, and electrical and attic mechanical spaces. An air-cooled scroll chiller serves to cool 100% of the facility along with a ductless mini split dedicated to cool the IT room. 100% of the facility is heated by two gas-fired condensing hot water boilers.

Aerial View of Facilities

Recent improvements and Facility Concerns

From 2018-2020 the Public Safety Building upgraded some of the HVAC systems and in 2021, installed bullet proof windows. Reported high energy consumption has caused concern with facility staff.

There have been no major facility improvements except for a renovation of a basement bathroom. Primary concerns for Town Hall include upgrading all lighting to LED technology and dehumidification, since the chiller does not address humidity problems at the facility.

2.2 Building Occupancy

The Public Safety Building operates continuously with maintenance hours occurring during the day. There is an average occupancy count of 65 staff but is lower for the night shift. A court room located at the front of the building is used from 8:00 AM to 5:00 PM during the week.

Town Hall operates from 8:30 AM to 4:30 PM during the week with the janitorial hours extending to 6:00 PM. Average occupancy count varies from 30 to 80 people.

Note: the energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary depending on changes to building use patterns.

Building Name	Weekday/Weekend	Operating Schedule
Public Safety Building Hours	Weekday	12:00 AM – 12:00 AM
	Weekend	12:00 AM – 12:00 AM
Public Safety Building Court Hours	Weekday	8:00 AM – 5:00 PM
	Weekend	N/A
Town Hall Office Hours	Weekday	8:30 AM – 4:30 PM
	Weekend	N/A
Town Hall Janitorial Hours	Weekday	8:30 AM – 6:00 PM
	Weekend	N/A

Figure 3 - Building Occupancy Schedule

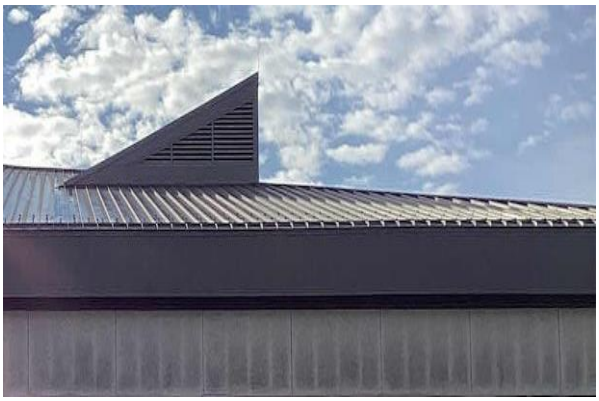
2.3 Building Envelope

The Public Safety Building is comprised of concrete masonry units (CMUs) with a red brick façade. The original building structure featured a flat EPDM roof. A standing seam metal roof was built over the original EPDM roof thus creating an attic space where the attic floor is the old EPDM roofing. The attic space houses HVAC equipment such as exhaust fans, air handling units (AHUs), mini-split AC systems, and heating and chilled water pumps. The nearby parking lot canopy has a sloped metal roof designed to house a solar panel array.

The building envelope, EPDM attic floor, and standing seam roof are in good condition. Facility windows are non-operable, bullet proof, and have a good seal between the glass and frame. All windows are in good condition. Exterior doors consist of a mix of solid metal and aluminum framed glass units; both of which are also in good condition.

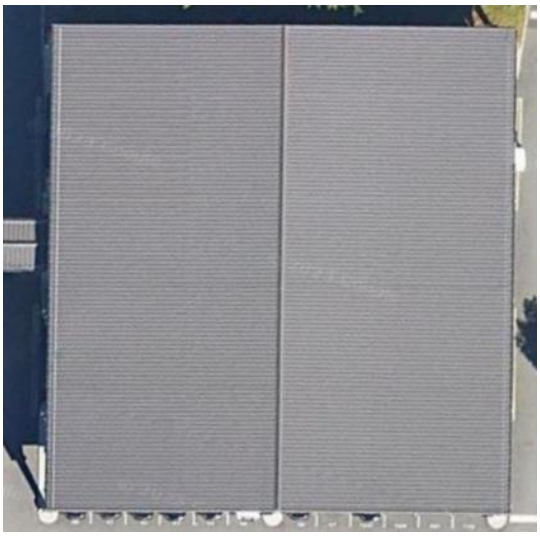
Exterior Walls

Exterior Walls



Standing Seam Metal Roof

EPDM Attic Floor



Police Canopy

Windows

Glass Doors

Solid Metal Doors

Town Hall Building walls are comprised of CMUs and a red brick façade; both of which are in good condition. The original building structure featured a flat EPDM roof. A standing seam metal roof was built over the original EPDM roof thus creating an attic space where the attic floor is the old EPDM roof.

The attic mechanical space houses HVAC equipment including exhaust fans and vertical fan coil units (VFCU). Facility windows are double paned, operable, and sealed well. The facility's exterior doors are comprised of aluminum framed glass units and are in good condition.

Exterior Walls

Exterior Walls

Standing Seam Metal Roof

EPDM Attic Floor

Windows

Exterior Doors

2.4 Lighting Systems

The Public Safety Building's primary lighting system includes a mix of LED and fluorescent lighting. Main indoor lighting includes 2-foot and 4-foot T8 linear fluorescent tubes, as well as T8 equivalent linear LED tubes which make up the second largest portion of the lighting. All emergency exit signs are up to date with LED technology. Other lighting technology includes T12 linear fluorescent tubes, metal halide, and compact fluorescent lamps (CFL). Common fixtures include parabolic, can, and retrofit drop ceiling fixtures with two, three, or four lamps per fixture.

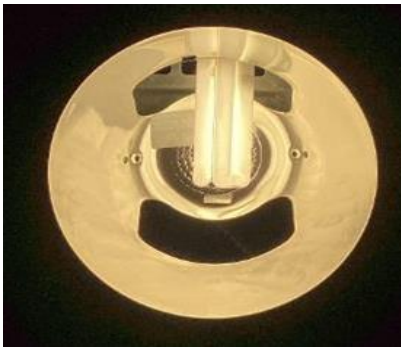
Lighting is mainly controlled by manual wall switches with occupancy sensors present only in select offices and restrooms. During the audit, multiple unoccupied spaces were observed with their lighting systems operating. Retrofitting inefficient fixtures and installing automatic lighting controls such as occupancy sensors will help reduce lighting energy consumption. The mechanical room, corridors, court room, locker rooms, restrooms, and office spaces are typical of areas that have not been upgraded to LED light sources. Overall, the current lighting system is in good condition with adequate light levels.

Exterior lighting is provided by metal halide and LED technology. Fixtures are in good condition and are controlled by photocell. Most of the parking lot and exterior lighting is provided by 69-Watt LED pole lights and LED wall packs.

Exit Sign

Exit Sign, 2-Foot Linear Fluorescent Tubes

4-Foot Linear Fluorescent Tubes



Recessed Double Biaxial CFL Bulb

2-Foot U-Bend Fluorescent Tubes

Wall Mounted Occupancy Sensor with Switch

Ceiling Mounted Occupancy Sensor

Exterior LED Wall Pack

Pole Mounted LED Light

Town Hall lighting is provided by a mix of CFLs, LED, and linear fluorescent technology. Four-foot linear fluorescent tubes and 2-foot U-bend fluorescent tubes are the most common lamp types. Halogen spotlights with MR16 bulbs provide lighting in the Town Hall meeting room, and main north and south corridors. Double biaxial CFLs are used throughout the building. Exit signs use LED technology. Lighting fixtures include recessed can, parabolic, prismatic, and retrofit drop ceiling fixtures with two, three, or four lamps per fixture.

Manual wall switches control most Town Hall light fixtures, with a small amount of occupancy sensors used in the main corridors, restrooms, break rooms, offices, and conference rooms. Numerous spaces have not been upgraded to LED lighting, including the basement, boiler room, main corridors, offices, IT room, and restrooms. Overall, interior lighting is in good condition with sufficient light levels being met.

Photocells control the exterior lighting, which is comprised of recessed CFLs and an LED floodlight. The parking lot is shared with the Public Safety Building. Overall, exterior lighting is in good condition.

4-Foot Linear Fluorescent Tubes

2-Foot Linear Fluorescent Tube

2-Foot U-Bend Fluorescent Tubes

Exit Sign

Triple Tube Biaxial CFL Bulb

Halogen Spotlight

Wall Mounted Occupancy Sensor

Exterior Recessed Can & LED Spotlight

Exterior Recessed Can & LED Spotlight

2.5 Air Handling Systems

Unit Ventilators

Unit ventilators (UV) throughout Town Hall are equipped with supply fan motors and digitally controlled outside air dampers. The UVs are connected to the hot and chilled water distribution systems to provide heating and cooling to various spaces. UVs also modulate ventilation. The units are in good condition.

Horizontal Fan Coil Unit (FCU)

BAS Screenshot - Horizontal FCU

Unitary Electric HVAC Equipment

The Public Safety Building houses unitary HVAC equipment including a one-ton window AC unit located in a closet, two, 3.5 ton ductless mini-split AC systems located in the attic, and one, 1.5-ton split system air source heat pump located in the back parking lot. They serve a storage closet, IT closet, and other various spaces in the building, respectively.

The seasonal energy efficiency ratio (SEER) for each unit ranges from 10 to 15.6. The window AC unit and one of the ductless mini split AC systems are operating beyond their useful life and have been evaluated for replacement while the rest of the equipment is in good condition. These are controlled by programmable thermostats.

Window AC Unit

Mini Split AC

Window AC Unit & Mini Split AC

Town Hall has a single 2.5-ton ductless mini split AC system that serves the IT room. This unit's SEER is 17.5. It is operating beyond its useful life, and replacement has been evaluated. The split system is locally controlled.

Town Hall - Ductless Mini Split AC

Air Handling Units (AHUs)

The Public Safety Building is conditioned by six air handling units (AHUs) located in the attic mechanical space. The AHUs are equipped with hot water and chilled water coils, economizers, and supply and return fans that are controlled by variable frequency drives (VFDs). Each unit contains hydronic pre-heat coils. The AHUs are operated for long hours to accommodate the needs of the facility. The units are in good condition and are controlled by the BAS.

Air distribution is provided to supply air registers by ducts concealed above the ceiling. Heated and cooled air is distributed through ductwork to variable air volume (VAV) terminals concealed above the ceiling.

Unit	Area Served	Cooling Coil	Hot Water Coil	Supply Fan (hp)	Return/Exhaust Fan (hp)
AHU-1	Public Safety Building	Yes	Yes	7.5	5.0
AHU-2	Public Safety Building	Yes	Yes	5.0	3.0
AHU-3	Public Safety Building	Yes	Yes	5.0	5.0
AHU-4	Public Safety Building	Yes	Yes	7.5	5.0
AHU-5	Public Safety Building	Yes	Yes	3.0	1.0
AHU-6	Public Safety Building	Yes	Yes	3.0	N/A

AHU-3

AHU-3 Supply Motor

BAS Screenshot AHU-3

Town Hall is conditioned by two air handling units (AHUs) located in the basement and boiler room. The BAS controls both AHUs. Vertical and horizontal fan coil units (VFCUs and HFCUs) condition the rest of the building. The AHUs are equipped with hot water and chilled water coils and supply fans. A variable frequency drive (VFD) controls AHU-2's supply fan. AHU-1 is not equipped with a VFD. The units are in good condition and are controlled by the BAS.

There are no VAV boxes at Town Hall. Valves equipped on the HFCUs and VFCUs control the temperature by modulating the amount of hot or chilled water that flows into the local coil.

Unit	Location	Cooling Coil	Hot Water Coil	Supply Fan (hp)	Return/Exhaust Fan (hp)
AHU-1	Boiler Room	Yes	Yes	3.0	N/A
AHU-2	Basement	Yes	Yes	3.0	N/A

Town Hall AHU-2

AHU-2 VFD

Nameplate

2.6 Building General Exhaust Air Systems

General exhaust fans ventilate restrooms, corridors, offices, and other spaces.

Fractional horsepower motors drive the Public Safety Building fans, most of which appear to be in fair condition. There are some exhaust fans that are currently out of service. The BAS reports the status of the exhaust fans; there is no control logic for them.

Public Safety Building - EF-2

Town Hall also uses fractional horsepower motors for the exhaust fans. They are in good condition and are operating within their useful life. The BAS only reports an on/off status for the exhaust fans; there is no control logic for them.

