



# Local Government Energy Audit Report

Municipal Building

January 14, 2025

*Prepared for:*

Manchester Township

1 Colonial Drive

Whiting, New Jersey 08759

*Prepared by:*

TRC

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## Disclaimer

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

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

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

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

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

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**Appendix A: Equipment Inventory & Recommendations ..... A-1**

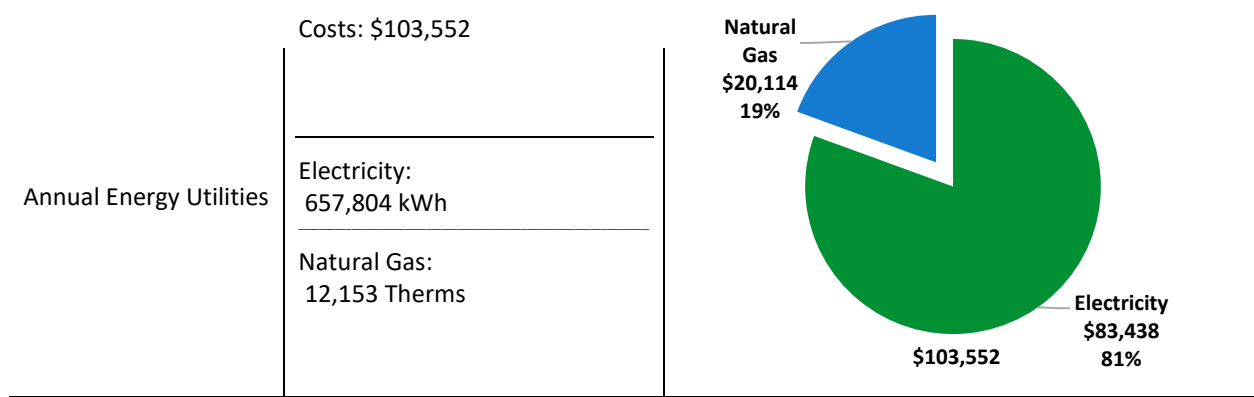
**Appendix B: ENERGY STAR Statement of Energy Performance..... B-1**

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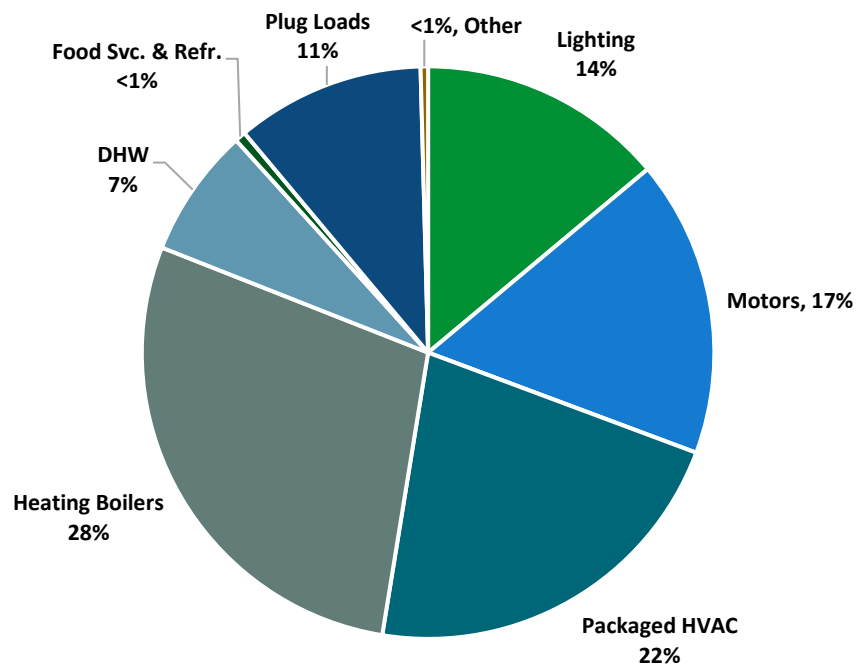
# 1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) report for Municipal Building. 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



ENERGY STAR® Benchmarking Score	N/A <i>(1-100 scale)</i>	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.
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*Energy Use by System*

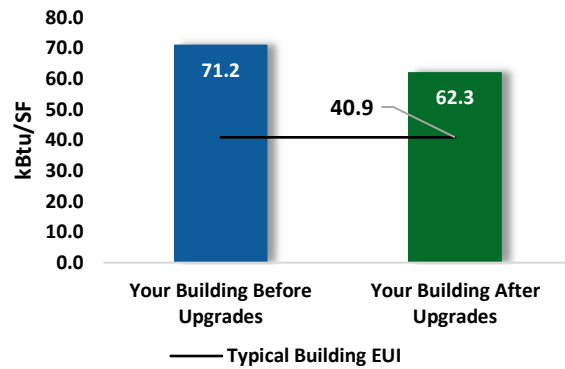
## POTENTIAL IMPROVEMENTS



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.

