Local Government Energy Audit Report

City Hall

November 17, 2021

Prepared for:

City of Trenton

319 E State St

Trenton, NJ 08608

Prepared by:

TRC

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

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

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Energy Efficiency Incentive & Rebate Transition

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

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

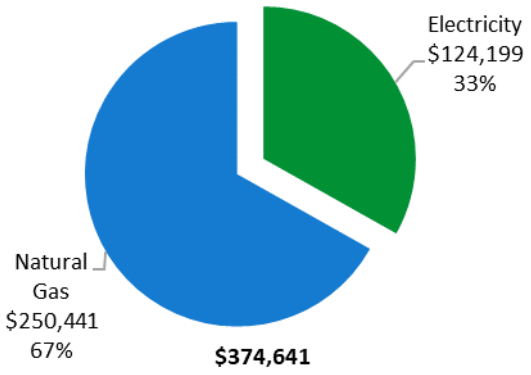
These "next generation" energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and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

New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website.

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Trenton Public Library. 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: $374,641 Electricity: 975,780 kWh Natural Gas: 44,469 Therms	
ENERGY STAR® Benchmarking Score	70 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

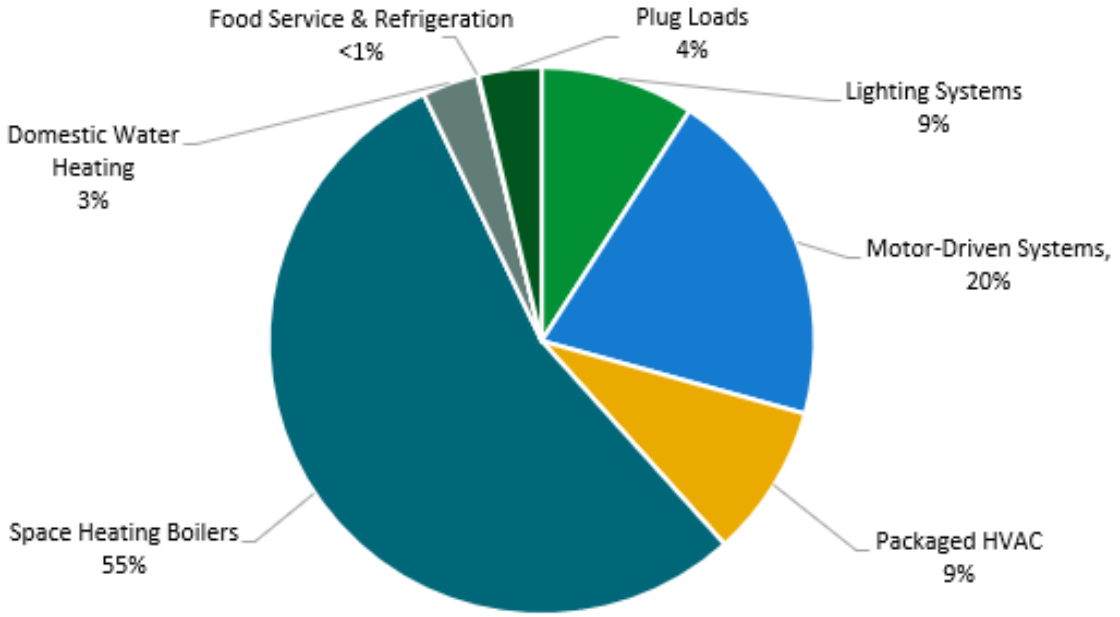


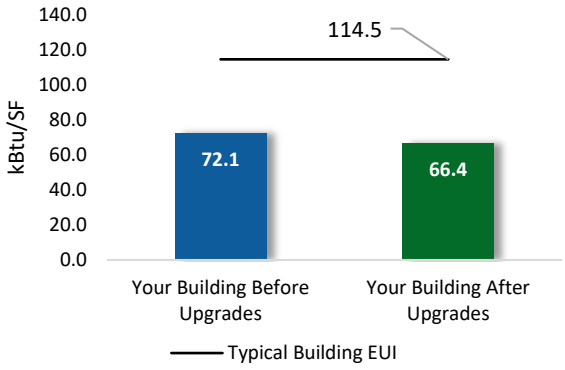
Figure 1 - Energy Use by System

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.

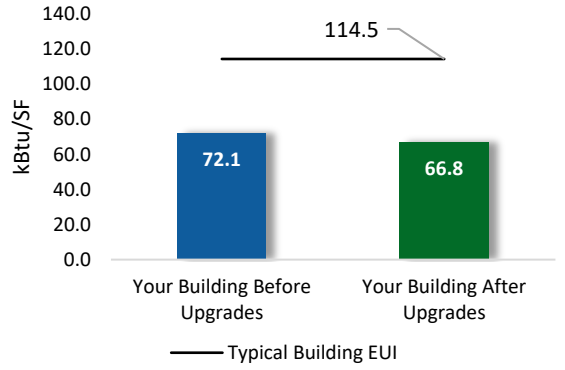
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$177,542
Potential Rebates & Incentives[1]	$31,392
Annual Cost Savings	$22,442
Annual Energy Savings	Electricity: 188,408 kWh Natural Gas: -273 Therms
Greenhouse Gas Emission Savings	93 Tons
Simple Payback	6.5 Years
Site Energy Savings (all utilities)	8%



Scenario 2: Cost Effective Package[2]

Installation Cost	$95,155
Potential Rebates & Incentives	$22,377
Annual Cost Savings	$20,495
Annual Energy Savings	Electricity: 173,116 kWh Natural Gas: -273 Therms
Greenhouse Gas Emission Savings	86 Tons
Simple Payback	3.8 Years
Site Energy Savings (all utilities)	7%



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			**109,434**	**24.6**	**-22**	**$12,710**	**$33,094**	**$8,000**	**$25,093**	**2.0**	**107,664**
ECM 1	Install LED Fixtures	Yes	1,590	0.0	0	$202	$1,656	$190	$1,466	7.2	1,602
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	704	0.3	0	$84	$550	$80	$470	5.6	698
ECM 3	Retrofit Fixtures with LED Lamps	Yes	107,139	24.3	-22	$12,423	$30,887	$7,730	$23,157	1.9	105,365
Lighting Control Measures			**26,693**	**5.6**	**-6**	**$3,077**	**$27,129**	**$7,960**	**$19,169**	**6.2**	**26,214**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	18,130	4.6	-4	$2,090	$19,254	$2,615	$16,639	8.0	17,804
ECM 5	Install High/Low Lighting Controls	Yes	8,564	1.1	-2	$987	$7,875	$5,345	$2,530	2.6	8,410
Motor Upgrades			**1,768**	**0.3**	**0**	**$225**	**$6,281**	**$0**	**$6,281**	**27.9**	**1,781**
ECM 6	Premium Efficiency Motors	No	1,768	0.3	0	$225	$6,281	$0	$6,281	27.9	1,781
Variable Frequency Drive (VFD) Measures			**28,894**	**5.1**	**0**	**$3,678**	**$34,150**	**$6,000**	**$28,150**	**7.7**	**29,096**
ECM 7	Install VFDs on Chilled Water Pumps	Yes	12,421	3.3	0	$1,581	$9,476	$4,000	$5,476	3.5	12,508
ECM 8	Install VFDs on Heating Water Pumps	Yes	16,473	1.8	0	$2,097	$24,673	$2,000	$22,673	10.8	16,588
Unitary HVAC Measures			**13,524**	**9.2**	**0**	**$1,721**	**$76,106**	**$9,015**	**$67,091**	**39.0**	**13,618**
ECM 9	Install High Efficiency Air Conditioning Units	No	13,030	8.9	0	$1,658	$70,976	$9,015	$61,961	37.4	13,121
ECM 10	Install High Efficiency Heat Pumps	No	494	0.3	0	$63	$5,130	$0	$5,130	81.6	497
Domestic Water Heating Upgrade			**6,141**	**0.0**	**0**	**$782**	**$323**	**$316**	**$6**	**0.0**	**6,184**
ECM 11	Install Low-Flow DHW Devices	Yes	6,141	0.0	0	$782	$323	$316	$6	0.0	6,184
Food Service & Refrigeration Measures			**1,954**	**0.2**	**0**	**$249**	**$460**	**$100**	**$360**	**1.4**	**1,968**
ECM 12	Vending Machine Control	Yes	1,954	0.2	0	$249	$460	$100	$360	1.4	1,968
TOTALS (COST EFFECTIVE MEASURES)			**173,116**	**35.5**	**-27**	**$20,495**	**$95,155**	**$22,377**	**$72,778**	**3.6**	**171,126**
TOTALS (ALL MEASURES)			**188,408**	**45.0**	**-27**	**$22,442**	**$177,542**	**$31,392**	**$146,150**	**6.5**	**186,525**

* - All incentives presented in this table are included as placeholders 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.

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

Options from Around the State

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

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

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

The CHP program provides incentives for combined heat and power (aka 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.

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.

2 EXISTING CONDITIONS

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

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

2.1 Site Overview

On April 7, 2021, TRC performed an energy audit at City Hall located in Trenton, New Jersey. TRC met with Charles Richardson to review the facility operations and help focus our investigation on specific energy-using systems.

City Hall is a four-story, 107,900 square foot building originally built in 1907, updated in 1952, and further modified with a third addition. Spaces include offices, restrooms, corridors, stairwells, storage spaces, city departments, mayor's office, conference rooms, city council, IT department and server rooms, and mechanical space.

2.2 Building Occupancy

The facility is occupied year-round. Department use varies, but the facility is open to the public during normal working hours.

Building Name	Weekday/Weekend	Operating Schedule
City Hall	Weekday	8:30 AM - 4:30 PM
	Weekend	closed

Figure 3 – Building Occupancy Schedule

2.3 Building Envelope

The exterior is brick with a marble façade. Sections of the building are exposed brick. The newer addition is built with CMU block and covered in marble and glass. The roof is flat; the older section is covered with rolled asphalt and in poor condition. The newer section is covered in stone and is in fair condition.

Original Exterior

Original Exterior

Roof

Addition Exterior

Addition Exterior

Roof

Most of the windows are double glazed with aluminum frames. Older windows are single glazed in wood frames. The glass-to-frame seals are in fair condition. The operable window weather seals are in poor condition, showing evidence of excessive wear. Exterior doors have aluminum frames and are in fair condition with worn door seals. Degraded window and door seals increase drafts and outside air infiltration.

Double Glazed Windows

Single Glazed Windows

Single Glazed Windows

Exterior Door

Revolving Door

Interior Wood Door

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T12 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Many of which are housed in a variety of decorative fixtures. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 1-lamp, 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot-long troffer, recessed, surface mounted fixtures and 2-foot fixtures with U-bend and linear tube lamps. Many fixtures are in poor condition. All exit signs are LED. Interior lighting levels were generally sufficient lit.

Lighting fixtures in restrooms and in Offices 306 – 309 are controlled by occupancy sensor. Most light fixtures are controlled by wall switches.

Fluorescent 2-foot Fixture

Fluorescent 4-foot Fixture

U-bend Fixtures

EXIT Sign

LED Lamps

LED Lamps

Exterior fixtures include wall packs, flood lights, canopy lights with high intensity discharge (HID) or LED lamps. Most of the exterior fixtures have been retrofitted with LED lamps.

The pole mounted flood fixtures use LED sources. Exterior light fixtures are controlled by a time clock or switch, depending on the fixture.

Floodlight Fixtures

Floodlight Fixtures

Canopy Light

Unitary Electric HVAC Equipment

City Hall has several split-system AC units. The IT server room is cooled by two 15-ton split-system AC units, used to regulate humidity and temperature. Several offices have split-system AC units ranging in size from 1.5 tons to 5 tons. The facility has two air source heat pumps ranging in size from 0.75 tons to 1.25 tons. These units are beyond their useful life.