Town Hall - EF-1

2.7 Heating Hot Water Systems

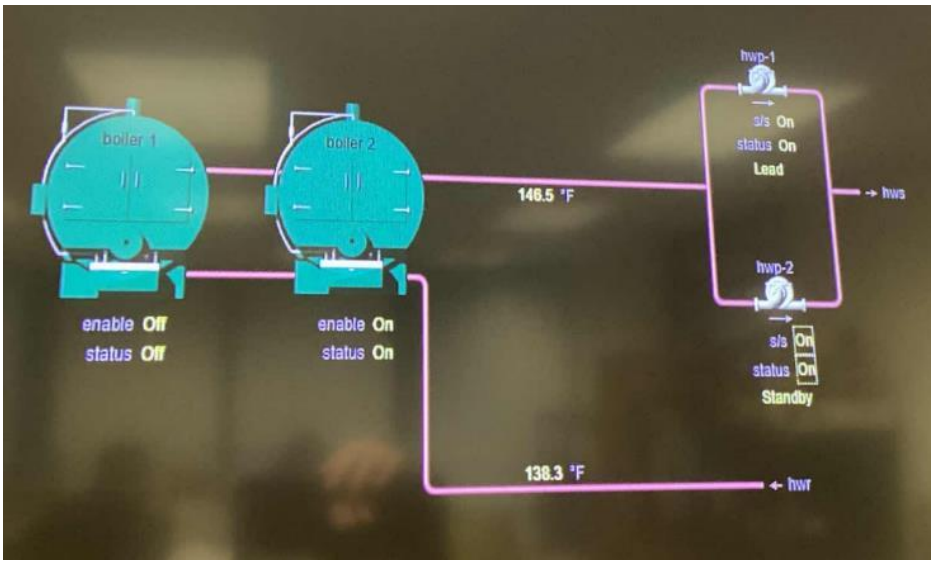
A total of four, 959 MBh Raypack XTherm condensing hot water boilers serve the Public Safety Building and Town Hall with two boilers at each site. The boilers run on a lead-lag scheme at a nominal efficiency of 95%. The facility replaced old boilers in 2017 and the new units are in good condition.

Two constant speed, 3 hp heating hot water (HHW) pumps located in the Public Safety Building boiler room distribute the hot water to AHUs, hydronic unit heaters, and fin tube radiators. Each AHU is equipped with a fractional horsepower booster pump. The addition of VFD control for the two, 3 hp motors has been evaluated.

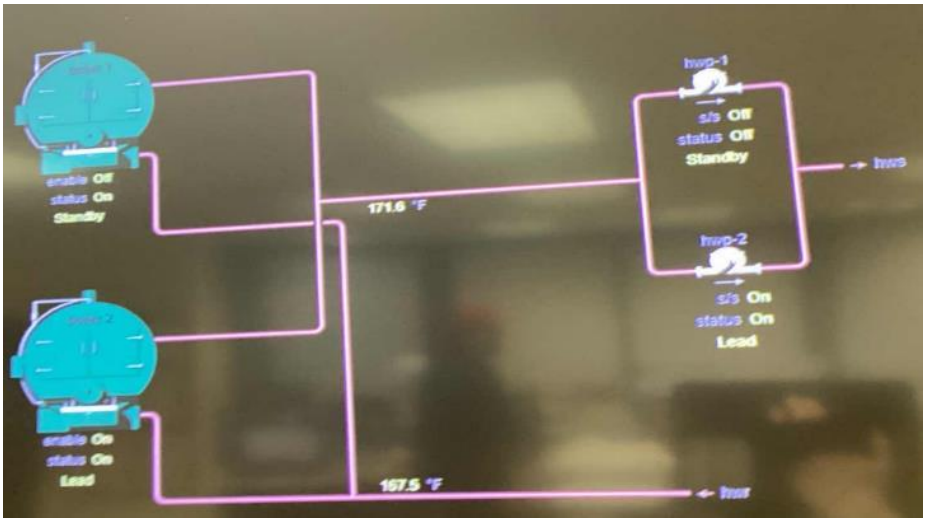
Two constant speed, 7.5 hp HHW pumps located in Town Hall's boiler room distribute the hot water to AHUs and horizontal and vertical fan coil units. The addition of VFD control has been evaluated for these motors. Pipe insulation is sufficient and in good condition at both sites.

The BAS controls the boilers which run on an algorithm based on outside air temperature. During the audit, the hot water supply and return temperatures for the Public Safety Building were 146.5°F and 138.3°F, respectively. Hot water supply and return temperature for Town Hall was 171.6°F and 167.5°F. Note that condensing boilers need a low return water temperature, typically between 80˚F and 120˚F, to condense the hot flue gas and operate efficiently. As the return water temperature rises, the Thermal Efficiency (TE) drops as less of the exhaust gas condenses. If operated with high return temperatures, condensing boilers lose much of their efficiency gain over conventional boilers.

Public Safety Building Condensing Boilers



Public Safety Building BAS Screenshot - Hot Water Loop



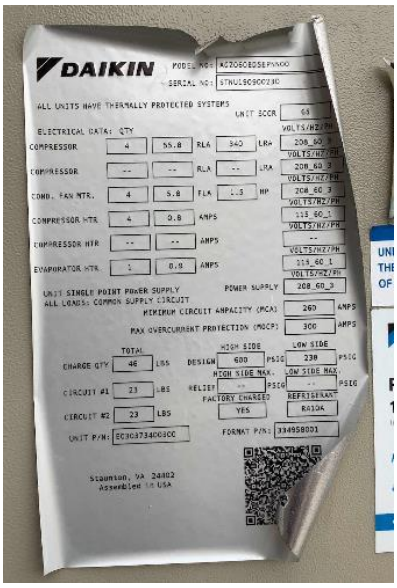
Town Hall BAS Screenshot - Hot Water Loop

2.8 Chilled Water Systems

The Public Safety Building chiller plant consists of two, 60-ton air cooled scroll chillers (CH 1 and CH 2) located on an exterior pad situated at the rear of the building. The chillers have a total of four, 5 horsepower chilled water (CHW) pumps. Two primary pumps located next to the chillers circulate water between the chillers and two secondary pumps located in the attic circulate the water to the AHUs. VFDs control the two secondary pumps. The primary pumps operate at constant speed, and VFD control has been evaluated for this system. The chillers run based on outside air temperature (OAT) with water distribution temperatures around 41°F. Glycol is present in the first half of the chiller loop to prevent water from freezing outside and stops at the heat exchanger. The chiller serves the building AHUs, which are responsible for most of the cooling. In 2019 the chillers were replaced and are currently in good condition.

Public Safety Building Chiller Plant

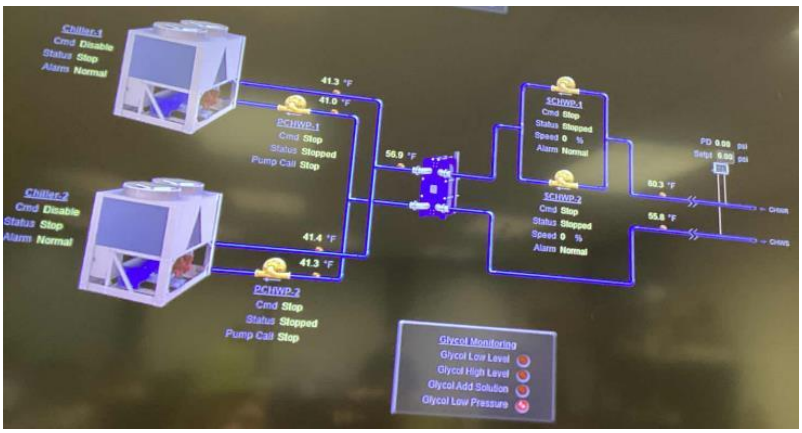
Chiller



Nameplate

Primary CHWP

Secondary Pump VFD



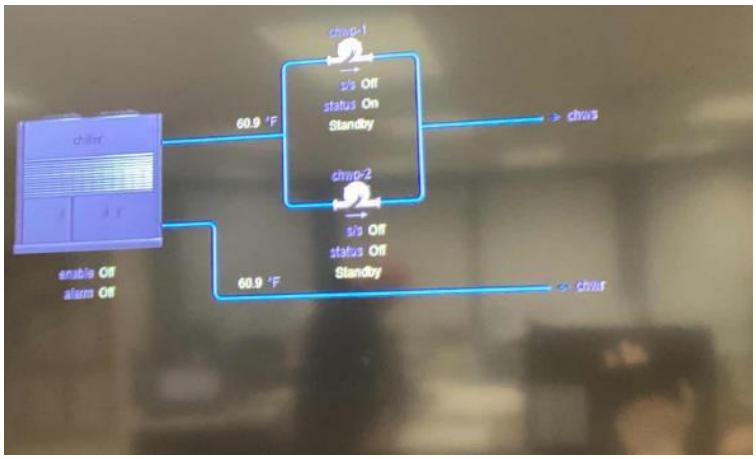
BAS Screenshot

The Town Hall chiller plant consists of one, 55-ton air cooled scroll chiller. The chiller uses two constant speed, 10 hp CHW pumps located in the boiler room. The motors are operating beyond their useful life but remain in good condition. VFD control has been evaluated for these pump motors.

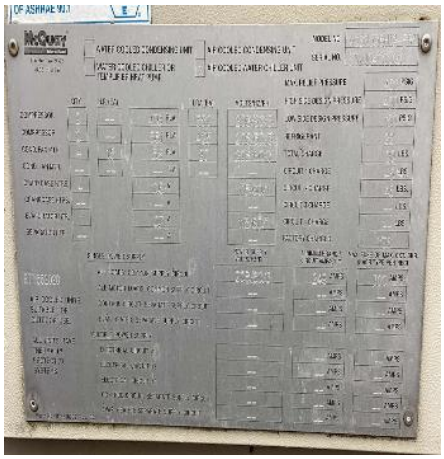
The chillers run based on outside air temperature (OAT). Glycol is present in the chiller loop. The chiller serves all the horizontal and vertical FCUs in the building which are responsible for most of the cooling.

Replacement has been evaluated as the chiller is 19 years old and is near the end of its useful life. Note: large HVAC upgrades and replacements often do not have a reasonable payback period based on energy savings alone. It is up to the facility to determine if a chiller replacement is appropriate.

Town Hall Chiller



BAS Screenshot



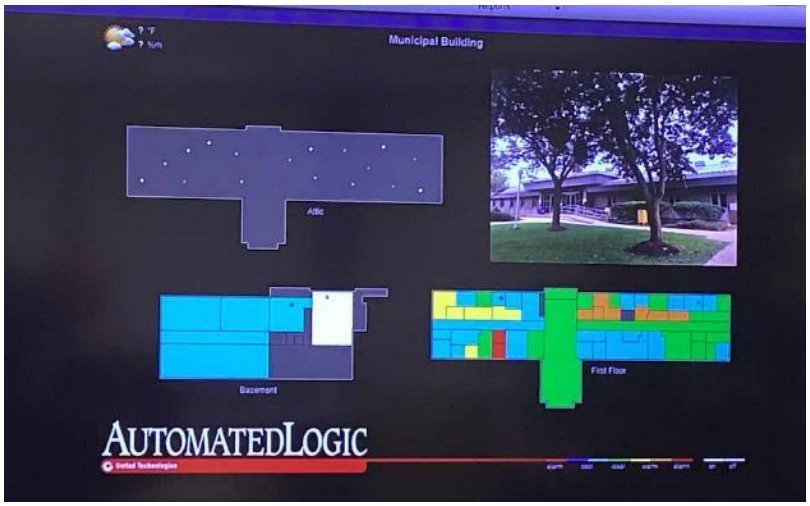
Nameplate

2.9 Building Automation System (BAS)

An Automated Logic system controls the HVAC equipment, boilers, chillers, and AHUs. It also reports status of certain equipment that has no control logic attached, including the Town Hall exhaust fans.

The system provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, and heating and cooling water loop temperatures.

Some of the equipment appears to be mislabeled in the BAS screen displays.



Town Hall BAS Screenshot

2.10 Domestic Hot Water

An electric Bradford White 80-gallon, 4.5 kW water heater serves the Public Safety Building's domestic hot water (DHW) demand. One fractional horsepower DHW pump circulates the water. The unit is in good condition, within its useful life, and water pipes are insulated.

Electric DHW Heater

An electric Bradford White 50-gallon, 4.5 kW water heater serves the Town Hall's domestic hot water demand. One fractional horsepower DHW pump circulates the water. The unit is brand new, in good condition, and has insulated pipes.

Electric DHW Heater

DHW Pump

2.11 Plug Load and Vending Machines

For the Public Safety Building, plug loads include office and police related equipment. Typical office loads include computers, server room, printers, projectors, universal power supplies (UPS), coffee machines, microwaves, and televisions. There are 68 desktops with an additional 39 monitors throughout the Public Safety Building. Other special equipment includes body camera docks, radio docks, and a driving simulator. Public Safety Building has a file server.

There are seven mini size and five full size residential-style refrigerators. A refrigerated beverage vending machine is also present and is not equipped with occupancy-based controls. Equipment condition and efficiencies vary.