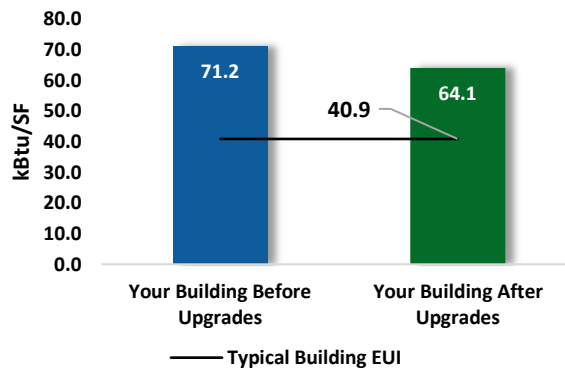
### Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	\$221,710
Potential Rebates & Incentives <sup>1</sup>	\$13,920
Annual Cost Savings	\$14,523
Annual Energy Savings	Electricity: 104,656 kWh Natural Gas: 754 Therms
Greenhouse Gas Emission Savings	57 Tons
Simple Payback	14.3 Years
Site Energy Savings (All Utilities)	13%



### Scenario 2: Cost Effective Package<sup>2</sup>

Installation Cost	\$66,210
Potential Rebates & Incentives	\$7,320
Annual Cost Savings	\$11,243
Annual Energy Savings	Electricity: 78,800 kWh Natural Gas: 754 Therms
Greenhouse Gas Emission Savings	44 Tons
Simple Payback	5.2 Years
Site Energy Savings (all utilities)	10%



### On-site Generation Potential

Photovoltaic	None
Combined Heat and Power	None

<sup>1</sup> Incentives are based on previously run state rebate programs. Contact your utility provider for current program incentives that may apply.

<sup>2</sup> 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>			<b>10,397</b>	<b>2.1</b>	<b>-1</b>	<b>\$1,294</b>	<b>\$6,740</b>	<b>\$750</b>	<b>\$5,990</b>	<b>4.6</b>	<b>10,295</b>
ECM 1	Install LED Fixtures	Yes	4,515	0.4	0	\$567	\$2,860	\$300	\$2,560	4.5	4,505
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	1,386	0.3	0	\$171	\$650	\$70	\$580	3.4	1,362
ECM 3	Retrofit Fixtures with LED Lamps	Yes	4,496	1.4	-1	\$556	\$3,230	\$380	\$2,850	5.1	4,429
<b>Lighting Control Measures</b>			<b>31,705</b>	<b>6.0</b>	<b>-7</b>	<b>\$3,912</b>	<b>\$21,660</b>	<b>\$5,350</b>	<b>\$16,310</b>	<b>4.2</b>	<b>31,150</b>
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	26,878	5.0	-6	\$3,316	\$16,600	\$2,180	\$14,420	4.3	26,408
ECM 5	Install High/Low Lighting Controls	Yes	4,827	0.9	-1	\$596	\$5,060	\$3,170	\$1,890	3.2	4,743
<b>Variable Frequency Drive (VFD) Measures</b>			<b>34,211</b>	<b>4.6</b>	<b>0</b>	<b>\$4,340</b>	<b>\$35,300</b>	<b>\$800</b>	<b>\$34,500</b>	<b>8.0</b>	<b>34,451</b>
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	34,211	4.6	0	\$4,340	\$35,300	\$800	\$34,500	8.0	34,451
<b>Unitary HVAC Measures</b>			<b>24,434</b>	<b>16.4</b>	<b>0</b>	<b>\$3,099</b>	<b>\$151,100</b>	<b>\$6,400</b>	<b>\$144,700</b>	<b>46.7</b>	<b>24,605</b>
ECM 7	Install High Efficiency Air Conditioning Units	No	19,993	12.5	0	\$2,536	\$122,700	\$5,400	\$117,300	46.3	20,133
ECM 8	Install High Efficiency Heat Pumps	No	4,441	3.9	0	\$563	\$28,400	\$1,000	\$27,400	48.6	4,472
<b>HVAC System Improvements</b>			<b>0</b>	<b>0.0</b>	<b>71</b>	<b>\$1,182</b>	<b>\$1,870</b>	<b>\$200</b>	<b>\$1,670</b>	<b>1.4</b>	<b>8,360</b>
ECM 9	Install Pipe Insulation	Yes	0	0.0	71	\$1,182	\$1,870	\$200	\$1,670	1.4	8,360
<b>Domestic Water Heating Upgrade</b>			<b>875</b>	<b>0.0</b>	<b>12</b>	<b>\$311</b>	<b>\$370</b>	<b>\$170</b>	<b>\$200</b>	<b>0.6</b>	<b>2,299</b>
ECM 10	Install Low-Flow DHW Devices	Yes	875	0.0	12	\$311	\$370	\$170	\$200	0.6	2,299
<b>Food Service &amp; Refrigeration Measures</b>			<b>3,034</b>	<b>0.3</b>	<b>0</b>	<b>\$385</b>	<b>\$4,670</b>	<b>\$250</b>	<b>\$4,420</b>	<b>11.5</b>	<b>3,055</b>
ECM 11	Replace Refrigeration Equipment	No	1,422	0.2	0	\$180	\$4,400	\$200	\$4,200	23.3	1,432
ECM 12	Vending Machine Control	Yes	1,612	0.2	0	\$204	\$270	\$50	\$220	1.1	1,623
<b>TOTALS (COST EFFECTIVE MEASURES)</b>			<b>78,800</b>	<b>12.8</b>	<b>75</b>	<b>\$11,243</b>	<b>\$66,210</b>	<b>\$7,320</b>	<b>\$58,890</b>	<b>5.2</b>	<b>88,179</b>
<b>TOTALS (ALL MEASURES)</b>			<b>104,656</b>	<b>29.4</b>	<b>75</b>	<b>\$14,523</b>	<b>\$221,710</b>	<b>\$13,920</b>	<b>\$207,790</b>	<b>14.3</b>	<b>114,215</b>