Server Split System


Server Split System


Heat Pump Split System


Heat Pump Split System

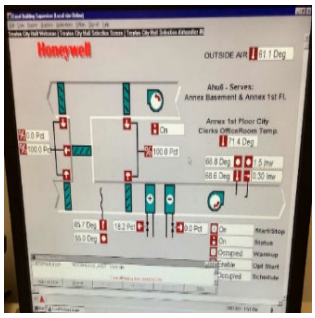

Mayor's Office Split System


Mayor's Office Split System

Air Handling Units (AHUs)

The building is mainly conditioned by eight air handling units, equipped with constant speed supply and return fan motors, hot water heating coils, and refrigerant coils for cooling. The units are in mechanical spaces above the fourth floor and at the lower level. Supply fan motors range in size from 5 HP to 15 hp, while return fan motors range in size from 1.5 HP to 5 hp.

- AHU-1 serves Tax and Water Departments on the 1st floor, 2nd floor: Mayors and Clerk's office, 3rd floor: 311, Administration
- AHU-2 serves the old computer rooms, 1st floor Treasurers and Accounts Control, 2nd floor Crime and Prevention, and 3rd floor, room 300, and rooms 304-310
- AHU-3 provides conditioning for the Public Works Director's offices, Engineers, Assessors, Councilor's office, and the 2nd floor council & conference rooms
- AHU-4 serves the Council chamber area
- AHU-5 serves the Solarium between buildings (1st, 2nd, & 3rd floors)
- AHU-6 serves Annex basement and Annex 1st floor
- AHU-7 serves Annex 2nd & 3rd floors
- AHU-8 serves Annex basement and snack bar area



Air Handling Unit


Air Handling Unit


Air Handling Unit


Air Handling Unit


Air Handling Unit


Air Handling Unit

2.6 Heating Hot Water Systems

The building heating load is met by boilers located at nearby plant operated by Vicinity Energy, a third-party district energy provider to client facilities in Trenton. The service is provided through the lower-level mechanical space. The system transfers hot water using two, 3 hp motors in the lower-level mechanical space. In addition, the facility has two sets of three, 2 hp pumps serving the main building and annex building heating loops, respectively. Two of the three pumps serve north and south while the third serves as a standby.


Vicinity Energy Meter

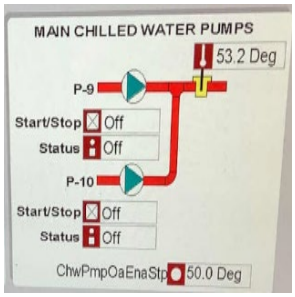
Vicinity Energy Meter


Intake Piping

HHW circulation pumps for annex/main south, standby pumps, and annex/main north pumps

2.7 Chilled Water Systems

Chilled water is also supplied by Vicinity Energy. The service is provided through the lower-level mechanical space. The chilled water intake is connected to two, 7.5 hp pumps for circulation through a dedicated chilled water loop. The pumps provide chilled water to cooling coils located in the building's eight air handling units. There is an old building chiller connected to the system, however, it does not operate.



Chilled Water Pumps

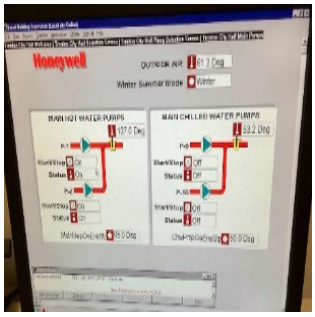
Old Chiller

2.8 Building Energy Management Systems (EMS)

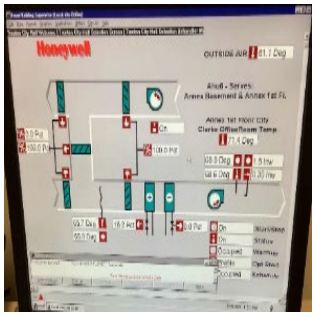
A Honeywell management system controls the air handlers throughout the facility. The system provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, heating water loop temperatures, and chilled water loop temperatures.

The site staff expressed an interest in expanding the level of control provided by the Honeywell system, upgrading the system, and receiving additional training on how to operate it.

Honeywell Management System Overview



Main Pumps



AHU 8 Diagram

2.9 Domestic Hot Water

Hot water is produced by a heat exchanger using hot water from the space heating boiler and stored in a 940-gallon tank. One, 1/3 hp circulation pump distributes water to end uses. The circulation pump operates continuously. The domestic hot water pipes are insulated, and the insulation is in fair condition.

Hot Water Storage Tank

Unit Label

DWH Pump

2.10 Plug Load & Vending Machines

The location is doing a great job managing their electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are 110 computer workstations throughout the facility with an additional ten laptops. Plug loads throughout the building include general café and office equipment.

There are several residential-style refrigerators throughout the building. These vary in condition and efficiency. There is one refrigerated beverage vending machine and one non-refrigerated vending machine. Vending machines are not equipped with occupancy-based controls.

Microwave

Refrigerator

Vending Machine

2.11 Water-Using Systems

There are 12 restrooms with toilets and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher.

Restroom Sink

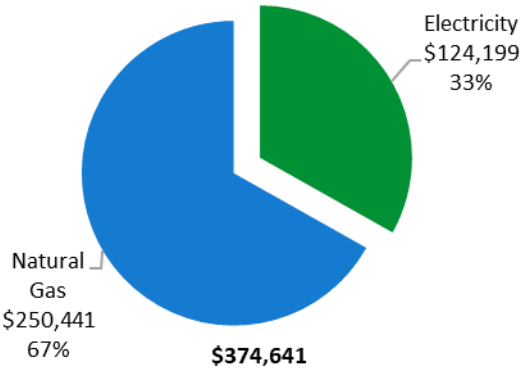
Restroom Sink

Kitchen Sink

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	975,780 kWh	$124,199
Natural Gas	44,469 Therms	$250,441
Total		**$374,641**



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.

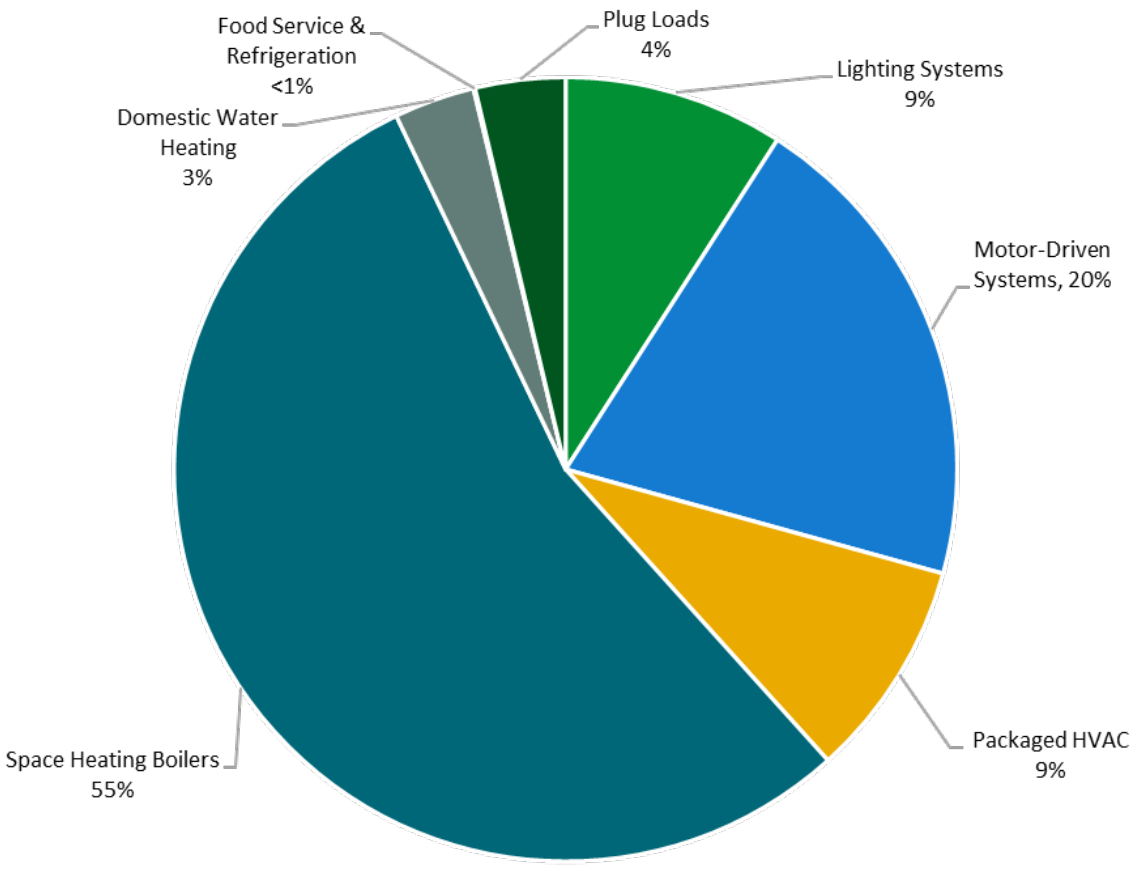
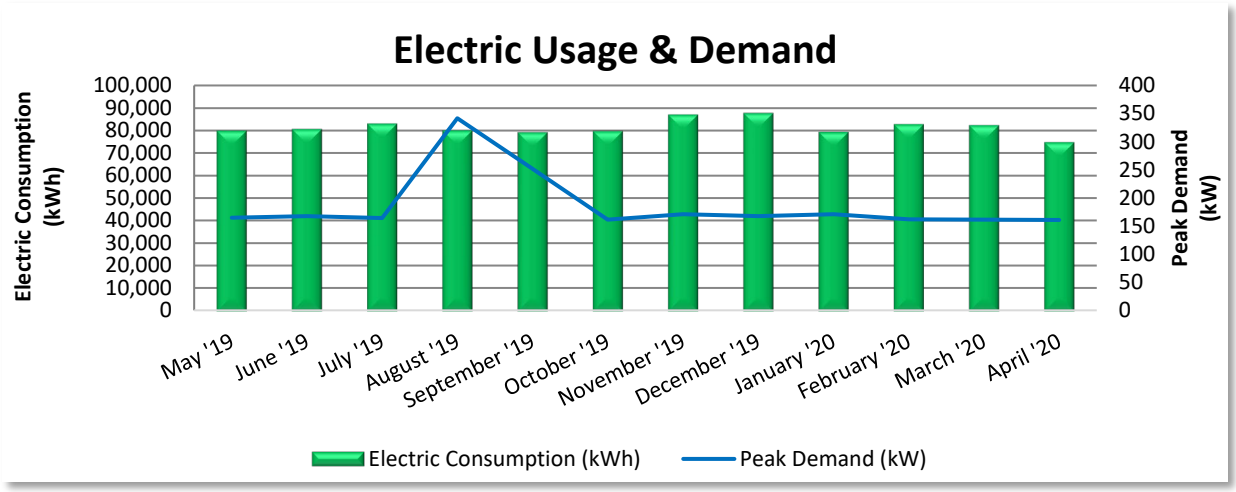