Residential Refrigerator

Vending Machine

For the Town Hall, plug loads include general office equipment. Typical office loads include computers, server room, printers, projectors, universal power supplies (UPS), coffee machines, microwaves, and televisions. There are 38 desktops throughout the Town Hall, and a file server. No special equipment is present.

There are four mini size and three full size residential-style refrigerators in Town Hall. A non-refrigerated snack vending machine and a refrigerated beverage vending machine are in the break room. Neither vending machine is equipped with occupancy-based controls. Equipment condition and efficiencies vary.

Snack Vending Machine

Snack Vending Machine

2.12 Water-Using Systems

There are numerous restrooms with toilets, urinals, and sinks. There is a single shower in the men's locker room of the Public Safety Building rated at 1.5 gallons per minute (gpm). Faucet flow rates are 2.2 gpm or lower. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf. There is room for improvement to reduce the site's water usage.

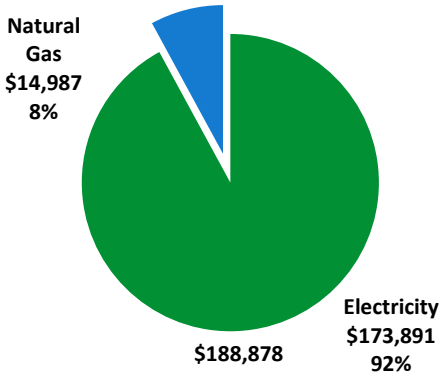
Kitchen Faucet

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	1,139,864 kWh	$173,891
Natural Gas	15,881 Therms	$14,987
Total		**$188,878**



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

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

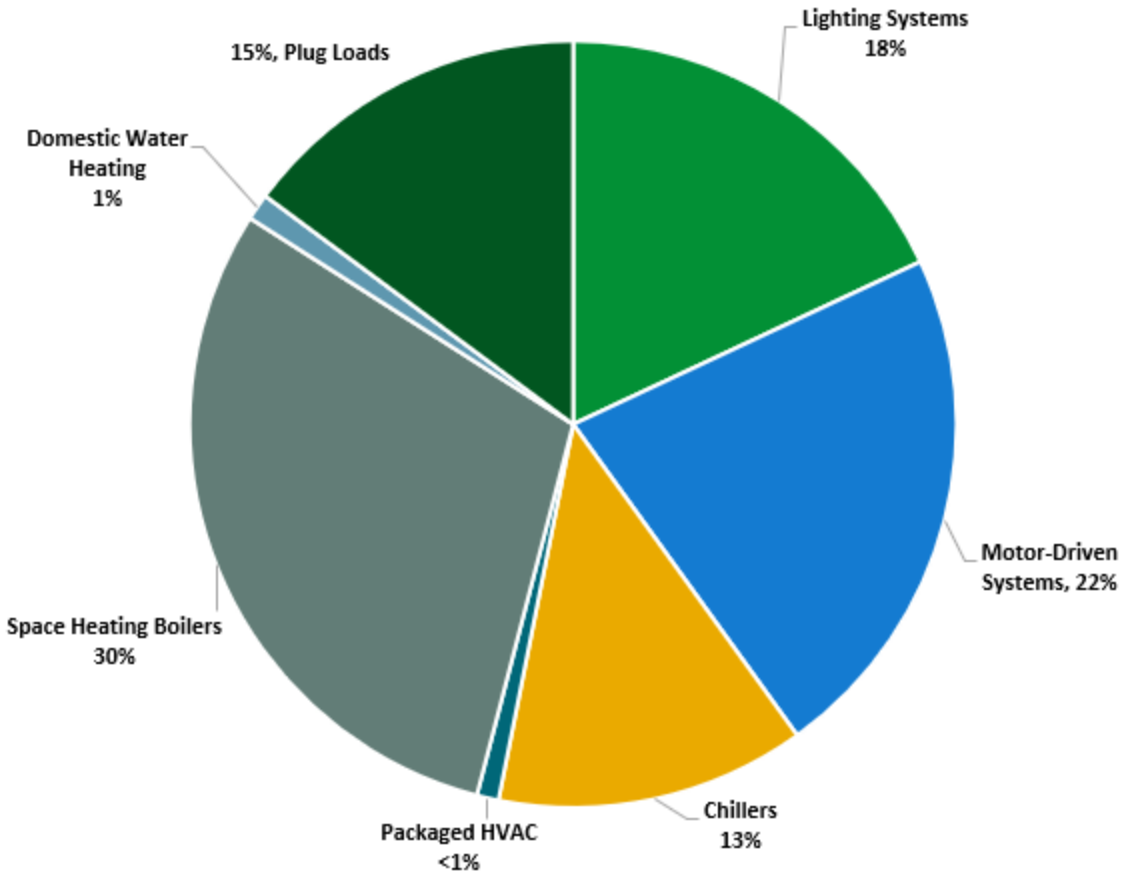
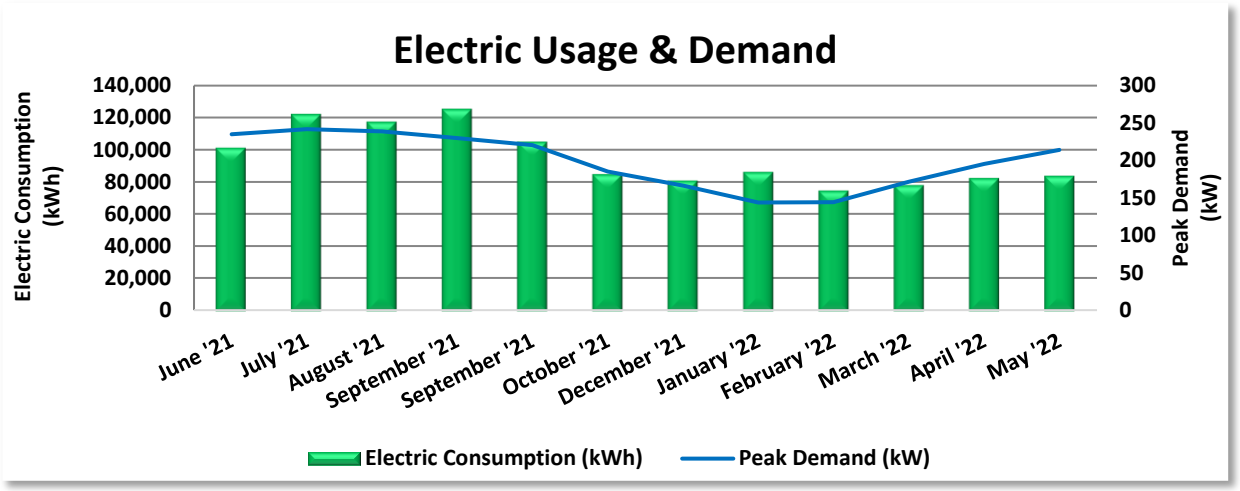


Figure 4 - Energy Balance

3.1 Electricity

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



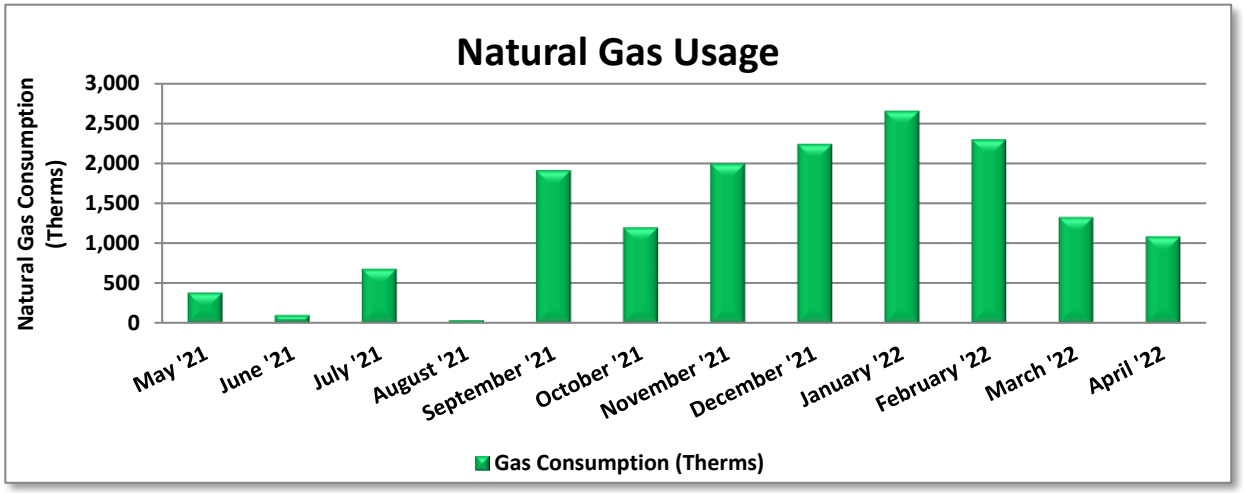
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/17/21	30	100,912	235	$3,014	$17,260
7/19/21	32	121,785	242	$3,103	$20,048
8/17/21	29	117,170	239	$3,069	$18,885
9/16/21	30	125,100	230	$2,951	$19,771
10/15/21	29	104,868	220	$836	$15,060
11/15/21	31	84,725	185	$703	$12,317
12/16/21	31	80,760	166	$631	$11,724
1/19/22	34	86,111	144	$546	$12,343
2/16/22	28	74,488	144	$548	$10,804
3/18/22	30	77,953	171	$651	$11,364
4/19/22	32	82,285	195	$741	$12,026
5/18/22	29	83,707	214	$812	$12,290
Totals	**365**	**1,139,864**	**242**	**$17,605**	**$173,891**
Annual	**365**	**1,139,864**	**242**	**$17,605**	**$173,891**

Notes:

- Peak demand of 242 kW occurred in July '21.
- Average demand over the past 12 months was 199 kW.
- The average electric cost over the past 12 months was $0.153/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.
- Note: Both the Public Safety Building and the Town Hall share the same electric meter. Therefore, the electric billing data for both sites has been combined.

3.2 Natural Gas

PSE&G delivers natural gas under rate class Large Volume Gas, with natural gas supply provided by Direct Energy, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/11/21	29	384	$415
7/13/21	32	102	$249
8/12/21	30	679	$583
9/13/21	32	41	$209
10/13/21	30	1,908	$1,468
11/10/21	28	1,195	$1,322
12/13/21	33	1,992	$1,922
1/13/22	31	2,235	$2,125
2/10/22	28	2,646	$2,453
3/14/22	32	2,293	$2,184
4/12/22	29	1,322	$1,119
5/13/22	31	1,084	$939
Totals	**365**	**15,881**	**$14,987**
Annual	**365**	**15,881**	**$14,987**

Notes:

- The average gas cost for the past 12 months is $0.944/therm, which is the blended rate used throughout the analysis.
- Note: The Town Hall and Public Safety Building each have a dedicated gas meter. The combined usage is shown.