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

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

*All Evaluated Energy Improvements<sup>3</sup>*

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

<sup>3</sup> TRC bases estimated material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations.



## 1.1 Planning Your Project

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

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

### Pick Your Installation Approach

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

### Options from Your Utility Company

#### *Prescriptive and Custom Rebates*

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

#### *Direct Install*

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

#### *Engineered Solutions*

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

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

## **Options from New Jersey's Clean Energy Program**

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

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

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

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

### *Successor Solar Incentive Program (SuSI)*

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

### *Ongoing Electric Savings with Demand Response*

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

### *Large Energy User Program (LEUP)*

LEUP is designed to promote self-investment in energy efficiency for the largest energy consumers in the state. Customers in this category spend about \$5 million a year on energy bills. This program incentivizes owners/users of buildings to upgrade or install energy conserving measures in existing buildings to help offset the capital costs associated with the project. The efficiency upgrades are customized to meet the requirements of the customers' existing facilities, while advancing the State's energy efficiency, conservation, and greenhouse gas reduction goals.

For more details on these programs please visit [New Jersey's Clean Energy Program website](#).



## 2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) report for Municipal Building. 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 August 28, 2024, TRC performed an energy audit at Municipal Building located in Whiting, New Jersey. TRC met with Jason Henry to review the facility operations and help focus our investigation on specific energy-using systems.

The Municipal Building is a multi-story, 48,610 square foot building built in 1967 that houses local government functions. Spaces include a civic center, gym, locker rooms, offices, interview rooms, corridors, stairwells, janitorial spaces, storage spaces, restrooms, lobby areas, and mechanical spaces.

#### **Recent Improvements and Facility Concerns**

Over the last five years, the facility has replaced most of its existing T12 and T8 fluorescent fixtures with LED fixtures. The site is interested in a new Building Automation System (BAS) but has been unable to fund the project. Facility staff are mainly concerned over outdated HVAC condensing systems and are planning to replace them along with the programmable thermostat for each of the PTAC units.

### 2.2 Building Occupancy

The municipal office and courthouse areas are occupied Monday through Friday during regular business hours. The police building is occupied continuously.

Building Name	Weekday/Weekend	Operating Schedule
Municipal and Courthouse Building	Weekday	8:00 AM - 4:00 PM
	Weekend	N/A
Police Building	Weekday	24/7
	Weekend	24/7

*Building Occupancy Schedule*

### 2.3 Building Envelope

The walls are made of brick over structural steel with a painted CMU interior finish. Steel trusses support a pitched roof with a metal deck covered with asphalt shingles. The flat roof is also supported by steel trusses and a metal deck. The roof is relatively new, having been installed recently.