Figure 4 - Energy Balance

3.1 Electricity

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



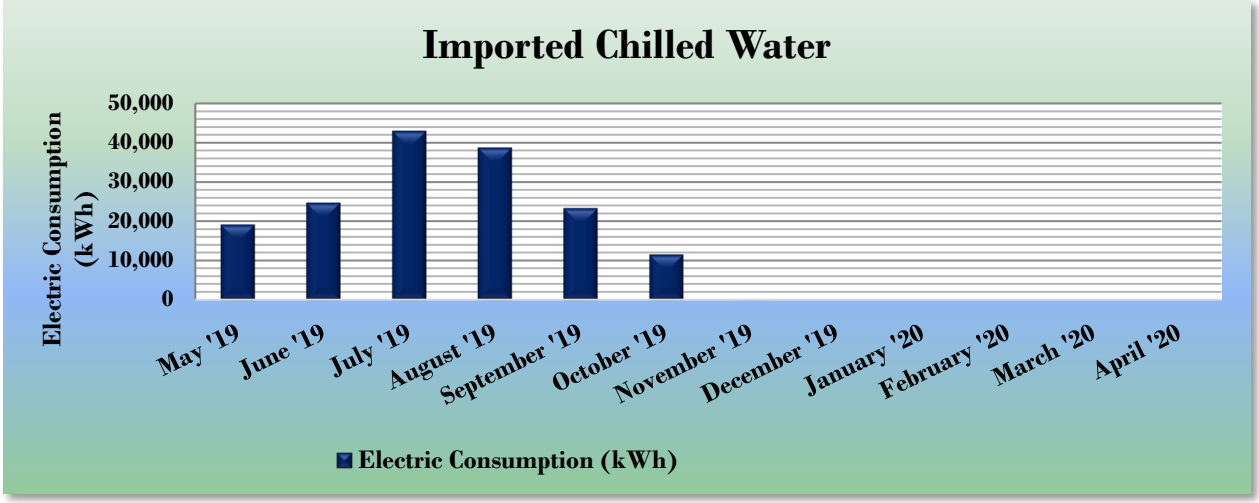
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
6/12/19	30	79,898	165	$2,098	$11,158
7/12/19	30	80,554	168	$2,089	$11,226
8/12/19	31	83,030	164	$2,125	$11,548
9/11/19	30	79,947	342	$2,080	$11,171
10/10/19	29	79,201	252	$642	$9,657
11/11/19	32	79,714	162	$625	$9,566
12/11/19	30	86,914	171	$608	$10,465
1/13/20	33	87,618	168	$645	$10,582
2/11/20	29	79,244	171	$632	$9,665
3/12/20	30	82,661	162	$645	$10,061
4/13/20	32	82,272	162	$611	$9,984
5/12/20	29	74,727	161	$570	$9,118
Totals	**365**	**975,780**	**342**	**$13,369**	**$124,199**
Annual	**365**	**975,780**	**342**	**$13,369**	**$124,199**

Notes:

- Peak demand of 342 kW occurred in August 2019.
- Average demand over the past 12 months was 187 kW.
- The average electric cost over the past 12 months was $0.127/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Chilled Water Usage

As for other buildings in the area, thermal energy and chilled water is supplied from the Vicinity owned Central Plant. There is a chilled water service agreement between the City (Customer) and Vicinity (Service Provider).



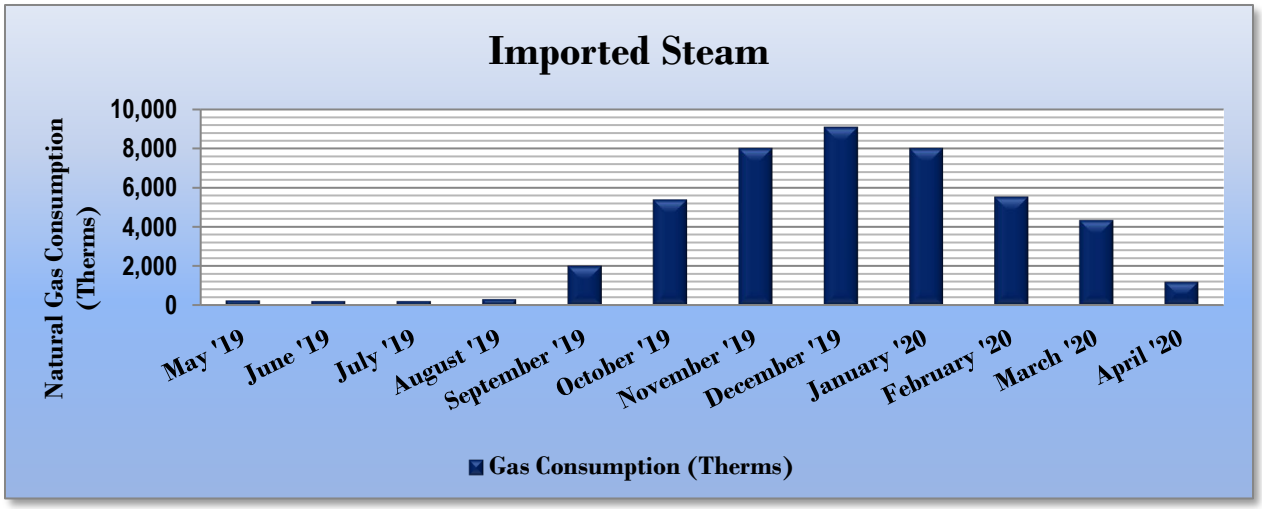
Chilled Water Billing Data for City Hall				
Period Ending	Days in Period	Chilled Water (ton-hr)	Cost	Cooling Demand (tons?)
5/31/19	30	19,230	$7,115	300
6/30/19	30	24,760	$9,037	300
7/31/19	31	42,890	$15,312	300
8/31/19	31	38,710	$14,400	300
9/30/19	30	23,320	$8,488	300
10/31/19	31	11,600	$1,972	300
11/30/19	30	70	$26	300
12/31/19	31	0	$0	300
1/31/20	31	0	$0	300
2/28/20	28	0	$0	300
3/31/20	32	0	$0	300
4/30/20	30	0	$0	300
Totals	**365**	**160,580**	**$56,351**	
Annual	**365**	**160,580**	**$56,351**	

Notes:

- The building cooling demand is 300 tons.
- The average chilled water cost over the past 12 months was $0.35/ton-hour.

3.3 Thermal Usage

As for many buildings in the area, thermal energy and chilled water are supplied from the Vicinity owned Central Plant. There is a thermal usage service agreement between the State as (Customer) and Vicinity (Service Provider).



Steam Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therm Equiv)**	**Natural Gas Cost**
6/30/19	30	250	$17,743
7/31/19	31	220	$18,085
8/31/19	31	220	$17,821
9/30/19	30	315	$17,919
10/31/19	31	2,012	$19,544
11/30/19	30	5,390	$21,517
12/31/19	31	8,010	$25,334
1/31/20	31	9,093	$26,735
2/28/20	28	8,005	$24,418
3/31/20	32	5,538	$22,108
4/30/20	30	4,345	$20,904
5/31/20	31	1,193	$18,999
Totals	**366**	**44,591**	**$251,127**
Annual	**365**	**44,469**	**$250,441**

Notes:

- The average thermal cost for the past 12 months is $56.32/MMBtu or $5.63/Therm Equivalent, which is the blended rate used throughout the analysis.

3.4 Benchmarking

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

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

Benchmarking Score	**[70]**

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.

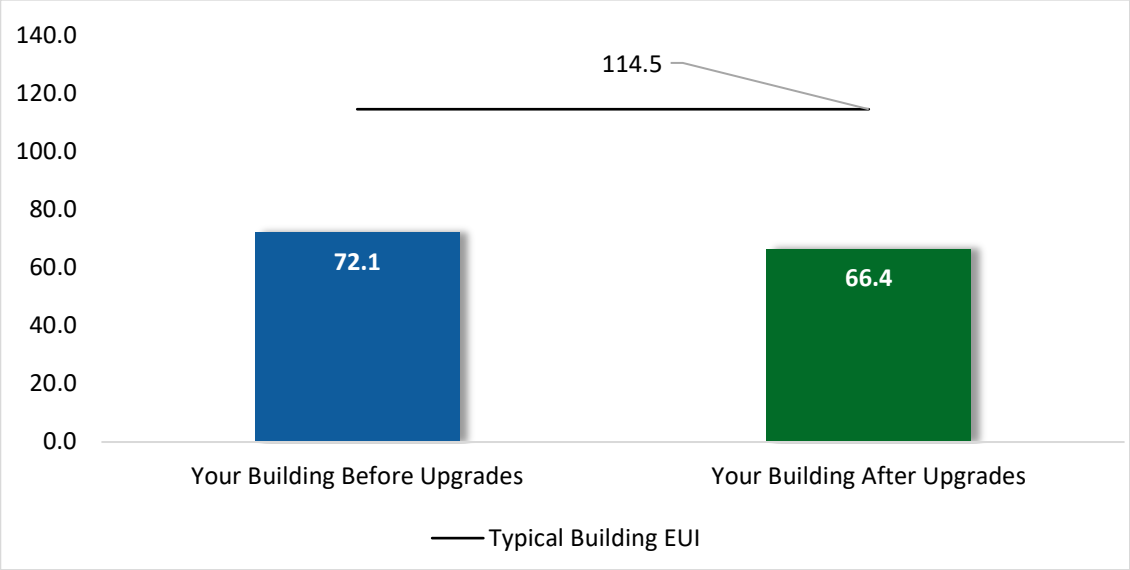


Figure 5 - Energy Use Intensity Comparison[3]

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

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause a building to vary from the "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 we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[4].

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

4 Energy Conservation Measures

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**109,434**	**24.6**	**-22**	**$12,710**	**$33,094**	**$8,000**	**$25,093**	**2.0**	**107,664**
ECM 1	Install LED Fixtures	Yes	1,590	0.0	0	$202	$1,656	$190	$1,466	7.2	1,602
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	704	0.3	0	$84	$550	$80	$470	5.6	698
ECM 3	Retrofit Fixtures with LED Lamps	Yes	107,139	24.3	-22	$12,423	$30,887	$7,730	$23,157	1.9	105,365
Lighting Control Measures			**26,693**	**5.6**	**-6**	**$3,077**	**$27,129**	**$7,960**	**$19,169**	**6.2**	**26,214**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	18,130	4.6	-4	$2,090	$19,254	$2,615	$16,639	8.0	17,804
ECM 5	Install High/Low Lighting Controls	Yes	8,564	1.1	-2	$987	$7,875	$5,345	$2,530	2.6	8,410
Motor Upgrades			**1,768**	**0.3**	**0**	**$225**	**$6,281**	**$0**	**$6,281**	**27.9**	**1,781**
ECM 6	Premium Efficiency Motors	No	1,768	0.3	0	$225	$6,281	$0	$6,281	27.9	1,781
Variable Frequency Drive (VFD) Measures			**28,894**	**5.1**	**0**	**$3,678**	**$34,150**	**$6,000**	**$28,150**	**7.7**	**29,096**
ECM 7	Install VFDs on Chilled Water Pumps	Yes	12,421	3.3	0	$1,581	$9,476	$4,000	$5,476	3.5	12,508
ECM 8	Install VFDs on Heating Water Pumps	Yes	16,473	1.8	0	$2,097	$24,673	$2,000	$22,673	10.8	16,588
Unitary HVAC Measures			**13,524**	**9.2**	**0**	**$1,721**	**$76,106**	**$9,015**	**$67,091**	**39.0**	**13,618**
ECM 9	Install High Efficiency Air Conditioning Units	No	13,030	8.9	0	$1,658	$70,976	$9,015	$61,961	37.4	13,121
ECM 10	Install High Efficiency Heat Pumps	No	494	0.3	0	$63	$5,130	$0	$5,130	81.6	497
Domestic Water Heating Upgrade			**6,141**	**0.0**	**0**	**$782**	**$323**	**$316**	**$6**	**0.0**	**6,184**
ECM 11	Install Low-Flow DHW Devices	Yes	6,141	0.0	0	$782	$323	$316	$6	0.0	6,184
Food Service & Refrigeration Measures			**1,954**	**0.2**	**0**	**$249**	**$460**	**$100**	**$360**	**1.4**	**1,968**
ECM 12	Vending Machine Control	Yes	1,954	0.2	0	$249	$460	$100	$360	1.4	1,968
TOTALS			**188,408**	**45.0**	**-27**	**$22,442**	**$177,542**	**$31,392**	**$146,150**	**6.5**	**186,525**