3.3 Benchmarking

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

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

Benchmarking Score	**N/A**

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

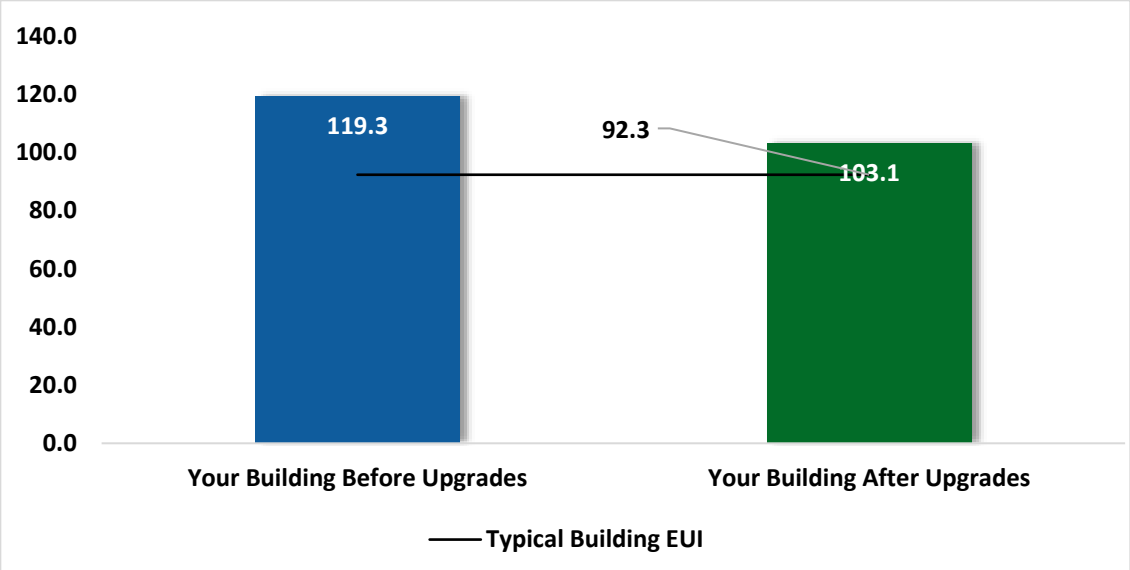


Figure 5 - Energy Use Intensity Comparison[3]

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

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**126,027**	**24.2**	**-25**	**$18,991**	**$42,374**	**$7,192**	**$35,182**	**1.9**	**123,998**
ECM 1	Install LED Fixtures	Yes	4,700	0.2	-1	$712	$2,572	$150	$2,422	3.4	4,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	279	0.2	0	$42	$257	$40	$217	5.2	274
ECM 3	Retrofit Fixtures with LED Lamps	Yes	121,049	23.9	-24	$18,238	$39,545	$7,002	$32,543	1.8	119,055
Lighting Control Measures			**25,497**	**4.2**	**-5**	**$3,838**	**$20,344**	**$3,955**	**$16,389**	**4.3**	**25,040**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	22,645	3.8	-5	$3,409	$18,094	$2,415	$15,679	4.6	22,239
ECM 5	Install High/Low Lighting Controls	Yes	2,852	0.4	-1	$429	$2,250	$1,540	$710	1.7	2,801
Variable Frequency Drive (VFD) Measures			**54,476**	**8.6**	**0**	**$8,311**	**$50,681**	**$6,600**	**$44,081**	**5.3**	**54,857**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	3,210	0.9	0	$490	$4,555	$200	$4,355	8.9	3,232
ECM 7	Install VFDs on Chilled Water Pumps	Yes	34,343	5.6	0	$5,239	$25,126	$4,000	$21,126	4.0	34,583
ECM 8	Install VFDs on Heating Water Pumps	Yes	16,924	2.1	0	$2,582	$21,000	$2,400	$18,600	7.2	17,042
Unitary HVAC Measures			**671**	**0.3**	**0**	**$102**	**$5,232**	**$0**	**$5,232**	**51.1**	**676**
ECM 9	Install High Efficiency Air Conditioning Units	No	671	0.3	0	$102	$5,232	$0	$5,232	51.1	676
Electric Chiller Replacement			**905**	**-3.1**	**0**	**$138**	**$69,198**	**$4,950**	**$64,248**	**465.4**	**911**
ECM 10	Install High Efficiency Chillers	No	905	-3.1	0	$138	$69,198	$4,950	$64,248	465.4	911
Domestic Water Heating Upgrade			**5,561**	**0.0**	**0**	**$848**	**$143**	**$72**	**$72**	**0.1**	**5,600**
ECM 11	Install Low-Flow DHW Devices	Yes	5,561	0.0	0	$848	$143	$72	$72	0.1	5,600
Food Service & Refrigeration Measures			**3,224**	**0.4**	**0**	**$492**	**$460**	**$100**	**$360**	**0.7**	**3,246**
ECM 12	Vending Machine Control	Yes	3,224	0.4	0	$492	$460	$100	$360	0.7	3,246
Custom Measures			**10,537**	**0.0**	**0**	**$1,608**	**$5,706**	**$0**	**$5,706**	**3.5**	**10,611**
ECM 13	Replace Electric Water Heater with Heat Pump Water Heater	Yes	10,537	0.0	0	$1,608	$5,706	$0	$5,706	3.5	10,611
TOTALS			**226,898**	**34.6**	**-30**	**$34,329**	**$194,139**	**$22,869**	**$171,270**	**5.0**	**224,939**

* - 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		**126,027**	**24.2**	**-25**	**$18,991**	**$42,374**	**$7,192**	**$35,182**	**1.9**	**123,998**
ECM 1	Install LED Fixtures	4,700	0.2	-1	$712	$2,572	$150	$2,422	3.4	4,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	279	0.2	0	$42	$257	$40	$217	5.2	274
ECM 3	Retrofit Fixtures with LED Lamps	121,049	23.9	-24	$18,238	$39,545	$7,002	$32,543	1.8	119,055
Lighting Control Measures		**25,497**	**4.2**	**-5**	**$3,838**	**$20,344**	**$3,955**	**$16,389**	**4.3**	**25,040**
ECM 4	Install Occupancy Sensor Lighting Controls	22,645	3.8	-5	$3,409	$18,094	$2,415	$15,679	4.6	22,239
ECM 5	Install High/Low Lighting Controls	2,852	0.4	-1	$429	$2,250	$1,540	$710	1.7	2,801
Variable Frequency Drive (VFD) Measures		**54,476**	**8.6**	**0**	**$8,311**	**$50,681**	**$6,600**	**$44,081**	**5.3**	**54,857**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	3,210	0.9	0	$490	$4,555	$200	$4,355	8.9	3,232
ECM 7	Install VFDs on Chilled Water Pumps	34,343	5.6	0	$5,239	$25,126	$4,000	$21,126	4.0	34,583
ECM 8	Install VFDs on Heating Water Pumps	16,924	2.1	0	$2,582	$21,000	$2,400	$18,600	7.2	17,042
Domestic Water Heating Upgrade		**5,561**	**0.0**	**0**	**$848**	**$143**	**$72**	**$72**	**0.1**	**5,600**
ECM 11	Install Low-Flow DHW Devices	5,561	0.0	0	$848	$143	$72	$72	0.1	5,600
Food Service & Refrigeration Measures		**3,224**	**0.4**	**0**	**$492**	**$460**	**$100**	**$360**	**0.7**	**3,246**
ECM 12	Vending Machine Control	3,224	0.4	0	$492	$460	$100	$360	0.7	3,246
Custom Measures		**10,537**	**0.0**	**0**	**$1,608**	**$5,706**	**$0**	**$5,706**	**3.5**	**10,611**
ECM 13	Replace Electric Water Heater with Heat Pump Water Heater	10,537	0.0	0	$1,608	$5,706	$0	$5,706	3.5	10,611
TOTALS		**225,322**	**37.4**	**-30**	**$34,089**	**$119,709**	**$17,919**	**$101,790**	**3.0**	**223,352**

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

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

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**126,027**	**24.2**	**-25**	**$18,991**	**$42,374**	**$7,192**	**$35,182**	**1.9**	**123,998**
ECM 1	Install LED Fixtures	4,700	0.2	-1	$712	$2,572	$150	$2,422	3.4	4,670
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	279	0.2	0	$42	$257	$40	$217	5.2	274
ECM 3	Retrofit Fixtures with LED Lamps	121,049	23.9	-24	$18,238	$39,545	$7,002	$32,543	1.8	119,055

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

ECM 1: Install LED Fixtures

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

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

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

Affected Building Areas: Public Safety Building exterior recessed lamps and Public Safety Building sally port.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected Building Areas:

- **Public Safety Building: a**ttic access.
- **Town Hall**: roof access.

ECM 3: Retrofit Fixtures with LED Lamps

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

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

Affected Building Areas:

- **Public Safety Building**: attorney room, court room, IT closet, training closet, offices, and restrooms.
- **Town Hall**: corridors, meeting room, boiler room, department of administration conference room, exit 3, exit 4, exterior recessed, janitor closet, main entrance, main foyer, supplies closet, offices, and restrooms.

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		**25,497**	**4.2**	**-5**	**$3,838**	**$20,344**	**$3,955**	**$16,389**	**4.3**	**25,040**
ECM 4	Install Occupancy Sensor Lighting Controls	22,645	3.8	-5	$3,409	$18,094	$2,415	$15,679	4.6	22,239
ECM 5	Install High/Low Lighting Controls	2,852	0.4	-1	$429	$2,250	$1,540	$710	1.7	2,801

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

ECM 4: Install Occupancy Sensor Lighting Controls

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

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

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

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

Affected Building Areas:

- **Public Safety Building**: armory, break room, offices, computer lab, conference room, court room, detective bureau, evidence, entrance, internal affairs, operations division, photograph room, planning and logistics, records division, sally port, squad room, SVU, traffic safety, training rooms, and watch command.
- **Town Hall**: basement side room, offices, conference room, department of administration, department of finance, department of health, department of recreation, division of purchasing, HR entrance, main foyer, supplies closet, tax collection, and meeting room.

ECM 5: Install High/Low Lighting Controls

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

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

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

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

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

Affected Building Areas:

- **Public Safety Building**: corridor conference room, corridor court, corridor main hallway.
- **Town Hall**: corridor basement.

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**54,476**	**8.6**	**0**	**$8,311**	**$50,681**	**$6,600**	**$44,081**	**5.3**	**54,857**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	3,210	0.9	0	$490	$4,555	$200	$4,355	8.9	3,232
ECM 7	Install VFDs on Chilled Water Pumps	34,343	5.6	0	$5,239	$25,126	$4,000	$21,126	4.0	34,583
ECM 8	Install VFDs on Heating Water Pumps	16,924	2.1	0	$2,582	$21,000	$2,400	$18,600	7.2	17,042

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 VFD on Variable Air Volume (VAV) Fans

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally require less maintenance than mechanical air volume control devices.

Affected Air Handlers: Town Hall AHU-1.

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.

Affected Pumps:

- **Public Safety Building:** primary 5 hp CHW pumps 1 and 2.
- **Town Hall:** both10 hp CHW pumps.

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.

Affected Pumps:

- **Public Safety Building:** both 3 hp HHW pumps
- **Town Hall:** both 7.5 hp HHW pumps

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**671**	**0.3**	**0**	**$102**	**$5,232**	**$0**	**$5,232**	**51.1**	**676**
ECM 9	Install High Efficiency Air Conditioning Units	671	0.3	0	$102	$5,232	$0	$5,232	51.1	676

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

ECM 9: Install High Efficiency Air Conditioning Units

Replace standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling and heating load, and the estimated annual operating hours.

Affected Units: window AC unit and the Sanyo ductless mini split.

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		**905**	**-3.1**	**0**	**$138**	**$69,198**	**$4,950**	**$64,248**	**465.4**	**911**
ECM 10	Install High Efficiency Chillers	905	-3.1	0	$138	$69,198	$4,950	$64,248	465.4	911

ECM 10: Install High Efficiency Chillers

Replace the older inefficient Town Hall electric chiller with a new high efficiency chiller. 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.

Replacing the chiller has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the chiller is nearing the end of its normal useful life. Typically, the marginal cost of purchasing a high-efficiency chiller can be justified by the marginal savings from the improved efficiency. When the chiller is eventually replaced, consider purchasing equipment that exceed the minimum efficiency required by building codes.

4.6 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		**5,561**	**0.0**	**0**	**$848**	**$143**	**$72**	**$72**	**0.1**	**5,600**
ECM 11	Install Low-Flow DHW Devices	5,561	0.0	0	$848	$143	$72	$72	0.1	5,600

ECM 11: Install Low-Flow DHW Devices

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

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

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

Additional cost savings may result from reduced water usage.

4.7 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		**3,224**	**0.4**	**0**	**$492**	**$460**	**$100**	**$360**	**0.7**	**3,246**
ECM 12	Vending Machine Control	3,224	0.4	0	$492	$460	$100	$360	0.7	3,246

ECM 12: 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.

4.8 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**10,537**	**0.0**	**0**	**$1,608**	**$5,706**	**$0**	**$5,706**	**3.5**	**10,611**
ECM 13	Replace Electric Water Heater with Heat Pump Water Heater	10,537	0.0	0	$1,608	$5,706	$0	$5,706	3.5	10,611

CM 13: Replace Electric Water Heater with Heat Pump Water Heater

A typical electric water heater uses electric resistance coils to heat water at a coefficient of performance (COP) of 1. Air source heat pump water heaters (HPWH) use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. The typical average COP for a HPWH is about 2.5, so they require significantly less electricity to produce the same amount of hot water as a traditional electric water heater. There are two types of HPWH, those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The following addresses integrated HPWH.

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room.[4] The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

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

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

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

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[5]. 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.

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

Lighting Maintenance

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

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

Lighting Controls

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

Motor Controls

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

Motor Maintenance

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

Fans to Reduce Cooling Load

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

Thermostat Schedules and Temperature Resets

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

Economizer Maintenance

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

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

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

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

Optimize HVAC Equipment Schedules

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

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

Water Heater Maintenance

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

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

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

Compressed Air System Maintenance

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

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

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

Computer Monitor Replacement

ENERGY STAR labeled computer monitors can be up to 25% more efficient than standard monitors. ENERGY STAR rated monitors have power consumption requirements for different operating modes such as on, idle, and sleep.

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.