Most of the windows are double paned with vinyl frames. The glass-to-frame seals are in fair condition. The weather seals on the operable windows are also in fair condition, showing little sign of excessive wear. Exterior doors are made from fiber-reinforced polymer (FRP) composite material with aluminum frames. They are in fair condition with intact door seals. Degraded window and door seals can increase drafts and allow outside air infiltration. The windows were replaced approximately ten years ago, and the doors were installed approximately five years ago.



*Building Envelope*



*Bird's Eye View of Property*



*Building Roof*



*Building Door*



*Building Envelope*

## 2.4 Lighting Systems

The primary interior lighting system uses LED recessed flat panel fixtures. In addition, there are several 32-Watt linear fluorescent T8 lamps, a few linear fluorescent 40-Watt T12 lamps, and a T5 lamp. Fixture types include 1-lamp or 2-lamp, 4-foot-long fixtures. Typically, T8 and T5 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Some of the linear fixtures have been converted to operate LED tube lamps.

Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. All exit signs are LED.

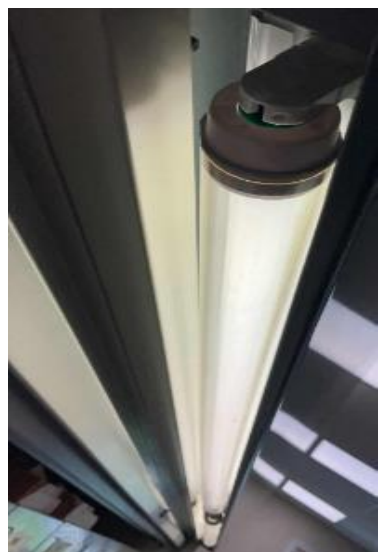
Most fixtures are in fair condition. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually and the remainder by occupancy sensors.



*CFL*



*LED Low Bay Fixture*



*T8 Fixture*



*LED Lamp*

Exterior fixtures include wall packs with high intensity discharge (HID) lamps, using both metal halide and mercury vapor sources. Additionally, there are exterior LED and CFLs. The pole mounted flood fixtures incorporate LED lamps. Exterior light fixtures are controlled by photocell.



*LED Lamp*



*LED Lamps*



*Metal Halide Wallpack*



*LED Pole Arm Fixture*

## 2.5 Air Handling Systems

### **Packaged Terminal AC units (PTAC)**

The building is served with packaged terminal air conditioning (PTAC) and packaged terminal heat pump (PTHP) units. Cooling capacities vary between 0.73 tons and 1 ton with cooling efficiencies between 10.0 SEER and 14.0 SEER. The packaged terminal AC units are equipped with supply fan motors and are connected to the hot water distribution system. They provide heating and cooling mainly to office areas throughout the building. This system appears to be in fair operating condition. Heat pump units have a heating capacity of 12 MBh with 3.10 COP heating efficiency. These units are in fair condition.

### **Packaged Units**

The electrical room in the police area contains a 10-ton capacity package unit with a cooling efficiency of 10.39. This unit is in fair condition.

## Split Systems

Some office areas are served with ductless mini-split air conditioners and a ductless mini-split heat pump. The cooling capacities vary between 0.75 tons and 12 tons. These vary in cooling efficiency between 9.6 SEER and 14.84 SEER. The heat pump unit has a heating capacity of 12 MBh with 13.50 HSPF heating efficiency. These units are mainly in poor condition.

Some building areas are served with split system air source heat pumps. Cooling capacities range between 0.75 tons and 2.88 tons with cooling efficiencies between 10 SEER and 17 SEER. They provide between 10 MBh and 37.5 MBh of heating with heating efficiencies ranging between 7 HSPF and 14 HSPF.

There are several split system AC unit condensers exterior to the building. These are associated with the air handling units described in the following section.



*Ductless Mini-Split AC*



*Packaged Terminal AC*



*Split Air Source Heat Pump*



*Packaged Unit*

### Air Handling Units (AHUs)

The buildings are partially conditioned by around eight air handling units. These units are equipped with a supply fan motor, hot water heating coil, and refrigerant coil for cooling. Most are physically located above ceiling areas and were inaccessible during the energy audit. The supply fan motors are assumed to range between 1 hp and 2 hp. Motors are assumed to operate at constant speed and be rated at standard efficiency.

Cooling is provided by outdoor condensing units with cooling capacities that range from 2 tons to 12 tons. Cooling efficiencies vary between 7.98 SEER and 17.50 SEER.

This is a split air-conditioning (AC) system configuration. The heating coil is supplied by the hot water boiler which is described in the section that follows. These units vary in condition from fair to poor condition.