* - All incentives presented in this table are included as placeholders 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		**109,434**	**24.6**	**-22**	**$12,710**	**$33,094**	**$8,000**	**$25,093**	**2.0**	**107,664**
ECM 1	Install LED Fixtures	1,590	0.0	0	$202	$1,656	$190	$1,466	7.2	1,602
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	704	0.3	0	$84	$550	$80	$470	5.6	698
ECM 3	Retrofit Fixtures with LED Lamps	107,139	24.3	-22	$12,423	$30,887	$7,730	$23,157	1.9	105,365
Lighting Control Measures		**26,693**	**5.6**	**-6**	**$3,077**	**$27,129**	**$7,960**	**$19,169**	**6.2**	**26,214**
ECM 4	Install Occupancy Sensor Lighting Controls	18,130	4.6	-4	$2,090	$19,254	$2,615	$16,639	8.0	17,804
ECM 5	Install High/Low Lighting Controls	8,564	1.1	-2	$987	$7,875	$5,345	$2,530	2.6	8,410
Variable Frequency Drive (VFD) Measures		**28,894**	**5.1**	**0**	**$3,678**	**$34,150**	**$6,000**	**$28,150**	**7.7**	**29,096**
ECM 7	Install VFDs on Chilled Water Pumps	12,421	3.3	0	$1,581	$9,476	$4,000	$5,476	3.5	12,508
ECM 8	Install VFDs on Heating Water Pumps	16,473	1.8	0	$2,097	$24,673	$2,000	$22,673	10.8	16,588
Domestic Water Heating Upgrade		**6,141**	**0.0**	**0**	**$782**	**$323**	**$316**	**$6**	**0.0**	**6,184**
ECM 11	Install Low-Flow DHW Devices	6,141	0.0	0	$782	$323	$316	$6	0.0	6,184
Food Service & Refrigeration Measures		**1,954**	**0.2**	**0**	**$249**	**$460**	**$100**	**$360**	**1.4**	**1,968**
ECM 12	Vending Machine Control	1,954	0.2	0	$249	$460	$100	$360	1.4	1,968
TOTALS		**173,116**	**35.5**	**-27**	**$20,495**	**$95,155**	**$22,377**	**$72,778**	**3.6**	**171,126**

* - All incentives presented in this table are included as placeholders 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		**109,434**	**24.6**	**-22**	**$12,710**	**$33,094**	**$8,000**	**$25,093**	**2.0**	**107,664**
ECM 1	Install LED Fixtures	1,590	0.0	0	$202	$1,656	$190	$1,466	7.2	1,602
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	704	0.3	0	$84	$550	$80	$470	5.6	698
ECM 3	Retrofit Fixtures with LED Lamps	107,139	24.3	-22	$12,423	$30,887	$7,730	$23,157	1.9	105,365

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 are 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 fixture(s).

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: exterior fixtures.

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: all areas with fluorescent fixtures with T12 tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent, HID, or 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.

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

Affected building areas: all areas with fluorescent fixtures with T8 tubes; incandescent and compact fluorescent lamps

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**26,693**	**5.6**	**-6**	**$3,077**	**$27,129**	**$7,960**	**$19,169**	**6.2**	**26,214**
ECM 4	Install Occupancy Sensor Lighting Controls	18,130	4.6	-4	$2,090	$19,254	$2,615	$16,639	8.0	17,804
ECM 5	Install High/Low Lighting Controls	8,564	1.1	-2	$987	$7,875	$5,345	$2,530	2.6	8,410

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: offices, conference rooms, restrooms, corridors, stairwells, and storage rooms.

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.

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

Affected building areas: hallways and stairwells.

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 an occupant approaches.

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**1,768**	**0.3**	**0**	**$225**	**$6,281**	**$0**	**$6,281**	**27.9**	**1,781**
ECM 6	Premium Efficiency Motors	1,768	0.3	0	$225	$6,281	$0	$6,281	27.9	1,781

ECM 6: Premium Efficiency Motors

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

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Mechanical 4	City Hall	1	Heating Hot Water Pump	2.0	
Mechanical 4	City Hall	2	Heating Hot Water Pump	2.0	
Mechanical 1	City Hall	1	Heating Hot Water Pump	2.0	
Mechanical 1	City Hall	1	Heating Hot Water Pump	2.0	
Mechanical 2	City Hall	1	DHW Circulation Pump	0.3	DHW
Mechanical 5	City Hall	1	Return Fan	3.0	
Mechanical 6	City Hall	1	Return Fan	1.5	
Mechanical 6	City Hall	1	Return Fan	5.0	
Mechanical 5	City Hall	1	Supply Fan	5.0	

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

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**28,894**	**5.1**	**0**	**$3,678**	**$34,150**	**$6,000**	**$28,150**	**7.7**	**29,096**
ECM 7	Install VFDs on Chilled Water Pumps	12,421	3.3	0	$1,581	$9,476	$4,000	$5,476	3.5	12,508
ECM 8	Install VFDs on Heating Water Pumps	16,473	1.8	0	$2,097	$24,673	$2,000	$22,673	10.8	16,588

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 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: chilled water 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: heating hot water pumps and chilled water pumps.

4.5 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		**13,524**	**9.2**	**0**	**$1,721**	**$76,106**	**$9,015**	**$67,091**	**39.0**	**13,618**
ECM 9	Install High Efficiency Air Conditioning Units	13,030	8.9	0	$1,658	$70,976	$9,015	$61,961	37.4	13,121
ECM 10	Install High Efficiency Heat Pumps	494	0.3	0	$63	$5,130	$0	$5,130	81.6	497

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 at this facility 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 split system ac units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. Some of the replacement units will incorporate efficient gas furnaces. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling and heating load and the estimated annual operating hours.

Affected units: mayor's office and lower-level offices

ECM 10: Install High Efficiency Heat Pumps

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

Affected units: lower-level offices.

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		**6,141**	**0.0**	**0**	**$782**	**$323**	**$316**	**$6**	**0.0**	**6,184**
ECM 11	Install Low-Flow DHW Devices	6,141	0.0	0	$782	$323	$316	$6	0.0	6,184

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		**1,954**	**0.2**	**0**	**$249**	**$460**	**$100**	**$360**	**1.4**	**1,968**
ECM 12	Vending Machine Control	1,954	0.2	0	$249	$460	$100	$360	1.4	1,968

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 Measures for Future Consideration

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

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

- evaluate these measures further
- develop firm costs
- determine measure savings
- prepare detailed implementation plans.

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

Retro-Commissioning Study

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

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

Once goals and responsibilities are established, the objective of the investigation process is to understand how the building is currently operating, identify the issues, and determine the most cost-effective way to improve performance. The retro-commissioning agent will review building documentation, interview building occupants, and inspect and test the equipment. Information is then compiled into a report and shared with facility staff, who will select which recommendations to implement after reviewing the findings.

The implementation phase puts the selected processes into place. Typical measures may include sensor calibration, equipment schedule changes, damper linkage repair and similar relatively low-cost adjustments -- although more expensive sophisticated programming and building control system upgrades may be warranted. Approved measures may be implemented by the agent, the building staff, or by subcontractors. Typically, a combination of these individuals makes up the retro-commissioning team.

After the approved measures are implemented, the team will verify that the changes are working as expected. Baseline and post-case measurements will allow building staff to monitor equipment and ensure that the benefits are maintained.

Upgrade/Replace Energy Management System

Based on our site survey and on conversations with facility staff, it appears that the existing energy management system (EMS) is substantially limited in its capabilities, means of control, monitoring/ reporting function, or condition relative to new systems available in the marketplace. A substantial upgrade to your site's EMS could increase the efficiency of your building HVAC system operation.

The current generation EMS typically provides building systems with a network of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems to adjust system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatics controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

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

It is recommended that an HVAC engineer or contractor who specializes in energy management systems be contacted for a detailed evaluation and implementation costs. A controls expert will be able to tell you to what extent an existing system can be refurbished or expanded, what sensors should be replaced, what additional HVAC systems could be controlled, and what monitoring and graphic capabilities can be added. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

Vestibule Revolving Doors

Revolving doors are a free-standing vestibule that are much more energy efficient than traditional doors. The installation of revolving doors increase comfort, improve traffic flow, and increase security. This allows for a significant amount of uncontrolled air exchange between the outside and inside of the building. The installation of revolving doors on the south side would greatly reduce this and thus reduce the load on the HVAC system which serves these lobby/corridor spaces. However, the design and installation of vestibule doors involve an architectural element and would potentially require a high cost for implementation. The measure would require more evaluation to determine feasibility.

Window Replacements

Energy efficient windows are an important consideration when improving the building envelope. The heat transfer through the glass panes are responsible for a significant portion of the facility's heating and cooling energy consumption. We recommend replacing single pane windows with double pane windows and considering models that are gas-filled with low-e coatings to reduce heat loss. Windows should be selected with low- U-factors to maximize energy savings. The U-factor is the rate at which the window conducts non-solar heat flow and is a key indicator of performance. The lower the U-factor, the higher the efficiency of the window. Window frames and sashes should be efficient as well. If metal frames are

specified or required by code, the frame extrusions should have a thermal break to reduce conduction through the frame. As part of the installation, the window frames should be properly sealed with caulk materials to ensure the mitigation of air infiltration. Building envelopes that limit air infiltration and that have adequate fenestrations play a key role in optimizing heating and cooling efficiency, controlling moisture, and providing occupant comfort. Window system replacement is an expensive upgrade that generally involves architectural elements. We recommend this as a measure for further study.

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 between 5% to 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, planned capital upgrades, and 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 will 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 can't manage what you don't 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 and thus 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 (ACH) 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.

Window Treatments/Coverings

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

Lighting Maintenance

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

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

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.

Economizer Maintenance

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

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

AC System Evaporator/Condenser Coil Cleaning

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

HVAC Filter Cleaning and Replacement

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

Ductwork Maintenance

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

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

Duct leakage in commercial buildings can account for 5% to 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.

Label HVAC Equipment

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

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

Optimize HVAC Equipment Schedules

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

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

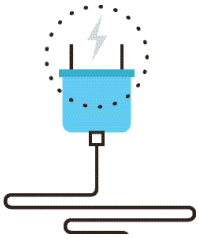
Compressed Air System Maintenance

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

- Inspection, cleaning, and replacement of inlet filter cartridges
- Cleaning of drain traps
- Daily inspection of lubricant levels to reduce unwanted friction
- Inspection of belt condition and tension
- Check for leaks and adjust loose connections
- Overall system cleaning

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

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[6]. Your local utility may offer incentives or rebates for this equipment.

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[7] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[8] 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] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

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

[8] 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.

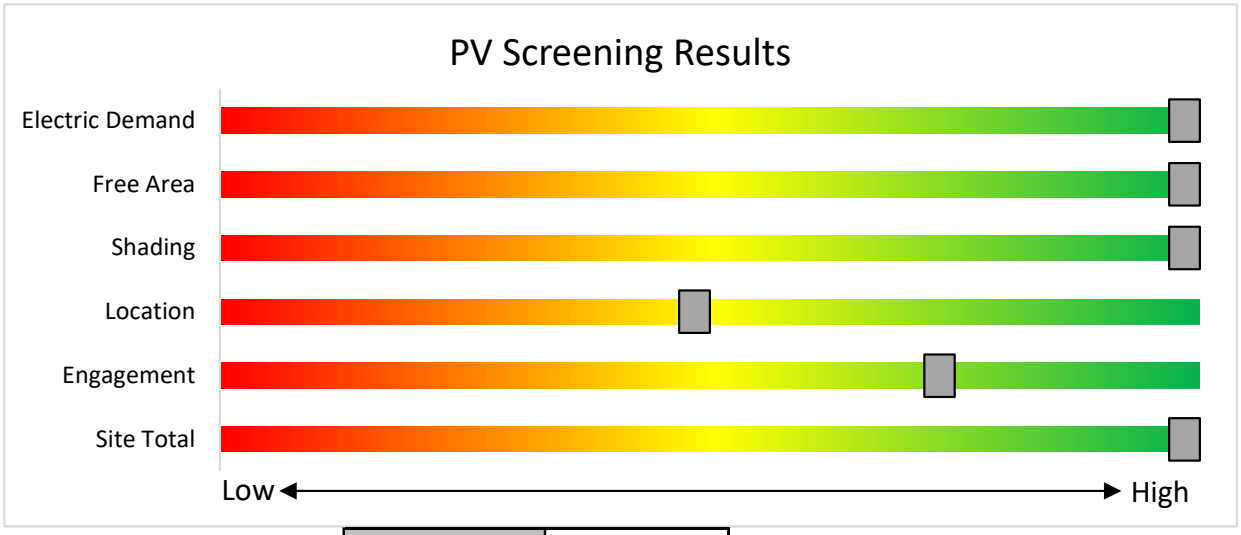
6.1 Solar Photovoltaic

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	188	kW DC STC
Electric Generation	223,978	kWh/yr
Displaced Cost	$28,510	/yr
Installed Cost	$733,200	

Figure 8 - Photovoltaic Screening

Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install 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 TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installation.