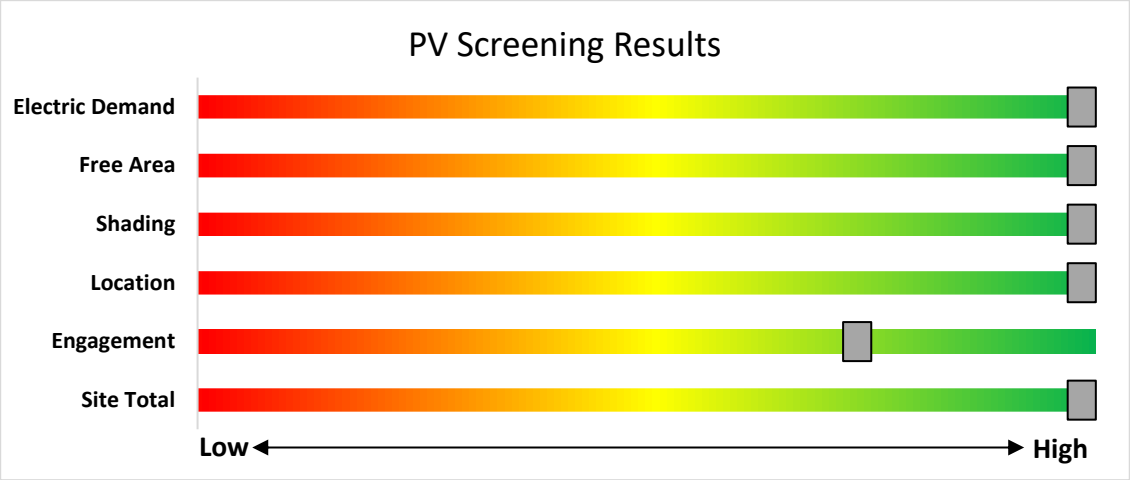
6.1 Solar Photovoltaic

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	189	kW DC STC
Electric Generation	225,169	kWh/yr
Displaced Cost	$34,350	/yr
Installed Cost	$491,400	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

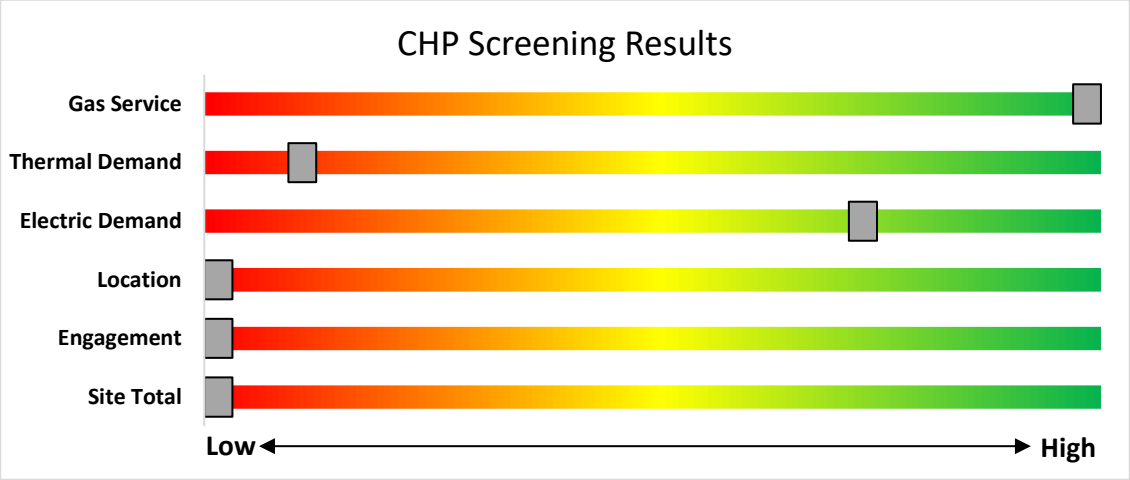


Figure 9 - Combined Heat and Power Screening

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

7 Electric Vehicles (EV)

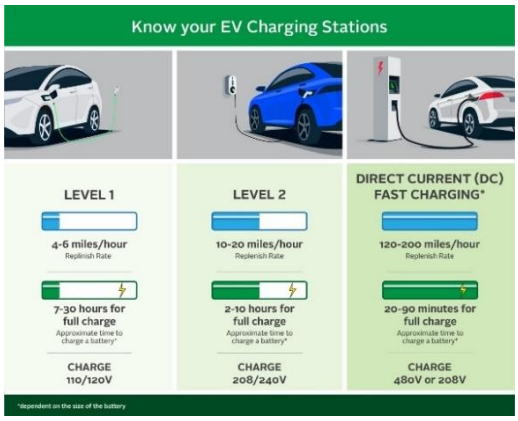
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes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

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

7.1 Electric Vehicle Charging

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

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



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

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

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

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

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

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

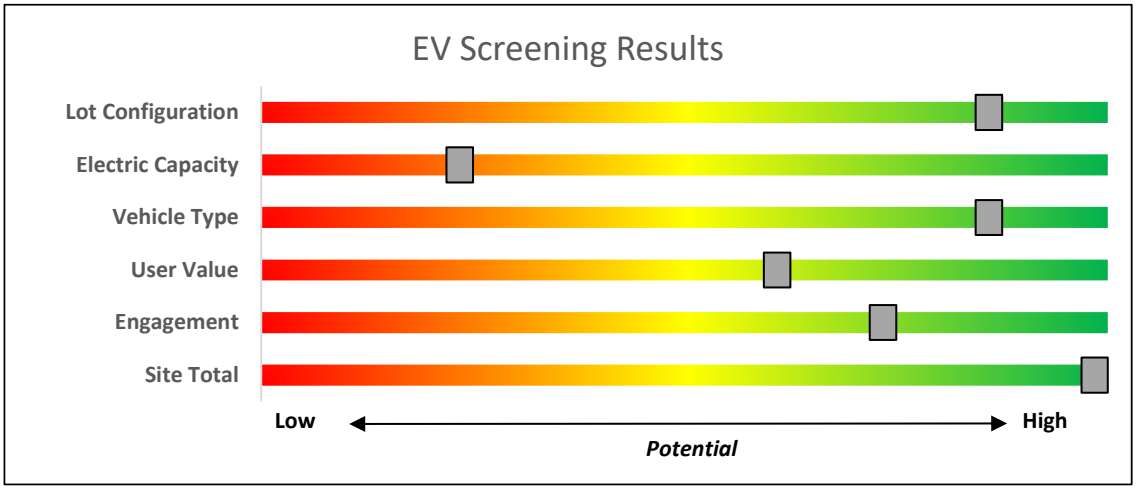


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

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

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

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

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

8 Project Funding and Incentives

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

8.1 Utility Energy Efficiency Programs

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

Prescriptive and Custom

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

Equipment Examples

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

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

Direct Install

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

Incentives

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

How to Participate

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

Engineered Solutions

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

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

8.2 New Jersey's Clean Energy Programs

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

Large Energy Users

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

Incentives

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

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

How to Participate

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

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

Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

Successor Solar Incentive Program (SuSI)

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

Administratively Determined Incentive (ADI) Program

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

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

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

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

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

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

Competitive Solar Incentive Program

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

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

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

Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

9 PROJECT DEVELOPMENT

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

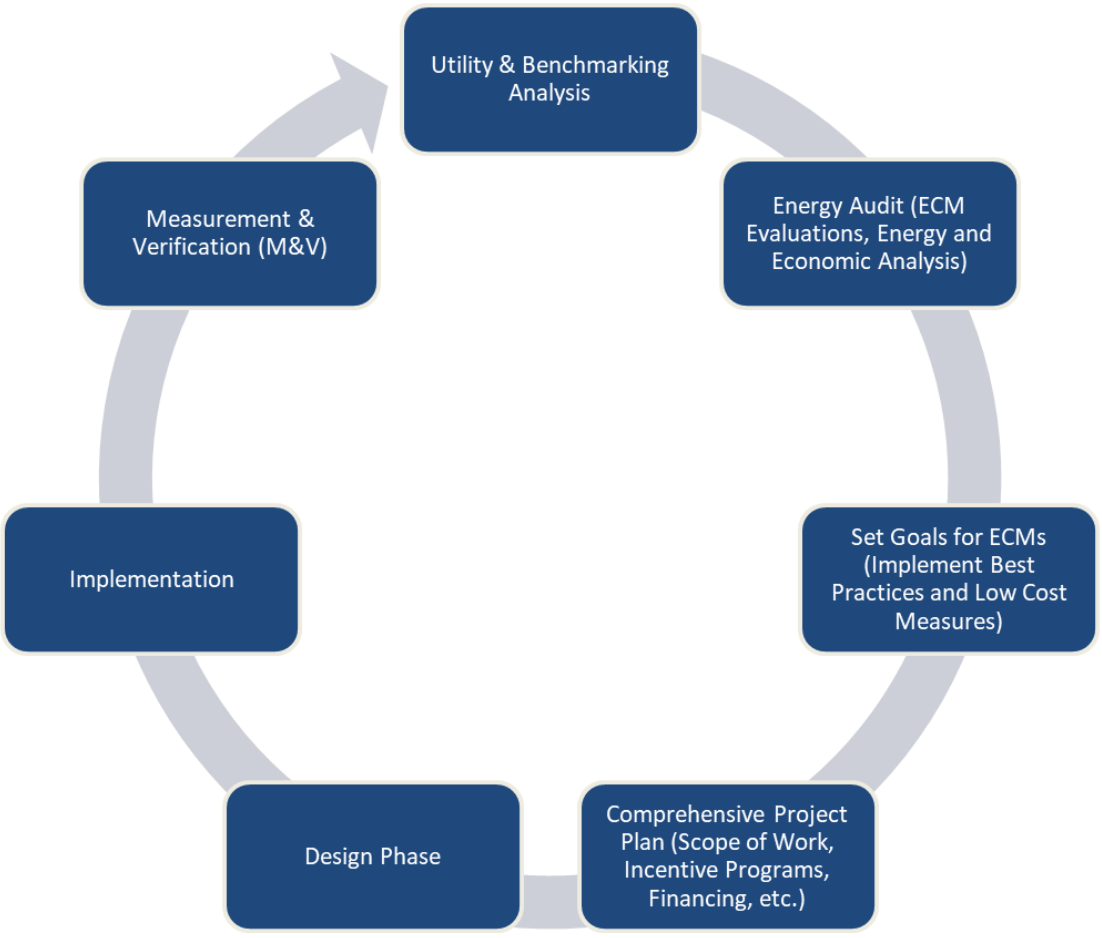


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[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
Armory - Public Safety Building	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	32	3,000		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	32	3,000	0.0	0	0	$0	$0	$0	0.0
Armory - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.1	408	0	$61	$226	$50	2.9
Attic - Public Safety Building	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3	Relamp	No	42	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	1.2	2,994	-1	$451	$1,534	$420	2.5
Attic Access - Public Safety Building	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	2,000	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	2,000	0.1	186	0	$28	$129	$20	3.9
Attorney Room - Public Safety Building	1	Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps	Wall Switch	S	52	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	37	1,000	0.0	16	0	$2	$25	$2	9.4
Back Entrance - Public Safety Building	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Back Entrance - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.0	160	0	$24	$55	$15	1.6
Back Parking Lot - Public Safety Building	41	LED Lamps: (1) 69W Plug-In Lamp	Photocell		69	4,380		None	No	41	LED Lamps: (1) 69W Plug-In Lamp	Photocell	69	4,380	0.0	0	0	$0	$0	$0	0.0
Boiler Room - Public Safety Building	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,000	3	Relamp	No	7	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,000	0.1	397	0	$60	$128	$35	1.6
Break Room - Public Safety Building	2	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	S	34	8,736	4	None	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.0	199	0	$30	$116	$20	3.2
Break Room - Public Safety Building	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	8,736	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	8,736	0.1	547	0	$82	$145	$20	1.5
Cellblock A - Public Safety Building	5	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	5	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	0.0	0	0	$0	$0	$0	0.0
Cellblock A - Public Safety Building	3	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	3	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	0.0	0	0	$0	$0	$0	0.0
Cellblock A - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,736	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.1	1,245	0	$187	$146	$40	0.6
Cellblock B - Public Safety Building	5	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	5	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	0.0	0	0	$0	$0	$0	0.0
Cellblock B - Public Safety Building	5	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	5	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	0.0	0	0	$0	$0	$0	0.0
Cellblock C - Public Safety Building	3	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	3	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	0.0	0	0	$0	$0	$0	0.0
Cellblock C - Public Safety Building	3	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	3	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	0.0	0	0	$0	$0	$0	0.0
Cellblock C - Public Safety Building	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	0	0	$0	$0	$0	0.0
Chief Office 1 - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.2	642	0	$97	$219	$60	1.6
Chief Office 2 - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.2	642	0	$97	$219	$60	1.6
Chief Secretary - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	816	0	$123	$489	$95	3.2
Closet - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	100	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	100	0.0	5	0	$1	$55	$15	49.4
Closet - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	100	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	100	0.0	6	0	$1	$73	$20	58.2
Computer Lab - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.1	1,189	0	$179	$226	$50	1.0