*Condensing Unit*



*Air Handling Unit*



*Condensing Unit*



*Air Handling Unit*



## 2.6 Heating Hot Water Systems

Five Weil Mclain 289 MBh condensing hot water boilers serve the municipal and police building heating load. The burners are fully modulating with a nominal efficiency of 92.5%. The boilers are configured in an automated control scheme. Multiple boilers are required under high-load conditions. They are in good condition.

Two Weil McLain 364 MBh condensing hot water boilers serve the courthouse building's heating load. The burners are fully modulating with a nominal efficiency of 91.3%. The boilers are configured in an automated control scheme. Multiple boilers are required under high-load conditions. They are in good condition.

The boilers are configured in a constant flow primary distribution with 0.90 hp constant hot water pumps associated with each boiler. These pumps operate in a manual control scheme. There are also auxiliary heating hot water pumps at 0.13 hp and 0.03 hp. The boilers provide hot water to packaged terminal AC units and air handling units throughout the building.



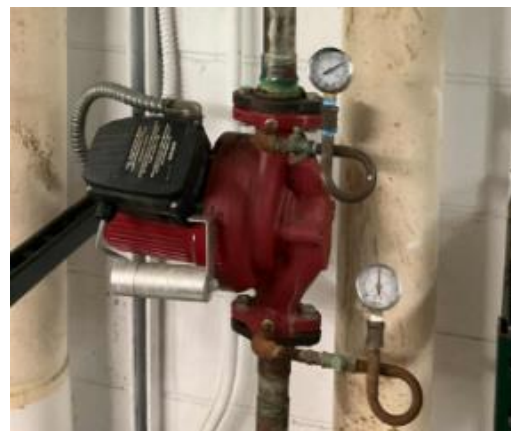
*Condensing Modular Hot Water Boilers (Municipal)*



*Condensing Modular Hot Water Boilers (Courts)*



*Heating Hot Water Pump*



*Heating Hot Water Pump*

## 2.7 Building Automation System (BAS)

At the time of the audit, the BAS was not accessible. According to previous energy audit reports, an Amana DigiSmart BAS previously controlled the HVAC equipment, boilers, and air handlers. The BAS provided scheduling control for equipment and monitored space temperatures, supply air temperatures, humidity, and heating water loop temperatures.

Currently, all rooms and PTAC units have individual thermostats. Site personnel reported that the old BAS is no longer operational, and they no longer have access to it, with all systems in the building now being controlled locally.

The site staff expressed interest in replacing the BAS and receiving additional training on how to operate it. They also expressed interest in replacing the individual thermostats with programmable ones, which would offer more options for scheduling and control of the equipment.



*PTAC Thermostat*



*PTAC Thermostat*

## 2.8 Domestic Hot Water

Hot water is produced for the municipal and courthouse buildings by a 50-gallon, 3.5 kW electric storage water heater. One, 0.13 hp circulation pump distributes water to end uses. The circulation pump operates continuously.

Hot water is produced for the police building by a 119 gallon, 200 MBh gas-fired storage water heater with an efficiency rating of 80%. Two, 0.9 hp circulation pump distributes water to end uses. The circulation pump operates continuously.



*Police Department DHW*



*Municipal Building DHW*



*DHW Pump*



*DHW Pump*

## 2.9 Refrigeration

The building has several stand-up refrigerators with either solid or glass doors in the kitchen and lounge areas. Most equipment is high efficiency and in fair condition.

Visit [https://www.energystar.gov/products/commercial\\_food\\_service\\_equipment](https://www.energystar.gov/products/commercial_food_service_equipment) for the latest information on high efficiency food service equipment.



*Refrigerator*



*Glass Door Refrigerator*

## 2.10 Plug Load and Vending Machines

You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area as well as energy efficient best practices.

There are 86 computer workstations throughout the facility. Plug loads include general cafe and office equipment.

There are several residential-style refrigerators throughout the building that are used to store perishables. These vary in condition and efficiency.

There is one refrigerated beverage vending machine and two non-refrigerated vending machines. Vending machines are not equipped with occupancy-based controls.



*Printer*



*Vending Machine*



*Microwave and Coffee Machine*



*Fan*

## 2.11 Water-Using Systems

EPA WaterSense® has set maximum flow rates for sanitary fixtures. They are: 1.28 gallons per flush (gpf) for toilets, 0.5 gpf for urinals, 1.5 gallons per minute (gpm) for lavatory faucets, and 2.0 gpm for showerheads. There are various restrooms with toilets, urinals, and sinks. Faucet flow rates are at 1.5 gpm or higher.