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:

Transition Incentive (TI) Program: https://www.njcleanenergy.com/renewable-energy/programs/transition-incentive-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.

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

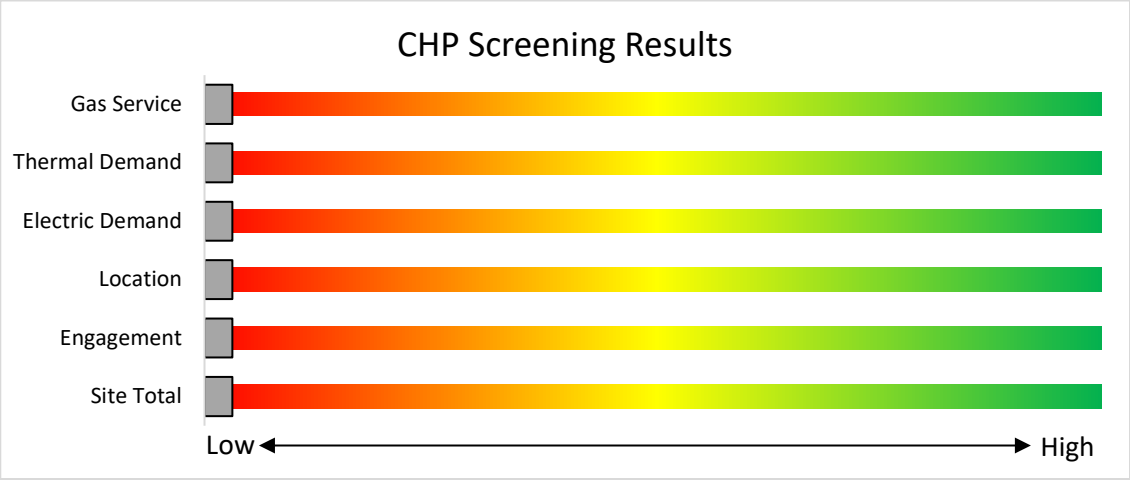


Figure 9 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

7.1 Utility Energy Efficiency Programs

New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website.

8 New Jersey's Clean Energy Programs

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

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

8.2 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 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 (ESP) 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 description 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.

8.3 Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install 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 TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installations. NJBPU calculates the value of a Transition Renewable Energy Certificate (TREC) by multiplying the base compensation rate ($152/MWh) by the project's assigned factor (i.e. $152 x 0.85 = $129.20/MWh). The TREC factors are defined based on the chart below:

Project Type	Factor
Subsection (t): landfill, brownfield, areas of historic fill	1.00
Grid supply (Subsection (r)) rooftop	1.00
Net metered non-residential rooftop and carport	1.00
Community solar	0.85
Grid supply (Subsection (r)) ground mount	0.60
Net metered residential ground mount	0.60
Net metered residential rooftop and carport	0.60
Net metered non-residential ground mount	0.60

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey TRECs.

Eligible projects may generate TRECs for 15 years following the commencement of commercial operations (also referred to as the "Transition Incentive Qualification Life"). After 15 years, projects may be eligible for a NJ Class I REC.

TRECs will be used by the identified compliance entities to satisfy a compliance obligation tied to a new Transition Incentive Renewable Portfolio Standard ("TI-RPS"), which will exist in parallel with, and completely separate from, the existing Solar RPS for Legacy SRECs. The TI-RPS is a carve-out of the current Class I RPS requirement. The creation of TRECs is based upon metered generation supplied to PJM-EIS General Attribute Tracking System ("GATS") by the owners of eligible facilities or their agents. GATS would create one TREC for each MWh of energy produced from a qualified facility.

TRECs will be purchased monthly by a TREC Administrator who will allocate the TRECs 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.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan. The Transition Incentive Program online portal is now open to new applications effective May 1, 2020. There are instructions on "How and When to Transfer my SRP Registration to the Transition Incentive Program". If you are considering installing solar photovoltaics on your building, visit the following link for more information:

https://www.njcleanenergy.com/renewable-energy/programs/transition-incentive-program

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. 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 includes the review of multiple bids for project work, incorporate potential operational & maintenance (O&M) cost savings and maximize your incentive potential.

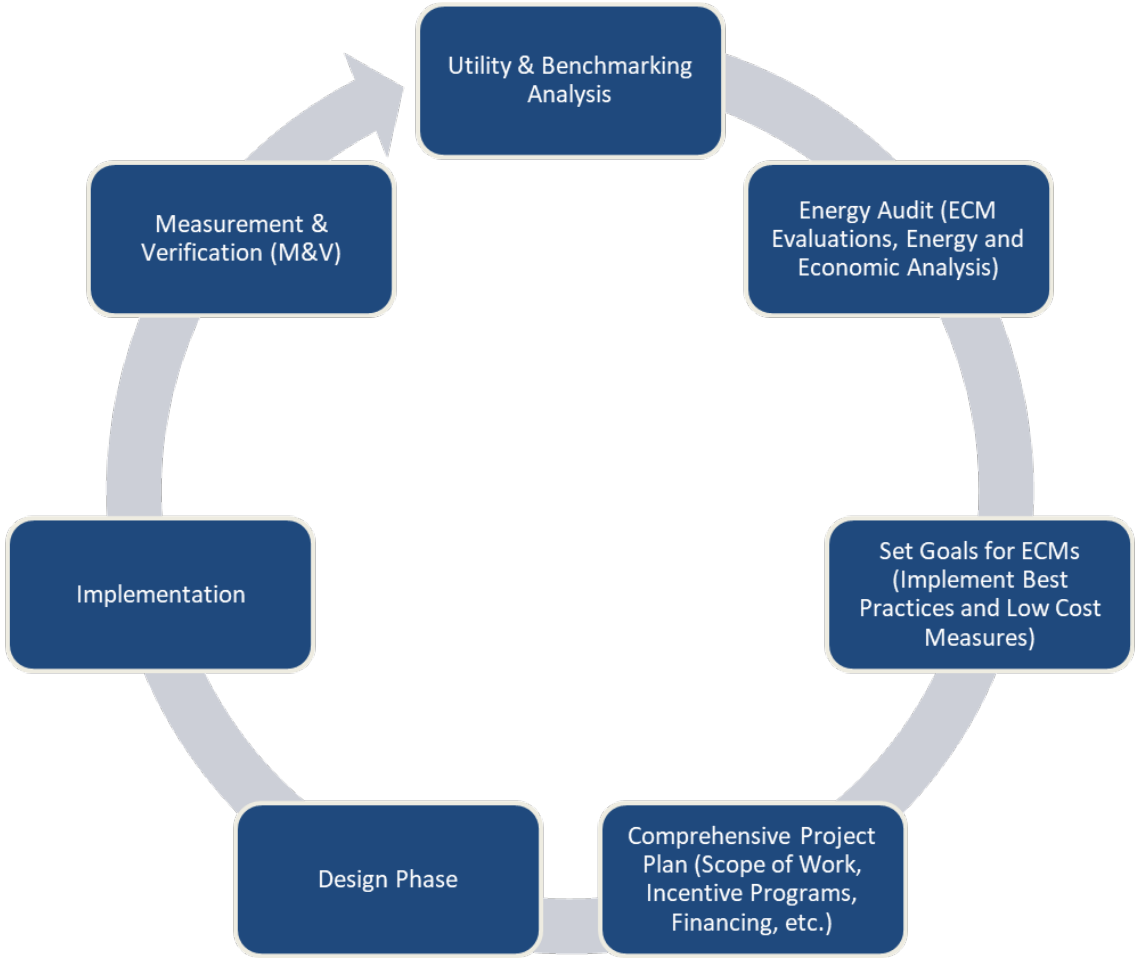


Figure 10 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, 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[9].

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 that fluctuate monthly. The utility provides basic gas supply service (BGSS) 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[10].

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

[10] 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
Corridor 2 old building	6	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2 old building	2	LED Lamps: (1) 10W A19 Screw-In Lamps	Wall Switch	S	10	6,552	5	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamps	High/Low Control	10	4,521	0.0	44	0	$5	$225	$70	30.6
Corridor 2 old building	18	LED Lamps: (1) 12W A19 Screw-In Lamps	Wall Switch	S	12	6,552	5	None	Yes	18	LED Lamps: (1) 12W A19 Screw-In Lamps	High/Low Control	12	4,521	0.1	474	0	$55	$225	$225	0.0
Corridor 2 old building	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.0	234	0	$27	$37	$10	1.0
Corridor 4 service elevator hall	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.2	1,783	0	$206	$444	$270	0.8
Corridor basement hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	6,552	3, 5	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.0	297	0	$34	$262	$45	6.3
Corridor basement hall	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor basement hall	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	6,552	5	None	Yes	3	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	4,521	0.0	66	0	$8	$225	$105	15.8
Corridor basement hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 5	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.0	297	0	$34	$37	$10	0.8
Corridor basement hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3, 5	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	4,521	0.5	4,188	-1	$483	$1,034	$440	1.2
Corridor basement hall	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3, 5	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	4,521	0.6	4,711	-1	$543	$1,107	$495	1.1
Electrical Room 1	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	828	0.3	435	0	$50	$562	$115	8.9
Elevator room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,035	0.1	240	0	$28	$262	$60	7.3
Mechanical 3 DHW distribution	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	1,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	1,500	0.0	53	0	$6	$37	$10	4.3
Mechanical 4 chill water intake	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	6	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Mechanical 5 AHU-6	8	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	8	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Mechanical 6	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	S	62	1,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	1,500	0.0	53	0	$6	$37	$10	4.3
Office - Building superintendent	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,500	4	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	2,415	0.0	23	0	$3	$0	$0	0.0
Office - Building superintendent	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,415	0.0	161	0	$19	$65	$12	2.9
Office - Building superintendent	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$73	$20	1.4
Office - Building superintendent	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$343	$55	7.9
Office - Division of public buildings	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.3	460	0	$53	$329	$90	4.5
Office - Division of public buildings entrance	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
Office - Division of public buildings entrance	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	230	0	$27	$164	$45	4.5
Office - Division of public buildings office	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.2	384	0	$44	$274	$75	4.5