	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
Conference Room - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.2	272	0	$41	$489	$95	9.6
Corridor Cell blocks - Public Safety Building	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Cell blocks - Public Safety Building	9	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	8,736	3	Relamp	No	9	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	8,736	0.2	2,463	-1	$371	$652	$90	1.5
Corridor Conference Room - Public Safety Building	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Conference Room - Public Safety Building	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,000		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	0	0	$0	$0	$0	0.0
Corridor Conference Room - Public Safety Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	3, 5	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	690	0.3	408	0	$61	$554	$300	4.1
Corridor Court - Public Safety Building	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Court - Public Safety Building	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	S	34	4,000		None	No	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	4,000	0.0	0	0	$0	$0	$0	0.0
Corridor Court - Public Safety Building	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	4,000	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,760	0.1	678	0	$102	$515	$180	3.3
Corridor Main Hallway - Public Safety Building	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Main Hallway - Public Safety Building	19	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 5	Relamp	Yes	19	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	6,028	1.1	11,291	-2	$1,700	$1,941	$950	0.6
Court Records - Public Safety Building	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	S	33	3,000		None	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.0	0	0	$0	$0	$0	0.0
Court Room - Public Safety Building	12	Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps	Wall Switch	S	52	3,000	3, 4	Relamp	Yes	12	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	37	2,070	0.3	1,029	0	$155	$1,110	$129	6.3
Court Room - Public Safety Building	8	Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps	Wall Switch	S	52	3,000	3	Relamp	No	8	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	37	3,000	0.1	389	0	$59	$200	$16	3.1
Court Room - Public Safety Building	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Court Room - Public Safety Building	4	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	S	34	3,000		None	No	4	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	3,000	0.0	0	0	$0	$0	$0	0.0
Court Room - Public Safety Building	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,000	3	Relamp	No	12	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,000	0.2	680	0	$102	$219	$60	1.6
Court Room Exit - Public Safety Building	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	690	0.1	85	0	$13	$261	$40	17.3
Court Room Office - Public Safety Building	17	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	S	34	3,000	4	None	Yes	17	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	2,070	0.2	581	0	$87	$540	$70	5.4
Court Room Office Side Room - Public Safety Building	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	690	0.1	127	0	$19	$333	$50	14.8
Court Room Vault - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	4.9
Detective Bureau - Public Safety Building	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Detective Bureau - Public Safety Building	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	8,736		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,736	0.0	0	0	$0	$0	$0	0.0
Detective Bureau - Public Safety Building	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	1.1	11,885	-3	$1,789	$1,635	$370	0.7
Detective Lieutenant - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	816	0	$123	$489	$95	3.2

Location	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Detective Office - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.0	94	0	$14	$72	$10	4.4
Detective Office - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.0	94	0	$14	$72	$10	4.4
Dispatch - Public Safety Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,736	0.3	2,802	-1	$422	$329	$90	0.6
Entrance - Public Safety Building	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Entrance - Public Safety Building	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736	4	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	0.0	424	0	$64	$270	$35	3.7
Entrance - Public Safety Building	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	8,736		None	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.0	0	0	$0	$0	$0	0.0
Evidence - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,736	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	0.1	1,585	0	$239	$416	$75	1.4
Evidence - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	8,736	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.0	528	0	$80	$73	$20	0.7
Exterior Recessed - Public Safety Building	10	Metal Halide: (1) 50W Lamp	Photocell		72	4,380	1	Fixture Replacement	No	10	LED - Fixtures: Downlight Recessed	Photocell	22	4,380	0.0	2,190	0	$334	$1,518	$50	4.4
Exterior Wall Pack - Public Safety Building	7	LED - Fixtures: Wall Pack	Photocell		35	4,380		None	No	7	LED - Fixtures: Wall Pack	Photocell	35	4,380	0.0	0	0	$0	$0	$0	0.0
Foyer Training Room - Public Safety Building	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,000		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	0	0	$0	$0	$0	0.0
Foyer Training Room - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	160	0	$24	$55	$15	1.6
General Investigation - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,736	0.0	467	0	$70	$55	$15	0.6
Holding Area - Public Safety Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.2	642	0	$97	$219	$60	1.6
Holding Area Office - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.0	160	0	$24	$55	$15	1.6
Internal Affairs Room - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	272	0	$41	$189	$40	3.6
IT Closet - Public Safety Building	1	Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps	Wall Switch	S	52	8,736	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	37	8,736	0.0	142	0	$21	$25	$2	1.1
Judge Chambers - Public Safety Building	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	254	0	$38	$261	$40	5.8
Main Chief Office - Public Safety Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.3	1,224	0	$184	$599	$125	2.6
Main Chief Office Exit - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.0	160	0	$24	$55	$15	1.6
Men's Locker Room - Public Safety Building	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	S	44	3,000		None	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	0	0	$0	$0	$0	0.0
Men's Locker Room - Public Safety Building	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.5	1,764	0	$266	$602	$165	1.6
Operations Division - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.1	1,189	0	$179	$226	$50	1.0
Photograph Room - Public Safety Building	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	1,000	4	None	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.0	44	0	$7	$270	$35	35.7
Planning And Logistics - Public Safety Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.3	3,566	-1	$537	$599	$125	0.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Planning And Logistics Office - Public Safety Building	2	LED - Linear Tubes: (1) 4' Lamps	Occupancy Sensor	S	15	3,000		None	No	2	LED - Linear Tubes: (1) 4' Lamps	Occupancy Sensor	15	3,000	0.0	0	0	$0	$0	$0	0.0
Planning And Logistics Office - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,070	0.1	272	0	$41	$343	$55	7.0
Planning And Logistics Office - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.0	160	0	$24	$55	$15	1.6
Planning And Logistics Test Room - Public Safety Building	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	612	0	$92	$434	$80	3.8
Planning And Logistics Vault Room - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	4.9
Prosecutor Office - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,000	0.0	107	0	$16	$37	$10	1.6
Public Defender Office - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,000	0.0	107	0	$16	$37	$10	1.6
Records Division - Public Safety Building	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.9	10,102	-2	$1,521	$1,471	$325	0.8
Records Office - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.1	321	0	$48	$110	$30	1.6
Records Reception - Public Safety Building	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Records Reception - Public Safety Building	14	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	3,000	4	None	Yes	14	LED - Fixtures: Downlight Recessed	Occupancy Sensor	16	2,070	0.1	218	0	$33	$270	$35	7.2
Records Side Room - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,000	0.0	31	0	$5	$72	$10	13.2
Report Room 1 - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	160	0	$24	$55	$15	1.6
Report Room 2 - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	160	0	$24	$55	$15	1.6
Restroom - Public Safety Building	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	8,736		None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,736	0.0	0	0	$0	$0	$0	0.0
Court Office Restroom - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.0	94	0	$14	$72	$10	4.4
Court Records Restroom - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.0	94	0	$14	$72	$10	4.4
Main Chief Office Restroom - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.0	94	0	$14	$72	$10	4.4
Men's Restroom - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	160	0	$24	$55	$15	1.6
Men's Restroom - Public Safety Building	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	3,000		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	3,000	0.0	0	0	$0	$0	$0	0.0
SVU Restroom - Public Safety Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.0	94	0	$14	$72	$10	4.4
Women's Restroom - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.0	160	0	$24	$55	$15	1.6
Women's Restroom - Public Safety Building	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	3,000		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	3,000	0.0	0	0	$0	$0	$0	0.0
Sally Port - Public Safety Building	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Sally Port - Public Safety Building	1	LED - Fixtures: Downlight Recessed	Wall Switch	S	16	8,736		None	No	1	LED - Fixtures: Downlight Recessed	Wall Switch	16	8,736	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
Sally Port - Public Safety Building	4	LED - Fixtures: Linear Strip	Wall Switch	S	35	8,736	4	None	Yes	4	LED - Fixtures: Linear Strip	Occupancy Sensor	35	6,028	0.0	409	0	$62	$270	$35	3.8
Sally Port - Public Safety Building	2	Metal Halide: (1) 150W Lamp	Wall Switch	S	190	8,736	1	Fixture Replacement	No	2	LED - Fixtures: High-Bay	Wall Switch	57	8,736	0.2	2,510	-1	$378	$1,054	$100	2.5
Server Room - Public Safety Building	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	8,736		None	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.0	0	0	$0	$0	$0	0.0
Squad Room - Public Safety Building	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	8,736	4	None	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.1	1,145	0	$172	$270	$35	1.4
Supply Room - Public Safety Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,736	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.2	1,868	0	$281	$219	$60	0.6
SVU - Public Safety Building	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
SVU - Public Safety Building	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	8,736	4	None	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.1	1,018	0	$153	$270	$35	1.5
SVU Conference - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.1	321	0	$48	$110	$30	1.6
SVU Interview Room - Public Safety Building	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	8,736		None	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.0	0	0	$0	$0	$0	0.0
SVU Office - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,000	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,000	0.0	181	0	$27	$73	$20	1.9
Traffic Safety Supervision - Public Safety Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.1	1,189	0	$179	$226	$50	1.0
Traffic Safety Unit - Public Safety Building	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	3,000		None	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,000	0.0	0	0	$0	$0	$0	0.0
Training Closet - Public Safety Building	1	Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps	Wall Switch	S	52	8,736	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	37	8,736	0.0	142	0	$21	$25	$2	1.1
Training Division - Public Safety Building	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	8,736	4	None	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.0	254	0	$38	$116	$20	2.5
Training Room - Public Safety Building	19	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	S	44	8,736	4	None	Yes	19	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.2	2,417	-1	$364	$540	$70	1.3
Training Simulator Room - Public Safety Building	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.7	7,131	-2	$1,074	$927	$215	0.7
Watch Command - Public Safety Building	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	6,028	0.2	1,783	0	$268	$434	$80	1.3
Women's Locker Room - Public Safety Building	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	3,000	3	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,000	0.2	802	0	$121	$274	$75	1.6
Women's Locker Room Restroom - Public Safety Building	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	S	34	8,736		None	No	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.0	0	0	$0	$0	$0	0.0
Women's Locker Room Restroom - Public Safety Building	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	8,736	0.0	467	0	$70	$55	$15	0.6
Police Canopy - Public Safety Building	12	LED - Fixtures: High-Bay	Photocell		75	4,380		None	No	12	LED - Fixtures: High-Bay	Photocell	75	4,380	0.0	0	0	$0	$0	$0	0.0
Police Canopy - Public Safety Building	12	LED - Fixtures: Wall Pack	Photocell		35	4,380		None	No	12	LED - Fixtures: Wall Pack	Photocell	35	4,380	0.0	0	0	$0	$0	$0	0.0
Attic - Town Hall	1	LED Lamps: (3) 10W A19 Screw-In Lamps	Wall Switch	S	30	2,500		None	No	1	LED Lamps: (3) 10W A19 Screw-In Lamps	Wall Switch	30	2,500	0.0	0	0	$0	$0	$0	0.0
Attic - Town Hall	3	LED Lamps: (1) 20W A19 Screw-In Lamp	Wall Switch	S	20	2,500		None	No	3	LED Lamps: (1) 20W A19 Screw-In Lamp	Wall Switch	20	2,500	0.0	0	0	$0	$0	$0	0.0
Attic - Town Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	89	0	$13	$37	$10	2.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom Basement - Town Hall	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	100	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	100	0.0	3	0	$0	$72	$10	132.5
Basement Side Access - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Basement Side Access - Town Hall	7	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,000	3	Relamp	No	7	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.1	121	0	$18	$228	$42	10.2
Basement Side Room - Town Hall	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Basement Side Room - Town Hall	15	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,000	3, 4	Relamp	Yes	15	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	690	0.3	345	0	$52	$1,028	$160	16.7
Basement Side Room - Town Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,000	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.0	57	0	$9	$55	$15	4.7
Basement Side Room - Town Hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	14	1,000	0.3	415	0	$62	$292	$80	3.4
Basement Side Room - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.1	121	0	$18	$146	$40	5.8
Boiler Room - Town Hall	2	Compact Fluorescent: (2) 26W Double Biaxial Plug-In Lamps	Wall Switch	S	52	3,000	3	Relamp	No	2	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	37	3,000	0.0	97	0	$15	$50	$4	3.1
Boiler Room - Town Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.0	160	0	$24	$55	$15	1.6
Boiler Room - Town Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,000	3	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,000	0.1	544	0	$82	$219	$60	1.9
Boiler Room - Town Hall	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.0	94	0	$14	$72	$10	4.4
Break Room - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Break Room - Town Hall	9	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	9	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.2	846	0	$127	$652	$90	4.4
Clerk Office - Town Hall	12	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.4	1,525	0	$230	$1,140	$155	4.3
Clerk Office 2 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.1	376	0	$57	$290	$40	4.4
Clerk Office 3 - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.1	408	0	$61	$226	$50	2.9
Clerk Office Copier Room - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Clerk Office File Storage - Town Hall	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	100	3	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	100	0.0	3	0	$1	$65	$12	101.9
Conference Room - Town Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	690	0.2	272	0	$41	$489	$95	9.6
Corridor Basement - Town Hall	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Basement - Town Hall	15	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,000	3, 5	Relamp	Yes	15	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,380	0.3	689	0	$104	$1,388	$615	7.4
Corridor Basement - Town Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,000	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,000	0.0	38	0	$6	$18	$5	2.3
Corridor Basement - Town Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	8	2,000	0.2	467	0	$70	$146	$40	1.5
Corridor Main North - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor Main North - Town Hall	44	Halogen Incandescent: (1) 50W MR16 Plug-In Lamp	Wall Switch	S	50	3,000	3	Relamp	No	44	LED Lamps: LED Lamps	Wall Switch	8	3,000	1.6	5,988	-1	$901	$1,196	$44	1.3
Corridor Main North - Town Hall	11	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	3,000		None	No	11	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	3,000	0.0	0	0	$0	$0	$0	0.0
Corridor Main South - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Main South - Town Hall	57	Halogen Incandescent: (1) 50W MR16 Plug-In Lamp	Wall Switch	S	50	3,000	3	Relamp	No	57	LED Lamps: LED Lamps	Wall Switch	8	3,000	2.1	7,757	-2	$1,168	$1,549	$57	1.3
Corridor Main South - Town Hall	16	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	3,000		None	No	16	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	3,000	0.0	0	0	$0	$0	$0	0.0
Department of Administration - Town Hall	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.3	1,017	0	$153	$850	$115	4.8
Department of Administration Break Room - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Department of Administration Break Room - Town Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	816	0	$123	$489	$95	3.2
Department of Administration Conference Room - Town Hall	12	Compact Fluorescent: (1) 26W Triple Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3, 4	Relamp	Yes	12	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	690	0.1	167	0	$25	$420	$47	14.8
Department of Administration Conference Room - Town Hall	6	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	32	3,000		None	No	6	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	32	3,000	0.0	0	0	$0	$0	$0	0.0
Department of Administration File Storage - Town Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	100	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	100	0.1	16	0	$2	$164	$45	49.4
Department of Administration Office 1 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Department of Administration Office 2 - Town Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.2	763	0	$115	$705	$95	5.3
Department of Administration Office 3 - Town Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.2	612	0	$92	$280	$65	2.3
Department of Finance - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.1	408	0	$61	$380	$65	5.1
Department of Finance - Town Hall	11	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	11	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.3	1,034	0	$156	$797	$110	4.4
Department of Finance Break Room - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,070	0.1	408	0	$61	$226	$50	2.9
Department of Finance Office 1 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Department of Finance Office 2 - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.1	321	0	$48	$110	$30	1.6
Department of Finance Office 3 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Department of Health - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Department of Health - Town Hall	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.3	1,017	0	$153	$850	$115	4.8
Department of Health File Storage - Town Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	100	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	100	0.1	11	0	$2	$110	$30	49.4
Department of Health Office 1 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Department of Health Office 2 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3