## 2.12 On-Site Generation

The facility has an emergency generator that, in the event of a power outage, serves the entire building along with critical services including lighting, elevator, heating, boiler, and pumps and is only used for emergency needs.

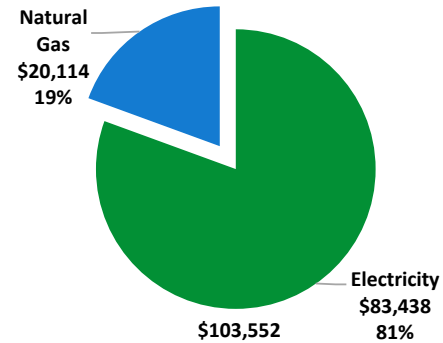


*Emergency Generator*

### 3 ENERGY USE AND COSTS

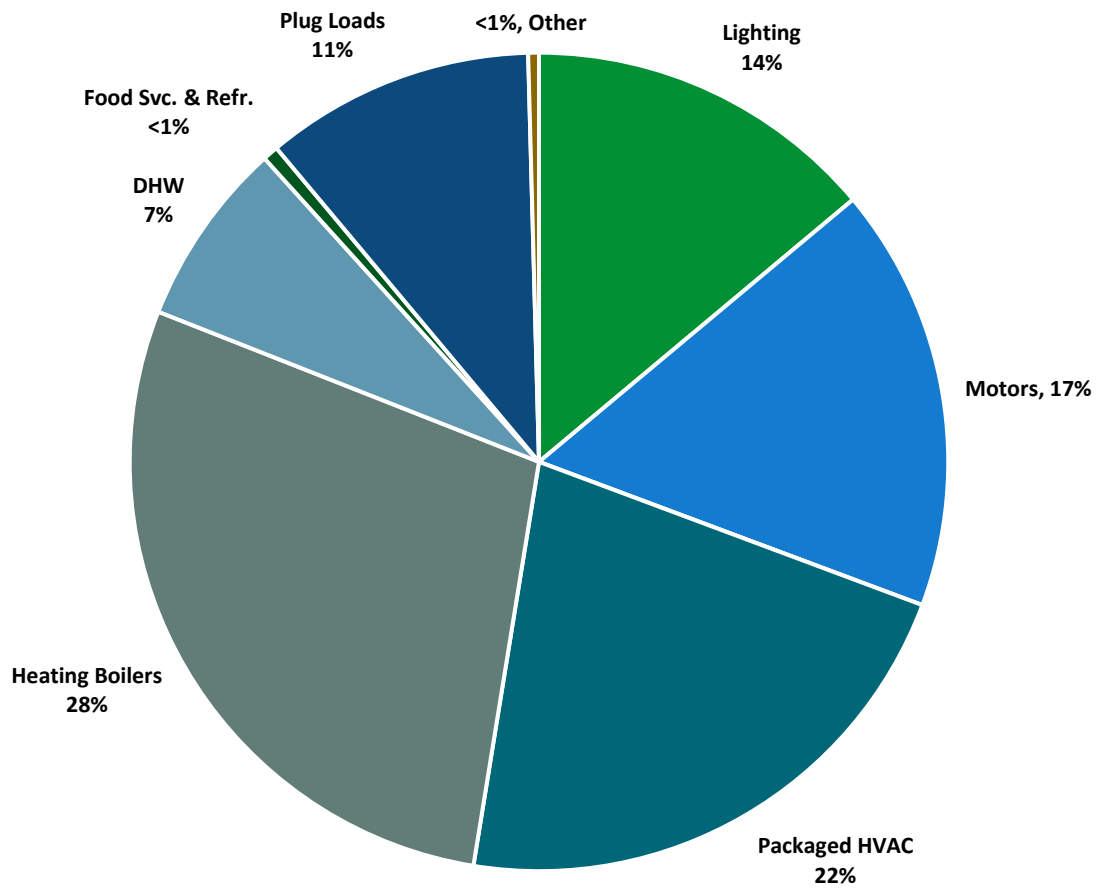
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	Usage	Cost
Electricity	657,804 kWh	\$83,438
Natural Gas	12,153 Therms	\$20,114
<b>Total</b>		<b>\$103,552</b>