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office - Enclosed 1 server rm office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Enclosed city clerk office	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.3	1,398	0	$161	$635	$135	3.1
Office - Enclosed dept of recreation office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Enclosed dept of recreation office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.2	952	0	$110	$489	$95	3.6
Office - Enclosed dept of recreation office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Enclosed file rm city clerk	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Enclosed havc office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	125	0	$14	$37	$10	1.8
Office - Enclosed office 1 computer rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.3	1,119	0	$129	$562	$115	3.5
Office - Enclosed office 2 computer rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.2	839	0	$97	$489	$95	4.1
Office - Enclosed print rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.3	1,119	0	$129	$562	$115	3.5
Office - Enclosed storage rm city clerk	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Open computer room	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
Office - Open computer room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.1	280	0	$32	$73	$20	1.6
Office - Open computer room	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,415	0.1	297	0	$34	$415	$55	10.5
Office - Open Dept traffic 101	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.8	3,571	-1	$412	$1,092	$260	2.0
Office - Open Dept traffic 101 II office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.0	187	0	$22	$55	$15	1.8
Office - Open Dept traffic 101 safe	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,200	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,200	0.0	64	0	$7	$55	$15	5.4
Office - Open Dept traffic 101 safe 2/3 LL	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,200	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	828	0.2	245	0	$28	$434	$80	12.5
Office - Open Plan chief assessor	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$73	$20	1.4
Office - Open Plan chief assessor	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.2	952	0	$110	$489	$95	3.6
Office - Open Plan chief assessor office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$189	$40	4.1
Office - Open Plan chief assessor safe	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	828	0.1	109	0	$13	$189	$40	11.9
Office - Open Plan city clerks office	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Office - Open Plan city clerks office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Open Plan dept of admin services	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
Office - Open Plan dept of admin services	19	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	19	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	1.1	4,524	-1	$522	$1,581	$355	2.4
Office - Open Plan dept of human services	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Office - Open Plan dept of human services	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Open Plan dept recreation	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
Office - Open Plan dept recreation	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.3	1,428	0	$165	$599	$125	2.9
Office - Open Plan dept recreation storage	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	1,200	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	828	0.2	264	0	$30	$476	$65	13.5
Office - Open Plan dept recreation conference	13	Incandescent: (1) 90W PAR30 Screw-In Lamp	Wall Switch	S	90	2,080	3	Relamp	No	13	LED Lamps: PAR30 Lamps	Wall Switch	12	2,080	0.9	2,278	0	$263	$302	$39	1.0
Office - Open Plan dept recreation conference	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.4	1,132	0	$130	$708	$155	4.2
Office - Parking enforcement	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.3	1,119	0	$129	$562	$115	3.5
Office - storage near of public buildings	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	828	0.1	218	0	$25	$416	$75	13.6
Office - Trenton PD office	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	6,552	3, 4	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,521	0.4	3,120	-1	$360	$653	$140	1.4
Office - Union president office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	125	0	$14	$37	$10	1.8
Open office dept of recreation	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
Open office dept of recreation	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.0	187	0	$22	$55	$15	1.8
Phone room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	1,200	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.1	76	0	$9	$69	$10	6.7
Restroom - Female 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	54	0	$6	$37	$10	4.2
Restroom - Female 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom - Female 3	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	81	0	$9	$55	$15	4.2
Restroom - Female 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom - female glass corridor	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	S	10	1,435		None	No	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,435	0.0	0	0	$0	$0	$0	0.0
Restroom - female glass corridor	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	81	0	$9	$55	$15	4.2
Restroom - female glass corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom - Male 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	54	0	$6	$37	$10	4.2
Restroom - Male 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom - Male glass corridor	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	S	10	1,435		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,435	0.0	0	0	$0	$0	$0	0.0

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Restroom - Male glass corridor	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	81	0	$9	$55	$15	4.2
Restroom - Male glass corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom male 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.1	109	0	$13	$73	$20	4.2
Safe division of public buildings	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Server Room 1	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
Server Room 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$73	$20	1.4
Server Room 1	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	1.0	4,474	-1	$516	$1,708	$390	2.6
Storage 1	5	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,200	4	None	Yes	5	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	828	0.0	20	0	$2	$270	$35	101.5
Storage 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	43	0	$5	$37	$10	5.4
Storage 3	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,200		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,200	0.0	0	0	$0	$0	$0	0.0
Storage 4	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,200		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,200	0.0	0	0	$0	$0	$0	0.0
Storage 5 technical inspection	1	LED Lamps: (1) 10W A19 Screw-In Lamp	None	S	10	3,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	None	10	3,500	0.0	0	0	$0	$0	$0	0.0
Storage 5 technical inspection	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	125	0	$14	$37	$10	1.8
Storage 5 technical inspection storage 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	S	114	1,200	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	None	58	1,200	0.0	73	0	$8	$73	$20	6.3
Storage 5 technical inspection storage 2	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,200	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	1,200	0.0	65	0	$7	$17	$1	2.2
Storage 5 technical inspection storage 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	43	0	$5	$37	$10	5.4
Storage chair and table storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,200	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,200	0.0	73	0	$8	$73	$20	6.3
Storage city clerk storage	3	Compact Fluorescent: (1) 32W Spiral Plug-In Lamp	Wall Switch	S	32	1,200	3, 4	Relamp	Yes	3	LED Lamps: A19 Lamps	Occupancy Sensor	10	828	0.1	98	0	$11	$322	$38	25.2
Storage city clerk storage	1	Incandescent: (1) 100W A19 Screw-In Lamp	Wall Switch	S	100	1,200	3, 4	Relamp	Yes	1	LED Lamps: A19 Lamps	Occupancy Sensor	12	828	0.1	119	0	$14	$17	$1	1.2
Storage city clerk storage	3	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,200	3, 4	Relamp	Yes	3	LED Lamps: A19 Lamps	Occupancy Sensor	12	828	0.1	201	0	$23	$322	$38	12.2
Storage file in building supervisor office	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	1,200	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	12	1,200	0.0	62	0	$7	$17	$1	2.3
Storage file in building supervisor office	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,200	3, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	828	0.1	171	0	$20	$380	$65	16.0
Storage finance	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,200	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,200	0.0	73	0	$8	$73	$20	6.3
Storage supply closet	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,200	4	None	Yes	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	828	0.0	12	0	$1	$116	$20	69.1
Storage supply closet	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,200	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	828	0.0	23	0	$3	$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
Storage supply closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	43	0	$5	$37	$10	5.4
Storage technical inspection 2	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,200		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,200	0.0	0	0	$0	$0	$0	0.0
Workshop 1 maintenance repair shop	1	Incandescent: (1) 60W A19 Screw-In Lamp	None	S	60	1,500	3	Relamp	No	1	LED Lamps: A19 Lamps	None	12	1,500	0.0	78	0	$9	$17	$0	1.9
Workshop 1 maintenance repair shop	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	S	114	1,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	None	58	1,500	0.0	91	0	$10	$73	$20	5.1
Workshop 1 maintenance repair shop	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,035	0.1	204	0	$24	$380	$65	13.4
Exterior 2	1	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock		100	4,380		None	No	1	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	4	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock		100	4,380		None	No	4	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Timeclock	100	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	1	LED Lamps: (1) 55W Corn Bulb Screw-In Lamp	Timeclock		55	4,380		None	No	1	LED Lamps: (1) 55W Corn Bulb Screw-In Lamp	Timeclock	55	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior 2	6	Metal Halide: (1) 100W Lamp	Timeclock		128	4,380	3	Relamp	No	6	LED Lamps: ≤125 W Lamp	Timeclock	18	4,380	0.0	2,891	0	$368	$103	$103	0.0
Exterior 2	2	Metal Halide: (1) 150W Lamp	Timeclock		190	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Stairwell/Passageway Lighting	Timeclock	42	4,380	0.0	1,296	0	$165	$621	$90	3.2
Mechanical 1	1	Compact Fluorescent: (1) 32W BR30 Screw-In Lamp	Wall Switch	S	32	1,500	3	Relamp	No	1	LED Lamps: BR30 Lamps	Wall Switch	12	1,500	0.0	32	0	$4	$24	$3	5.6
Mechanical 1	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500	4	None	Yes	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,035	0.0	15	0	$2	$270	$35	135.3
Mechanical 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,500	0.0	91	0	$10	$73	$20	5.1
Mechanical 2 hot water intake	2	Compact Fluorescent: (1) 32W Spiral Plug-In Lamp	Wall Switch	S	32	1,500	3	Relamp	No	2	LED Lamps: A19 Lamps	Wall Switch	12	1,500	0.0	65	0	$7	$34	$2	4.3
Mechanical 2 hot water intake	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Mechanical 2 hot water intake	1	LED - Fixtures: Wall Pack	Photocell	S	20	1,500		None	No	1	LED - Fixtures: Wall Pack	Photocell	20	1,500	0.0	0	0	$0	$0	$0	0.0
Storage 7	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,200	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.0	43	0	$5	$37	$10	5.4
2 balcony	11	Incandescent: (1) 75W PAR30 Screw-In Lamp	Timeclock	S	75	4,380	3	Relamp	No	11	LED Lamps: PAR30 Lamps	Timeclock	12	4,380	0.0	3,035	0	$386	$255	$33	0.6
Conference mayors office	14	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	High/Low Control	S	26	1,435	3	Relamp	No	14	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	12	1,435	0.2	304	0	$35	$175	$14	4.6
Conference mayors office	3	Compact Fluorescent: (2) 26W Biaxial Plug-In Lamps	High/Low Control	S	52	1,435	3	Relamp	No	3	LED Lamps: GX23 (Plug-In) Lamps	High/Low Control	24	1,435	0.1	130	0	$15	$75	$6	4.6
Conference mayors office	1	Compact Fluorescent: (3) 40W Biaxial Plug-In Lamps	High/Low Control	S	120	1,435	3	Relamp	No	1	LED Lamps: PL-L (Biax) Lamps	High/Low Control	72	1,435	0.0	74	0	$9	$41	$3	4.4
Conference mayors office	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
Conference mayors office	2	Incandescent: (1) 60W A19 Screw-In Lamp	High/Low Control	S	60	1,435	3	Relamp	No	2	LED Lamps: A19 Lamps	High/Low Control	10	1,435	0.1	155	0	$18	$34	$2	1.8
Conference mayors office	10	Linear Fluorescent - T5: 2' T5 (14W) - 3L	High/Low Control	S	51	1,435	3	Relamp	No	10	LED - Linear Tubes: (3) 2' Lamps	High/Low Control	26	1,435	0.2	395	0	$46	$488	$90	8.7
Conference mayors office	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	High/Low Control	S	52	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	1,435	0.0	54	0	$6	$33	$6	4.2