	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
Department of Health Office 3 - Town Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.2	763	0	$115	$705	$95	5.3
Department of Health Side Office - Town Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.2	763	0	$115	$705	$95	5.3
Department of Recreation - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Department of Recreation - Town Hall	10	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.3	1,271	0	$191	$995	$135	4.5
Department of Recreation Office 1 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Department of Recreation Office 2 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Department of Recreation Office 3 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Division of Purchasing - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Division of Purchasing - Town Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.2	763	0	$115	$705	$95	5.3
Division of Purchasing File Storage - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	100	3	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	18	100	0.2	19	0	$3	$290	$40	87.3
Division of Purchasing Office 1 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	19	2,070	0.2	634	0	$95	$560	$75	5.1
Exit 3 - Town Hall	1	Compact Fluorescent: (1) 26W Triple Biaxial Plug-In Lamp	Wall Switch	S	26	3,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	3,000	0.0	23	0	$3	$13	$1	3.4
Exit 4 - Town Hall	1	Compact Fluorescent: (1) 26W Triple Biaxial Plug-In Lamp	Wall Switch	S	26	3,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	3,000	0.0	23	0	$3	$25	$2	6.7
Exterior Flood Light - Town Hall	1	LED Lamps: (1) 25W PAR 38 Screw-In Lamp	Photocell		25	4,380		None	No	1	LED Lamps: (1) 25W PAR 38 Screw-In Lamp	Photocell	25	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Recessed - Town Hall	65	Compact Fluorescent: (2) 42W Double Biaxial Plug-In Lamps	Photocell		84	4,380	3	Relamp	No	65	LED Lamps: GX23 (Plug-In) Lamps	Photocell	59	4,380	0.0	7,118	0	$1,086	$1,625	$130	1.4
HR Entrance - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
HR Office - Town Hall	7	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	7	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	16	2,070	0.3	1,156	0	$174	$777	$105	3.9
IT Room - Town Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	8,736	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	14	8,736	0.2	2,236	0	$337	$164	$45	0.4
Janitor Closet - Town Hall	1	Compact Fluorescent: (1) 23W A19 Screw-In Lamp	Wall Switch	S	23	1,000	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	17	1,000	0.0	6	0	$1	$17	$1	16.6
Main Entrance - Town Hall	5	Compact Fluorescent: (1) 26W Triple Biaxial Plug-In Lamp	Wall Switch	S	26	3,000	3	Relamp	No	5	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	3,000	0.0	113	0	$17	$250	$50	11.7
Main Entrance - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Foyer - Town Hall	3	Compact Fluorescent: (2) 30W Circline/T6 Plug-In Lamps	Wall Switch	S	60	3,000	3, 4	Relamp	Yes	3	LED Lamps: LED Lamps	Occupancy Sensor	42	2,070	0.1	302	0	$45	$390	$35	7.8
Main Foyer - Town Hall	10	Compact Fluorescent: (1) 26W Triple Biaxial Plug-In Lamp	Wall Switch	S	26	3,000	3	Relamp	No	10	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	3,000	0.1	227	0	$34	$125	$10	3.4
Main Foyer - Town Hall	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Foyer - Town Hall	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	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
Mayor's Office - Town Hall	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3	Relamp	No	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,000	0.2	564	0	$85	$435	$60	4.4
Restroom Mens - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	3,000	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,000	0.0	113	0	$17	$37	$10	1.6
Restroom Mens - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.1	376	0	$57	$290	$40	4.4
Property Assessment Office - Town Hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Property Assessment Office - Town Hall	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,000	3	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,000	0.4	1,443	0	$217	$493	$135	1.6
Property Assessment Side Office 1 - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.1	508	0	$77	$560	$75	6.3
Property Assessment Vault - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	43	1,000	0.1	80	0	$12	$290	$40	20.7
Roof Access - Town Hall	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	1,000	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,000	0.1	93	0	$14	$129	$20	7.8
Supplies Closet - Town Hall	1	Compact Fluorescent: (1) 23W A19 Screw-In Lamp	Wall Switch	S	23	1,000	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	17	1,000	0.0	6	0	$1	$17	$1	16.6
Tax Collection - Town Hall	21	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,070	0.7	2,669	-1	$402	$2,062	$280	4.4
Tax Collection Office - Town Hall	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	18	2,070	0.2	643	0	$97	$406	$60	3.6
Tax Collection Vault - Town Hall	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,000	3	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	8	1,000	0.0	54	0	$8	$65	$12	6.5
Town Hall Meeting Room - Town Hall	26	Compact Fluorescent: (1) 26W Triple Biaxial Plug-In Lamp	Wall Switch	S	26	3,000	3, 4	Relamp	Yes	26	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	19	2,070	0.3	1,086	0	$163	$1,730	$192	9.4
Town Hall Meeting Room - Town Hall	10	Halogen Incandescent: (1) 50W MR16 Plug-In Lamp	Wall Switch	S	50	3,000	3	Relamp	No	10	LED Lamps: LED Lamps	Wall Switch	8	3,000	0.4	1,361	0	$205	$272	$10	1.3
Town Hall Meeting Room - Town Hall	18	Compact Fluorescent: (2) 40W Biaxial Plug-In Lamp	Wall Switch	S	80	3,000	3	Relamp	No	18	LED Lamps: LED Lamps	Wall Switch	56	3,000	0.4	1,400	0	$211	$486	$36	2.1
Restroom Women's - Town Hall	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	3,000	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,000	0.0	113	0	$17	$37	$10	1.6
Restroom Women's - Town Hall	5	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	5	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.1	470	0	$71	$362	$50	4.4
Restroom Women's - Town Hall	5	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	3,000	3	Relamp	No	5	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,000	0.1	470	0	$71	$362	$50	4.4

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room - Public Safety Building	Fire Pipes	1	Air Compressor	2.0	70.0%	No	Campbell Hausfeld	HU351000	W	1,820		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	SCHWP 1 & 2	2	Chilled Water Pump	5.0	89.5%	Yes	Baldor	36T140S270G1	B	4,368		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Back Parking Lot - Public Safety Building	PCHWP 1 & 2	2	Chilled Water Pump	5.0	89.5%	No	Baldor	36N542S268G1	W	4,368	7	No	89.5%	Yes	2	1.9	13,653	0	$2,083	$11,733	$1,800	4.8
Attic - Public Safety Building	EF-8	1	Exhaust Fan	0.3	65.0%	No	Marathon Electric	H09B1A0	W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	EF-9	1	Exhaust Fan	0.3	65.0%	No	Marathon Electric		W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	EF-4	1	Exhaust Fan	0.5	70.0%	No	Loren Cook	120 CPV	B	8,760		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	EF-2	1	Exhaust Fan	0.3	65.0%	No	Loren Cook	70 CPV	B	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	EF-3	1	Exhaust Fan	0.3	65.0%	No	Loren Cook		B	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	EF-5	1	Exhaust Fan	0.3	65.0%	No	Loren Cook	70 CPV	B	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-3 HWP	1	Heating Hot Water Pump	0.5	70.0%	No	Taco	132-096	W	4,368		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-2 HWP	1	Heating Hot Water Pump	0.5	70.0%	No	Taco	132-096	W	4,368		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-5 HWP	1	Heating Hot Water Pump	0.5	70.0%	No	Taco	132-097	W	4,368		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-1 HWP	1	Heating Hot Water Pump	0.5	70.0%	No	Taco	132-098	W	4,368		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-4 HWP	1	Heating Hot Water Pump	0.5	70.0%	No	Taco	132-099	W	4,368		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Public Safety Building	Boiler HWP	1	Heating Hot Water Pump	3.0	82.5%	No	Baldor	35N835T676	B	4,368	8	No	89.5%	Yes	1	0.4	5,069	0	$773	$4,555	$200	5.6
Boiler Room - Public Safety Building	Boiler HWP	1	Heating Hot Water Pump	3.0	89.5%	No	Baldor	36T140S658G1	B	4,368	8	No	89.5%	Yes	1	0.3	4,096	0	$625	$4,555	$200	7.0
Attic - Public Safety Building	Glycol Pump	1	Other	0.5	68.0%	No	Baldor	34C62-5422	B	1,000		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Salley Port - Public Safety Building	Garage Doors	2	Other	0.3	65.0%	No	Liftmaster		W	1,000		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Public Safety Building	HHW Internal Pump	2	Heating Hot Water Pump	0.5	70.0%	No	Taco	S55CXJFM-4927	W	8,760		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-5 - Supply Fan Public Safety Building	1	Supply Fan	3.0	89.5%	Yes	A.O Smith	5640	B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Attic - Public Safety Building	AHU-5 - Return Fan Public Safety Building	1	Return Fan	1.0	84.0%	Yes	A.O Smith		B	5,824		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-1 - Supply Fan Public Safety Building	1	Supply Fan	7.5	91.7%	Yes	A.O Smith		B	5,824		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-1 - Return Fan Public Safety Building	1	Return Fan	5.0	89.5%	Yes	A.O Smith		B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-3 - Supply Fan Public Safety Building	1	Supply Fan	5.0	89.5%	Yes	A.O Smith	7-850118-01-OJ	B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-3 - Return Fan Public Safety Building	1	Return Fan	5.0	89.5%	Yes	A.O Smith	7-850118-01-OJ	B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-4 - Supply Fan Public Safety Building	1	Supply Fan	7.5	91.7%	Yes	A.O Smith	7-850120-01-OJ	B	5,824		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-4 - Return Fan Public Safety Building	1	Return Fan	5.0	89.5%	Yes	A.O Smith	7-850118-01-OJ	B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-2 - Supply Fan Public Safety Building	1	Supply Fan	5.0	89.5%	Yes	A.O Smith		B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	AHU-2 - Return Fan Public Safety Building	1	Return Fan	3.0	89.5%	Yes	A.O Smith		B	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Evidence - Public Safety Building	AHU-6 - Supply Fan Public Safety Building	1	Supply Fan	3.0	89.5%	No			W	5,824		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Salley Port - Public Safety Building	Hydronic Unit Heater	1	Fan Coil Unit	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Public Safety Building	DHW Pump	1	DHW Circulation Pump	0.1	65.0%	No			W	8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	CWP	2	Chilled Water Pump	10.0	91.7%	No	A.O Smith	7-850123-01-OJ	B	3,391	7	No	91.7%	Yes	2	3.7	20,690	0	$3,156	$13,393	$2,200	3.5
Attic - Town Hall	EF-1	2	Exhaust Fan	0.2	65.0%	No	Cook	100 SQN	W	3,120		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Attic - Town Hall	EF-2	1	Exhaust Fan	0.2	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Various Spaces - Town Hall	Fan Coil Unit	43	Fan Coil Unit	0.2	65.0%	No	Trane	FCBB0601GAWA0H30AF4M0000D1000N00000000000000	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	Boiler HWP	2	Heating Hot Water Pump	7.5	91.7%	No	A.O Smith	7-850121-01-OJ	B	1,696	8	No	91.7%	Yes	2	1.4	7,759	0	$1,184	$11,890	$2,000	8.4
Boiler Room - Town Hall	Sump Pump	1	Other	0.2	65.0%	No			W	900		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	Glycol Pump	2	Other	0.5	70.0%	No	Emerson	S55JXNSW-7302	B	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	AHU-1 Supply Fan Town Hall	1	Supply Fan	3.0	86.5%	No			B	3,120	6	No	89.5%	Yes	1	0.9	3,210	0	$490	$4,555	$200	8.9