	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 1 glass	14	Compact Fluorescent: (1) 23W BR30 Screw-In Lamp	Wall Switch	S	23	6,552	3, 5	Relamp	Yes	14	LED Lamps: BR30 Lamps	High/Low Control	12	4,521	0.2	1,458	0	$168	$1,009	$532	2.8
Corridor 1 glass	2	Exit Signs: LED - 2 W Lamp	None		6	6,552		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	6,552	0.0	0	0	$0	$0	$0	0.0
Corridor 1 glass	14	Incandescent: (1) 65W BR30 Screw-In Lamp	Wall Switch	S	65	6,552	3, 5	Relamp	Yes	14	LED Lamps: BR30 Lamps	High/Low Control	12	4,521	0.7	5,619	-1	$648	$1,009	$532	0.7
Corridor 1 glass	9	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	6,552	5	None	Yes	9	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	4,521	0.0	197	0	$23	$450	$315	5.9
Corridor 7 service entrance	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.1	891	0	$103	$335	$135	1.9
Corridor glass corridor	2	Exit Signs: LED - 2 W Lamp	None		6	6,552		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	6,552	0.0	0	0	$0	$0	$0	0.0
Corridor glass corridor	8	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	6,552	5	None	Yes	8	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	4,521	0.0	175	0	$20	$450	$280	8.4
Corridor old building	2	Exit Signs: LED - 2 W Lamp	None		6	6,552		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	6,552	0.0	0	0	$0	$0	$0	0.0
Corridor old building	7	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	6,552	5	None	Yes	7	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	4,521	0.0	154	0	$18	$450	$245	11.6
Corridor old building	16	LED Lamps: (1) 10W A19 Screw-In Lamps	Wall Switch	S	10	6,552	5	None	Yes	16	LED Lamps: (1) 10W A19 Screw-In Lamps	High/Low Control	10	4,521	0.0	351	0	$40	$225	$225	0.0
Corridor old building	11	LED Lamps: (1) 12W A19 Screw-In Lamps	Wall Switch	S	12	6,552		None	No	11	LED Lamps: (1) 12W A19 Screw-In Lamps	Wall Switch	12	6,552	0.0	0	0	$0	$0	$0	0.0
Courtroom city council	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
Courtroom city council	100	LED Lamps: (1) 14W A19 Screw-In Lamps	Wall Switch	S	14	2,080		None	No	100	LED Lamps: (1) 14W A19 Screw-In Lamps	Wall Switch	14	2,080	0.0	0	0	$0	$0	$0	0.0
Courtroom city council	64	LED Lamps: (1) 20W A19 Screw-In Lamps	Wall Switch	S	20	2,080		None	No	64	LED Lamps: (1) 20W A19 Screw-In Lamps	Wall Switch	20	2,080	0.0	0	0	$0	$0	$0	0.0
Janitorial 1	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,080		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	2,080	0.0	0	0	$0	$0	$0	0.0
Kitchen mayors break room	3	Compact Fluorescent: (1) 26W Biaxial Plug-In Lamp	Wall Switch	S	26	2,080	3, 4	Relamp	Yes	3	LED Lamps: GX23 (Plug-In) Lamps	Occupancy Sensor	12	1,435	0.0	119	0	$14	$308	$38	19.6
Kitchen mayors break room	6	Linear Fluorescent - T5: 2' T5 (14W) - 3L	Wall Switch	S	51	2,080	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,435	0.2	450	0	$52	$563	$89	9.1
Kitchen mayors break room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,080	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	0.0	126	0	$15	$73	$20	3.7
Lobby 1 parking lot entrance	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Lobby 1 parking lot entrance	12	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	6,552	5	None	Yes	12	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	4,521	0.0	263	0	$30	$450	$420	1.0
Office - Chief of staff 214	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
Office - Chief of staff 214	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$189	$40	4.1
Office - Chief of staff 214	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.2	714	0	$82	$434	$80	4.3
Office - Chief of staff 214	1	Compact Fluorescent: (2) 40W Biaxial Plug-In Lamps	Wall Switch	S	80	3,500	3	Relamp	No	1	LED Lamps: PL-L (Biax) Lamps	Wall Switch	46	3,500	0.0	129	0	$15	$27	$2	1.7
Office - Chief of staff 214	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.2	952	0	$110	$489	$95	3.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office - Chief of staff 214 conference	1	Compact Fluorescent: (2) 40W Biaxial Plug-In Lamps	Wall Switch	S	80	2,080	3	Relamp	No	1	LED Lamps: PL-L (Biax) Lamps	Wall Switch	46	2,080	0.0	76	0	$9	$27	$2	2.8
Office - Chief of staff 214 conference	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,080	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	283	0	$33	$226	$50	5.4
Office - Chief of staff 214 assistant	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.2	714	0	$82	$434	$80	4.3
Office - City council conference	10	Compact Fluorescent: (1) 12W BR30 Screw-In Lamp	Wall Switch	S	12	2,080	3, 4	Relamp	Yes	10	LED Lamps: BR30 Lamps	Occupancy Sensor	12	1,435	0.0	84	0	$10	$509	$65	46.1
Office - City council conference	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
Office - City council conference	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,080	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.1	133	0	$15	$69	$10	3.8
Office - City council conference	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.0	74	0	$9	$37	$10	3.1
Office - City council conference	12	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,080	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,435	0.4	1,058	0	$122	$1,140	$155	8.1
Office - Enclosed	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.2	839	0	$97	$489	$95	4.1
Office - Enclosed 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.2	839	0	$97	$489	$95	4.1
Office - Enclosed 204	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$189	$40	4.1
Office - Enclosed 216	4	Compact Fluorescent: (2) 13W Spiral Plug-In Lamps	Wall Switch	S	26	3,500	3, 4	Relamp	Yes	4	LED Lamps: (2) 5.5W Plug-In Lamps	Occupancy Sensor	11	2,415	0.1	278	0	$32	$316	$60	8.0
Office - Enclosed executive protection unit	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	3,500	0.0	0	0	$0	$0	$0	0.0
Office - Enclosed executive protection unit	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Finance	1	LED Lamps: (1) 14W A19 Screw-In Lamp	None	S	14	3,500		None	No	1	LED Lamps: (1) 14W A19 Screw-In Lamp	None	14	3,500	0.0	0	0	$0	$0	$0	0.0
Office - Finance	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.8	3,333	-1	$384	$1,037	$245	2.1
Office - Finance office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Mayor 208	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.3	1,119	0	$129	$562	$115	3.5
Office - Mayor 208 mayors office	1	Compact Fluorescent: (2) 40W Double Biaxial Plug-In Lamps	Wall Switch	S	80	3,500	3	Relamp	No	1	LED Lamps: PL-L (Biax) Lamps	Wall Switch	46	3,500	0.0	129	0	$15	$27	$2	1.7
Office - Mayor 208 mayors office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.3	1,119	0	$129	$562	$115	3.5
Office - Mayor 208 office 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Mayor 208 office 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Office of concerned citizens	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	635	0	$73	$416	$75	4.7
Office - Office of veterans & senior affairs	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.2	794	0	$91	$453	$85	4.0
Office - Open Plan 103 dept of public works	14	Linear Fluorescent - T5: 2' T5 (14W) - 3L	Wall Switch	S	51	3,500	3	Relamp	No	14	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	3,500	0.3	1,349	0	$156	$683	$126	3.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office - Open Plan division of environmental health	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
Office - Open Plan division of environmental health	54	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	54	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	2.0	8,571	-2	$988	$3,052	$680	2.4
Office - Open Plan division of environmental health	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.0	187	0	$22	$55	$15	1.8
Office - Open Plan division of environmental health	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.6	2,517	-1	$290	$927	$215	2.5
Office - Open Plan tax 107	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Office - Open Plan tax 107	28	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	28	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	1.6	6,666	-1	$769	$2,074	$490	2.1
Office - treasury	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.4	1,905	0	$220	$708	$155	2.5
Restroom - Female 1 glass corridor	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	S	10	1,435		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,435	0.0	0	0	$0	$0	$0	0.0
Restroom - Female 1 glass corridor	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	81	0	$9	$55	$15	4.2
Restroom - Female 1 glass corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom - Female 4	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,080	4	None	Yes	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,435	0.0	21	0	$2	$270	$35	97.6
Restroom - Female glass corridor	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,080	4	None	Yes	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,435	0.0	14	0	$2	$116	$20	59.8
Restroom - Female glass corridor	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,080	3, 4	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.1	148	0	$17	$325	$50	16.1
Restroom - Female glass corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.0	74	0	$9	$37	$10	3.1
Restroom - Male 1 glass corridor	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	S	10	1,435		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	1,435	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 1 glass corridor	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	S	32	1,435	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	81	0	$9	$55	$15	4.2
Restroom - Male 1 glass corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,435	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,435	0.0	51	0	$6	$37	$10	4.5
Restroom - Male 117	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,080	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,080	0.0	39	0	$5	$18	$5	2.9
Restroom - Male 117	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,080	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,435	0.1	332	0	$38	$262	$60	5.3
Restroom - Male 5	1	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	S	12	2,080		None	No	1	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	12	2,080	0.0	0	0	$0	$0	$0	0.0
Restroom - Male glass corridor	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	2,080		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	2,080	0.0	0	0	$0	$0	$0	0.0
Restroom - Male glass corridor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,080	3, 4	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,435	0.0	99	0	$11	$153	$30	10.8
Restroom - Male glass corridor	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,080	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.0	74	0	$9	$37	$10	3.1
Storage safe finance	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,200	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,200	0.0	73	0	$8	$73	$20	6.3
Conference dept of administration	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.2	307	0	$35	$219	$60	4.5

	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 dept of health	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,080	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,435	0.3	665	0	$77	$562	$115	5.8
Conference dept of health 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,080	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,435	0.3	665	0	$77	$562	$115	5.8
Corridor glass corridor	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 glass corridor	9	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	6,552	5	None	Yes	9	LED Lamps: (1) 10W A19 Screw-In Lamp	High/Low Control	10	4,521	0.0	197	0	$23	$450	$315	5.9
Corridor old building	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor old building	1	LED Lamps: (14) 10W A19 Screw-In Lamps	Wall Switch	S	140	6,552	5	None	Yes	1	LED Lamps: (14) 10W A19 Screw-In Lamps	High/Low Control	140	4,521	0.0	307	0	$35	$0	$0	0.0
Corridor old building	4	LED Lamps: (2) 10W A19 Screw-In Lamps	Wall Switch	S	20	6,552	5	None	Yes	4	LED Lamps: (2) 10W A19 Screw-In Lamps	High/Low Control	20	4,521	0.0	175	0	$20	$0	$0	0.0
Corridor old building	4	LED Lamps: (4) 10W A19 Screw-In Lamps	Wall Switch	S	40	6,552	5	None	Yes	4	LED Lamps: (4) 10W A19 Screw-In Lamps	High/Low Control	40	4,521	0.0	351	0	$40	$225	$140	2.1
Corridor old building	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.0	234	0	$27	$37	$10	1.0
Corridor service	2	Compact Fluorescent: (1) 32W Spiral Plug-In Lamp	Wall Switch	S	32	6,552	3, 5	Relamp	Yes	2	LED Lamps: (1) 10.5W Plug-In Lamp	High/Low Control	11	4,521	0.0	350	0	$40	$34	$2	0.8
Corridor service	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.1	1,189	0	$137	$371	$180	1.4
Library law 303	2	Compact Fluorescent: (4) 40W Biaxial Plug-In Lamps	Wall Switch	S	160	3,500	3, 4	Relamp	Yes	2	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	92	2,415	0.2	730	0	$84	$224	$28	2.3
Office - Department of Law	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.3	1,428	0	$165	$599	$125	2.9
Office - Enclosed 305	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	125	0	$14	$37	$10	1.8
Office - Enclosed 305	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	3,500	0.0	212	0	$24	$73	$20	2.2
Office - Enclosed 306 unoccupied	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,435	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,435	0.1	174	0	$20	$146	$40	5.3
Office - Enclosed 308	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	153	0	$18	$110	$30	4.5
Office - Enclosed 309	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	153	0	$18	$110	$30	4.5
Office - Enclosed benefits specialist	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	125	0	$14	$37	$10	1.8
Office - Enclosed benefits specialist	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Enclosed business administration	2	Compact Fluorescent: (4) 40W Biaxial Plug-In Lamps	Wall Switch	S	160	3,500	3, 4	Relamp	Yes	2	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	92	2,415	0.2	730	0	$84	$224	$28	2.3
Office - Enclosed business administration	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.1	317	0	$37	$189	$40	4.1
Office - Enclosed dept of administration	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,500	0.0	60	0	$7	$33	$6	3.8
Office - Enclosed dept of administration	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,435	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,435	0.1	153	0	$18	$110	$30	4.5
Office - Enclosed director of law	2	Compact Fluorescent: (4) 40W Biaxial Plug-In Lamps	Wall Switch	S	160	3,500	3, 4	Relamp	Yes	2	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	92	2,415	0.2	730	0	$84	$224	$28	2.3

	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
Office - Enclosed housing & economic development office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.0	187	0	$22	$55	$15	1.8
Office - Enclosed housing & economic development office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Enclosed office 304	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.0	187	0	$22	$55	$15	1.8
Office - Enclosed personnel director	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	3,500	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,500	0.0	60	0	$7	$33	$6	3.8
Office - Enclosed personnel director	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.1	476	0	$55	$226	$50	3.2
Office - Housing & economic development/dept of health	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
Office - Housing & economic development/dept of health	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	3,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.3	1,428	0	$165	$599	$125	2.9
Office - Housing & economic development/dept of health	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,415	0.1	559	0	$64	$262	$60	3.1
Office - Open Plan 303 dept of administration	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
Office - Open Plan 303 dept of administration	11	Incandescent: (2) 60W A19 Screw-In Lamps	Wall Switch	S	120	3,500	3, 4	Relamp	Yes	11	LED Lamps: A19 Lamps	Occupancy Sensor	20	2,415	1.0	4,416	-1	$509	$649	$57	1.2
Office - Open Plan 303 dept of administration	28	LED Lamps: (1) 10W A19 Screw-In Lamps	Wall Switch	S	10	3,500	4	None	Yes	28	LED Lamps: (1) 10W A19 Screw-In Lamps	Occupancy Sensor	10	2,415	0.1	328	0	$38	$270	$35	6.2
Office - Open Plan 303 dept of administration	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,500	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,415	0.4	1,663	0	$192	$905	$170	3.8
Restroom - Female old building	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,500	4	None	Yes	3	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	2,415	0.0	35	0	$4	$270	$35	58.0
Restroom - Male 8 old building	5	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	3,500	4	None	Yes	5	LED Lamps: (1) 10W A19 Screw-In Lamp	Occupancy Sensor	10	2,415	0.0	59	0	$7	$270	$35	34.8
Mechanical 6	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	2	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Mechanical 6	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	S	10	1,500		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	1,500	0.0	0	0	$0	$0	$0	0.0
Mechanical 6	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	1,500	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,500	0.0	266	0	$34	$206	$30	5.2
Mechanical 6	2	Metal Halide: (1) 100W Lamp	Timeclock	S	128	1,500	1	Fixture Replacement	No	2	LED - Fixtures: Architectural Flood/Spot Luminaire	Timeclock	30	1,500	0.0	294	0	$37	$1,035	$100	25.0
Stairs 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	6,552	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.2	1,783	0	$206	$444	$270	0.8
Stairs 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	6,552	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.1	594	0	$69	$298	$90	3.0
Stairs 2	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	6,552	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.1	594	0	$69	$298	$90	3.0
Stairs 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	6,552	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.1	1,189	0	$137	$371	$180	1.4
Stairs back	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	6,552	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.3	2,377	-1	$274	$517	$305	0.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Stairs front old	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch		10	6,552		None	No	1	LED Lamps: (1) 10W A19 Screw-In Lamp	Wall Switch	10	6,552	0.0	0	0	$0	$0	$0	0.0
Stairs health/human services	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	6,552	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	4,521	0.3	2,377	-1	$274	$517	$305	0.8

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical 4	Chill water intake	1	Air Compressor	0.8	70.0%	No	Marathon	M550NGX	W	5,096		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 5	AHU-6	1	Air Compressor	5.0	89.5%	No	Dayton	5N309	W	5,096		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 5	AHU-6	1	Air Compressor	5.0	89.5%	No	Baldor	M3218T	N	5,096		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 2	City Hall	1	Air Compressor	0.8	70.0%	No	Marathon	M550NGX	W	5,096		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 4	City Hall	1	Chilled Water Pump	7.5	84.0%	No	Marathon	Unknown	B	2,184	7	No	91.0%	Yes	1	1.6	6,210	0	$790	$4,738	$2,000	3.5
Mechanical 4	City Hall	1	Chilled Water Pump	7.5	84.0%	No	US Motors	N959A	W	2,184	7	No	91.0%	Yes	1	1.6	6,210	0	$790	$4,738	$2,000	3.5
Exterior 1	City Hall	1	Exhaust Fan	0.3	65.0%	No	Unknown	Unknown	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 4	City Hall	1	Heating Hot Water Pump	2.0	82.5%	No	Baldor	VW3558	B	2,745	6, 8	Yes	86.5%	Yes	1	0.2	2,017	0	$257	$3,261	$200	11.9
Mechanical 4	City Hall	2	Heating Hot Water Pump	2.0	82.5%	No	Franklin Electric	Unknown	B	2,745	6, 8	Yes	86.5%	Yes	2	0.5	4,033	0	$513	$6,522	$400	11.9
Mechanical 1	City Hall	1	Heating Hot Water Pump	2.0	82.5%	No	Unknown	Unknown	B	2,745	6, 8	Yes	86.5%	Yes	1	0.2	2,017	0	$257	$3,261	$200	11.9
Mechanical 1	City Hall	1	Heating Hot Water Pump	2.0	82.5%	No	GE	5K49ZN4611	B	2,745	6, 8	Yes	86.5%	Yes	1	0.2	2,017	0	$257	$3,261	$200	11.9
Mechanical 1	City Hall	1	Heating Hot Water Pump	2.0	82.5%	No	Gould	H181	W	2,745	8	No	86.5%	Yes	1	0.2	2,017	0	$257	$3,261	$200	11.9
Mechanical 2	City Hall	2	Heating Hot Water Pump	3.0	89.5%	No	Weg	12674796	N	2,745	8	No	89.5%	Yes	2	0.6	5,148	0	$655	$7,768	$800	10.6
Mechanical 2	City Hall	1	DHW Circulation Pump	0.3	65.0%	No	Century	HW2034BL	B	8,760	6	Yes	73.4%	No		0.0	288	0	$37	$384	$0	10.5
Elevator room	City Hall	3	Other	40.0	78.0%	No	Magnetek	Y184TY	W	1,560		No	78.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 2	City Hall	1	Other	0.3	65.0%	No	Unknown	Unknown	B	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 5	City Hall	1	Return Fan	3.0	88.0%	No	Reliance	Unknown	B	5,096	6	Yes	89.5%	No		0.0	163	0	$21	$876	$0	42.3
Mechanical 6	City Hall	1	Return Fan	1.5	88.0%	No	Reliance	Unknown	B	5,096	6	Yes	88.0%	No		0.0	0	0	$0	$758	$0	0.0
Mechanical 6	City Hall	1	Return Fan	1.5	88.0%	No	Reliance	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Return Fan	2.0	88.0%	No	Reliance	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical 6	City Hall	1	Return Fan	1.5	88.0%	No	Reliance	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Return Fan	5.0	88.0%	No	Reliance	Unknown	B	5,096	6	Yes	89.5%	No		0.0	272	0	$35	$800	$0	23.2
Mechanical 6	City Hall	1	Return Fan	2.0	88.0%	No	Reliance	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 5	City Hall	1	Supply Fan	5.0	88.0%	No	Marathon	Unknown	B	5,096	6	Yes	89.5%	No		0.0	272	0	$35	$800	$0	23.2
Mechanical 6	City Hall	1	Supply Fan	15.0	88.0%	No	Marathon	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Supply Fan	5.0	88.0%	No	Dayton	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Supply Fan	7.5	88.0%	No	Marathon	Unknown	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Supply Fan	7.5	88.0%	No	Marathon	JVE 213TTDR7359BB-F1W	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Supply Fan	5.0	81.5%	No	Baldor	M3218T	W	5,096		No	81.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 6	City Hall	1	Supply Fan	7.5	88.0%	No	Marathon	JVE 213TTDR7359BB-F1W	W	5,096		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior 2	City Hall	1	Split-System	5.00		10.00		Unknown	Unknown	B	9	Yes	1	Split-System	5.00		16.00		1.1	1,656	0	$211	$6,521	$1,050	26.0
Exterior 2	City Hall	1	Split-System	15.00		10.00		Liebert	FH199A-COD/DCDF308-A	B	9	Yes	1	Split-System	15.00		14.00		2.6	3,785	0	$482	$14,464	$2,670	24.5
Exterior 2	City Hall	1	Split-System	15.00		10.00		Liebert	DH199AUCAE1/CFD205L	B	9	Yes	1	Split-System	15.00		14.00		2.6	3,785	0	$482	$14,464	$2,670	24.5
2 balcony	City Hall	1	Split-System	3.00		10.50		Mitsubishi	PUG36AYB	B	9	Yes	1	Split-System	3.00		16.00		0.6	867	0	$110	$6,286	$630	51.2
2 balcony	City Hall	1	Split-System	3.00		10.50		Mitsubishi	PUG36AYB	B	9	Yes	1	Split-System	3.00		16.00		0.6	867	0	$110	$6,286	$630	51.2
Server Room 1	City Hall	1	Electric Resistance Heat		0.01		1 COP	Emerson	Unknown	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 2	City Hall	1	Split-System	2.00		10.50		Fredrich	Unknown	B	9	Yes	1	Split-System	2.00		16.00		0.4	578	0	$74	$5,922	$420	74.7
Exterior 2	City Hall	1	Split-System	1.50		10.00		Sanyo	CM1812	B	9	Yes	1	Split-System	1.50		16.00		0.3	497	0	$63	$5,678	$315	84.8
Exterior 2	City Hall	1	Ductless Mini-Split HP	0.75	0.11	10.00	8.2 HSPF	Mitsubishi	MUZ-A09NA	B		No							0.0	0	0	$0	$0	$0	0.0
Exterior 2	City Hall	1	Split-System	1.50		10.00		Mitsubishi	PU18EKI	B	9	Yes	1	Split-System	1.50		16.00		0.3	497	0	$63	$5,678	$315	84.8
Exterior 2	City Hall	1	Split-System	1.50		10.00		Mitsubishi	PU18EKI	B	9	Yes	1	Split-System	1.50		16.00		0.3	497	0	$63	$5,678	$315	84.8
Exterior 2	City Hall	1	Ductless Mini-Split HP	1.25	0.11	10.00	8.2 HSPF	Mitsubishi	MUZ-A15NA	B	10	Yes	1	Ductless Mini-Split HP	1.25	0.11	18.00	3.8 COP	0.3	494	0	$63	$5,130	$0	81.6

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
3rd Party	City Hall	1	Water-Cooled Centrifugal Chiller	300.00	proxy chiller		W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
3rd Party	City Hall	1	Non-Condensing Hot Water Boiler	12,929	proxy boiler		W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical room	DHW system	1	Indirect System	Heat exchanger		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
City Hall	11	2	Faucet Aerator (Kitchen)	2.50	1.50	0.0	164	0	$21	$14	$8	0.3
City Hall	11	43	Faucet Aerator (Lavatory)	2.20	0.50	0.0	5,978	0	$761	$308	$308	0.0

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
City Hall	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Avantco	Unknown	No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
City Hall	16	Coffee maker	900	No	Various	Various
City Hall	110	Desktop	270	No	Dell	Unknown
City Hall	19	Electric Space Heater	1,200	No	Various	Various
City Hall	27	Fan(portable)	200	No	Various	Various
City Hall	10	Laptop	75	No	Various	Various
City Hall	31	Microwave	1,000	No	Various	Various
City Hall	19	Paper shredder	300	Yes	Various	Various
City Hall	99	Printer	600	No	Various	Various
City Hall	16	Copier	1,000	Yes	Various	Various
City Hall	2	Projector	800	Yes	Various	Various
City Hall	24	Mini-refrigerator	42	No	Various	Various
City Hall	3	Residential refrigerator	90	No	Various	Various
City Hall	5	Scanner	300	Yes	Various	Various
City Hall	8	Television	200	No	Various	Various
City Hall	3	Toaster Oven	1,500	No	Various	Various
City Hall	8	Water cooler	90	No	Various	Various
City Hall	1	Misc Equipment	1,000	No	Various	Various
City Hall	3	Plotter	800	Yes	Various	Various

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
City Hall	1	Refrigerated	12	Yes	0.2	1,612	0	$205	$230	$100	0.6
City Hall	1	Non-Refrigerated	12	Yes	0.0	343	0	$44	$230	$0	5.3

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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.

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

70

ENERGY STAR® Score[1]

Trenton City Hall

Primary Property Type: Office
Gross Floor Area (ft²): 107,900
Built: 1907

For Year Ending: March 31, 2020
Date Generated: May 16, 2021

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
Trenton City Hall 319 East State Street Trenton, New Jersey 08608	City of Trenton 319 East State Street Trenton, NJ 08618 (609) 989-3615	Hoggarth Stephen 319 East State Street Trenton, NJ 08618 (609) 989-3615 hstephen@trentonnj.org

Property ID: 5992159

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
86.8 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	3,339,663 (36%)
District Hot Water (kBtu)	4,099,300 (44%)
District Chilled Water - Other (kBtu)	1,926,960 (21%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	114.5
National Median Source EUI (kBtu/ft²)	196.1
% Diff from National Median Source EUI	-24%

Source EUI
148.6 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	N/A

Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

Licensed Professional

___ _____
,
(___)___-_____
_____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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