		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
Basement - Town Hall	AHU-2 Supply Fan Town Hall	1	Supply Fan	3.0	89.5%	Yes			W	3,120		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	HHW Internal Pump	2	Heating Hot Water Pump	0.5	70.0%	No	Taco	S55CXJFM-4928	W	3,120		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	DHW Pump	1	DHW Circulation Pump	0.1	65.0%	No				8,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Closet - Public Safety Building	Closet	1	Window AC	1.00		10.00		Hampton Bay		B	9	Yes	1	Window AC	1.00		12.00		0.1	204	0	$31	$942	$0	30.2
Attic - Public Safety Building	Public Safety Building	1	Ductless Mini-Split AC	3.50		14.00		Mitsubishi Electric	PUY-A42NHA5	W		No							0.0	0	0	$0	$0	$0	0.0
Attic - Public Safety Building	Public Safety Building	1	Ductless Mini-Split AC	3.50		15.60		Sanyo	C4272R	B	9	Yes	1	Ductless Mini-Split AC	3.50		18.00		0.2	467	0	$71	$4,289	$0	60.3
Back parking lot - Public Safety Building	Public Safety Building	1	Split-System Air-Source HP	1.50	19.00	11.40	10.4 HSPF	Mitsubishi Electric	PUZ-A18NKA7	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Grounds - Town Hall	IT Room	1	Ductless Mini-Split AC	2.50		17.50		Fujitsu	AOU30RLX6	B		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
Back Parking Lot - Public Safety Building	Chiller 1 & 2 - Public Safety Building	2	Air-Cooled Scroll Chiller	60.00	Daikin	AGZ060EDSEPNN00	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Grounds - Town Hall	Chiller - Town Hall	1	Air-Cooled Scroll Chiller	55.00	McQuay	AGZ055BH	B	10	Yes	1	Air-Cooled Scroll Chiller	Variable	55.00	1.24	0.74	-3.1	905	0	$138	$69,198	$4,950	465.4

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room - Public Safety Building	Heating Hot Water	2	Condensing Hot Water Boiler	959	Raypak	H7-1005A	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	Heating Hot Water	2	Condensing Hot Water Boiler	959	Raypak	H7-1005A	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room - Public Safety Building	DHW	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	M280R6DS-1ncww	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room - Town Hall	DHW	1	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	RE250T6-1NCWW	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
Restrooms - Public Safety Building	11	13	Faucet Aerator (Lavatory)	2.20	0.50	0.0	3,614	0	$551	$93	$47	0.1
Restrooms - Town Hall	11	7	Faucet Aerator (Lavatory)	2.20	0.50	0.0	1,946	0	$297	$50	$25	0.1

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Public Safety Building	6	Coffee Machine	900	No		
Public Safety Building	1	Dehumidifier	625	No		
Public Safety Building	68	Desktop	270	Yes		
Public Safety Building	3	Laptop	75	Yes		
Public Safety Building	5	Microwave	1,000	No		
Public Safety Building	13	Printer (Medium/Small)	200	No		
Public Safety Building	8	Printer/Copier (Large)	600	No		
Public Safety Building	3	Projector	500	No		
Public Safety Building	7	Refrigerator (Mini)	150	No		
Public Safety Building	5	Refrigerator (Residential)	200	No		
Public Safety Building	10	Television	70	No		
Public Safety Building	2	Toaster	850	No		
Public Safety Building	7	Paper Shredder	150	No		
Public Safety Building	2	Water Cooler	90	No		
Public Safety Building	1	Residential Electric Oven	2,500	No		
Public Safety Building	39	Desktop Monitor	270	No		
Public Safety Building	16	Body Cam Dock	120	No		
Public Safety Building	4	Radio Dock	200	No		
Public Safety Building	3	UPS	2,500	No		
Public Safety Building	1	ID Printer	120	No		
Public Safety Building	1	Fuming Chamber	50	No		
Public Safety Building	1	Linear Downflow Workstation	140	No		
Public Safety Building	1	Driving Simulator	1,500	No		
Town Hall	4	Coffee Machine	900	No		
Town Hall	2	Dehumidifier	625	No		
Town Hall	38	Desktop	270	Yes		
Town Hall	3	Laptop	75	Yes		
Town Hall	5	Microwave	1,000	No		
Town Hall	12	Printer (Medium/Small)	200	No		
Town Hall	9	Printer/Copier (Large)	600	No		
Town Hall	1	Water Fountain	200	No		
Town Hall	4	Refrigerator (Mini)	150	No		
Town Hall	3	Refrigerator (Residential)	220	No		
Town Hall	7	Television	70	No		
Town Hall	1	Toaster	850	No		

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Town Hall	7	Paper Shredder	150	No		
Town Hall	4	UPS	600	No		
Town Hall	1	SendPro	500	No		
Town Hall	1	Residential Electric Oven	2,500	No		
Town Hall	2	Toaster Oven	1,200	No		
PSB & Town Hall	2	Servers	3,500	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
Break Room - Public Safety Building	1	Refrigerated	12	Yes	0.2	1,612	0	$246	$230	$50	0.7
Break Room - Town Hall	1	Refrigerated	12	Yes	0.2	1,612	0	$246	$230	$50	0.7
Break Room - Town Hall	1	Non-Refrigerated	N/A	No	0.0	0	0	$0	$0	$0	0.0

Custom (High Level) Measure Analysis

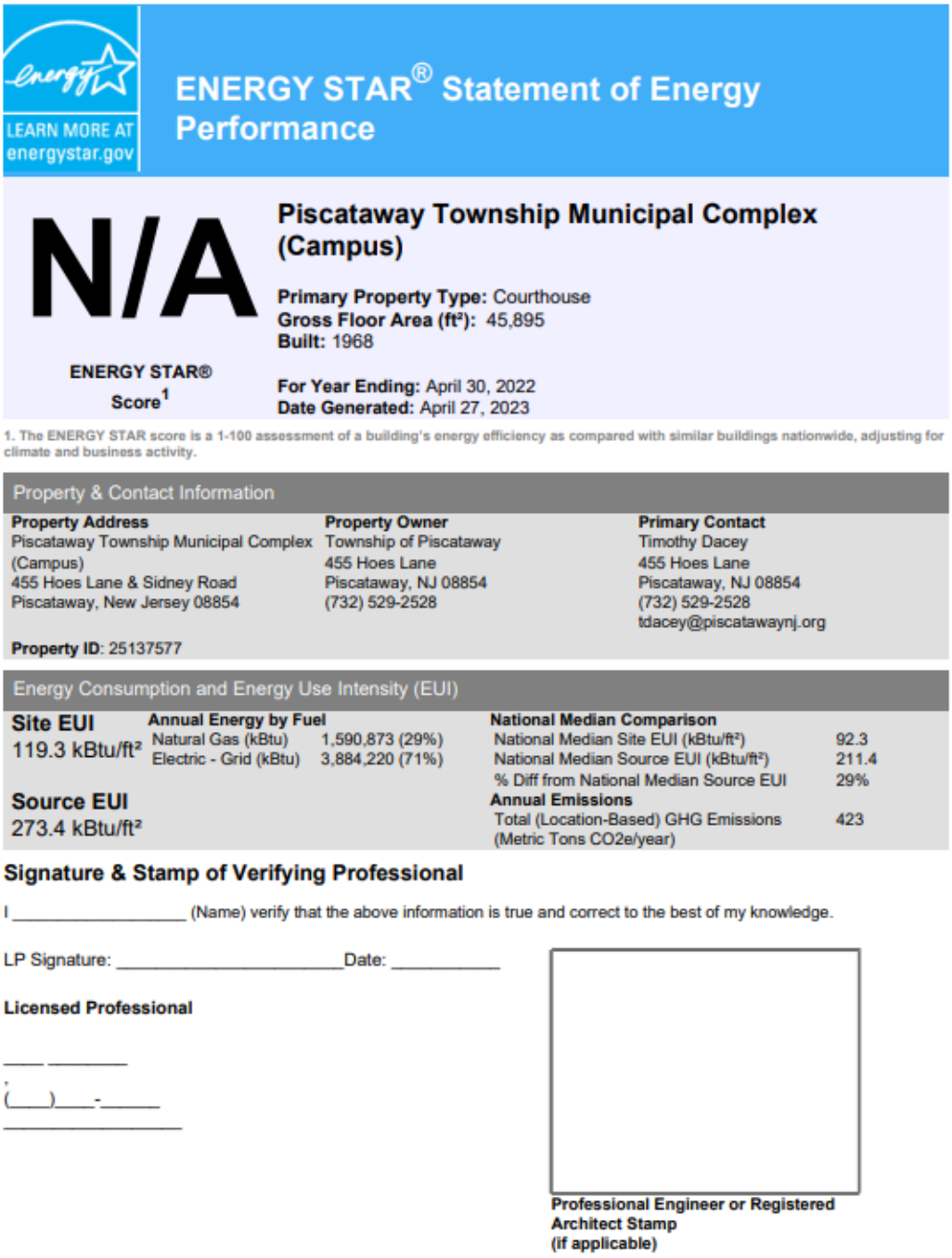
Electric Tank Water Heater to HPWH

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

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) - Public Safety Building	DHW	1,600	Electric	4.5	80	Heat Pump Water Heater	2.5	80	$3,322.98	0.00	6,021	0	$919	$3,323	$0	$0	$0	$3,323	3.62	3.62
Storage Tank Water Heater (≤50 Gal) - Town Hall	DHW	1,200	Electric	4.5	50	Heat Pump Water Heater	2.5	50	$2,383.17	0.00	4,516	0	$689	$2,383	$0	$0	$0	$2,383	3.46	3.46
			Electric																	

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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



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ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

Piscataway Township Municipal Complex (Campus)

Primary Property Type: Courthouse
Gross Floor Area (ft²): 45,895
Built: 1968

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

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Piscataway Township Municipal Complex (Campus) 455 Hoes Lane & Sidney Road Piscataway, New Jersey 08854	Township of Piscataway 455 Hoes Lane Piscataway, NJ 08854 (732) 529-2528	Timothy Dacey 455 Hoes Lane Piscataway, NJ 08854 (732) 529-2528 tdacey@piscatawaynj.org

Property ID: 25137577

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
119.3 kBtu/ft²

Source EUI
273.4 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	1,590,873 (29%)
Electric - Grid (kBtu)	3,884,220 (71%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	92.3
National Median Source EUI (kBtu/ft²)	211.4
% Diff from National Median Source EUI	29%
Annual Emissions	
Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	423

Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

Licensed Professional

___ _____
,
(___)___-_____
_____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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