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

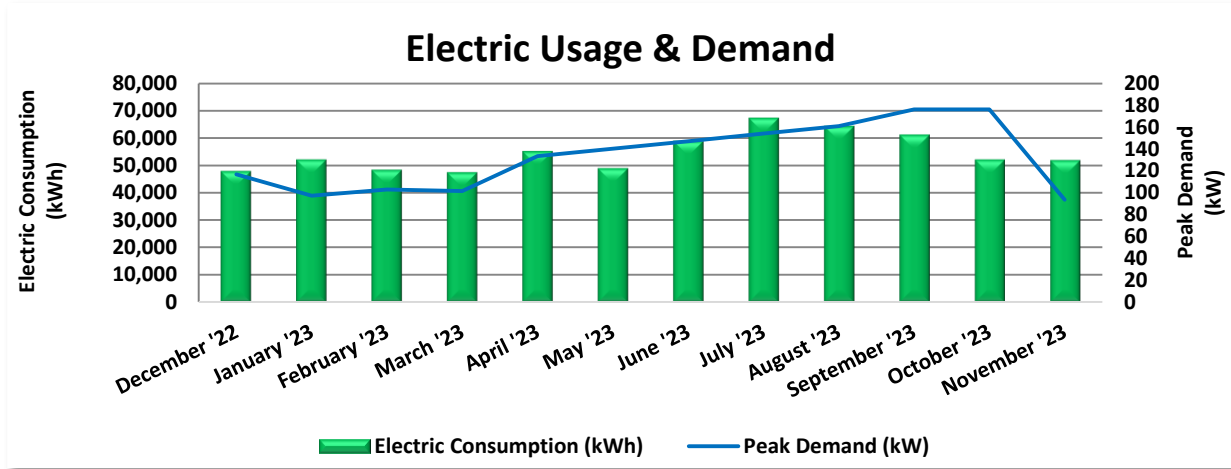
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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



*Energy Balance by System*

### 3.1 Electricity

JCP&L delivers electricity under rate class General Service Secondary 3 Phase, with electric production provided by Direct Energy, a third-party supplier.



Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
12/29/22	27	47,800	117	\$788	\$5,880
1/31/23	33	52,000	97	\$645	\$6,193
3/1/23	29	48,200	103	\$685	\$5,839
3/30/23	29	47,400	101	\$675	\$5,828
5/1/23	32	55,000	133	\$911	\$6,877
6/1/23	31	48,800	140	\$362,584	\$6,344
7/1/23	30	58,800	147	\$436,884	\$7,644
7/31/23	30	67,200	154	\$499,296	\$8,736
8/30/23	30	64,200	161	\$1,196	\$8,366
9/30/23	31	61,000	176	\$1,228	\$8,039
10/31/23	31	52,000	176	\$1,228	\$6,934
11/30/23	30	51,800	94	\$617	\$6,301
<b>Totals</b>	<b>363</b>	<b>654,200</b>	<b>176</b>	<b>\$1,306,736</b>	<b>\$82,981</b>
<b>Annual</b>	<b>365</b>	<b>657,804</b>	<b>176</b>	<b>\$1,313,936</b>	<b>\$83,438</b>

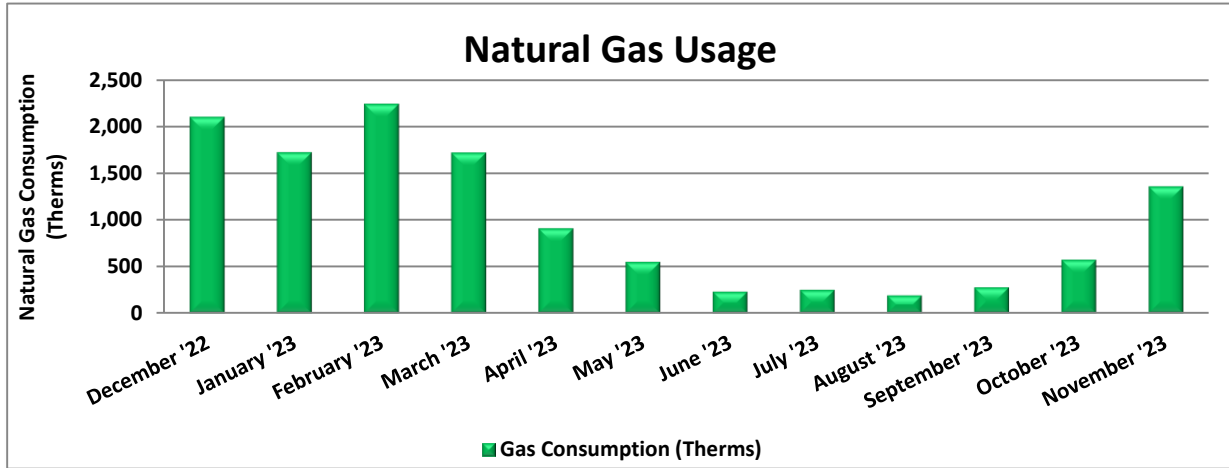
Notes:

- Peak demand of 176 kW occurred in September '23.
- Average demand over the past 12 months was 133 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 Natural Gas

NJ Natural Gas delivers natural gas under rate class General Service Large (GSL), with natural gas supply provided by UGI, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
12/29/22	30	2,104	\$3,560
1/27/23	29	1,726	\$2,617
3/3/23	35	2,243	\$3,034
4/3/23	31	1,722	\$2,365
5/3/23	30	911	\$1,429
6/5/23	33	552	\$1,058
6/29/23	24	234	\$626
8/3/23	35	252	\$746
8/30/23	27	193	\$679
9/27/23	28	281	\$768
10/30/23	33	575	\$1,126
11/29/23	30	1,360	\$2,106
<b>Totals</b>	<b>365</b>	<b>12,153</b>	<b>\$20,114</b>
<b>Annual</b>	<b>365</b>	<b>12,153</b>	<b>\$20,114</b>

Notes:

- The average gas cost for the past 12 months is \$1.655/therm, which is the blended rate used throughout the analysis.
- There is a dedicated gas meter that supplies natural gas to the generator. The annual gas usage of this meter is 141 therms/yr, and it has been included in the total usage indicated in the above chart.

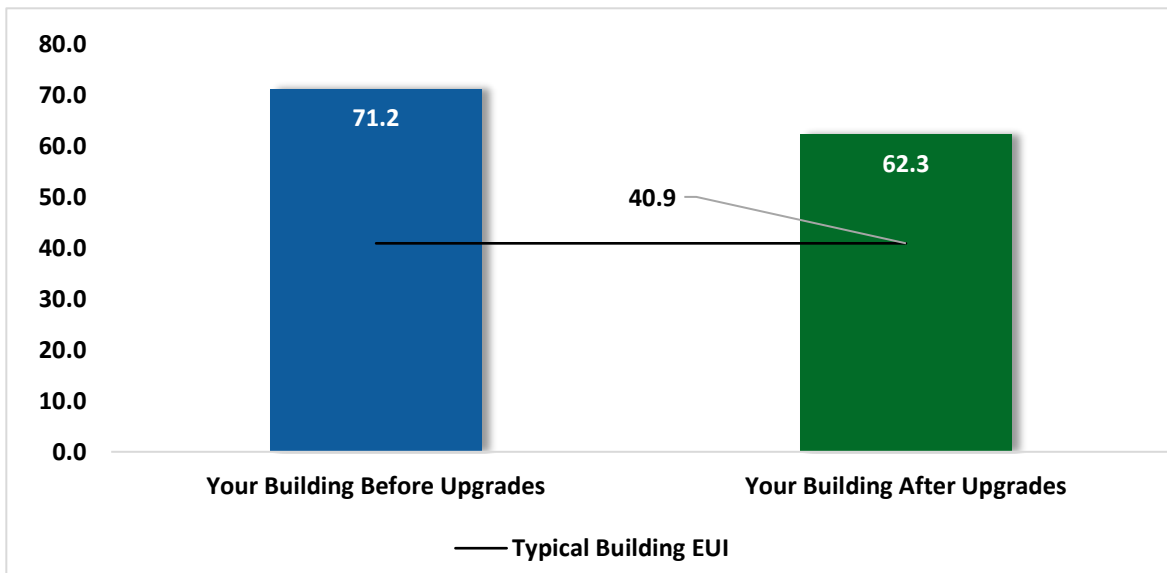
### 3.3 Benchmarking

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

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

<b>Benchmarking Score</b>	<b>N/A</b>
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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.



*Energy Use Intensity Comparison<sup>4</sup>*

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

<sup>4</sup> Based on all evaluated ECMs

## **Tracking your Energy Performance**

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

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

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

For more information on ENERGY STAR and Portfolio Manager, visit their [website](#).

## 3.4 Understanding Your Utility Bills

The State of New Jersey Department of the Public Advocate provides detailed information on how to read natural gas and electric bills. Your bills contain important information including account numbers, meter numbers, rate schedules, meter readings, and the supply and delivery charges. Gas and electric bills both provide comparisons of current energy consumption with prior usage.

Sample bills, with annotation, may be viewed at:

[https://www.nj.gov/rpa/docs/Understanding\\_Electric\\_Bill.pdf](https://www.nj.gov/rpa/docs/Understanding_Electric_Bill.pdf)

[https://www.nj.gov/rpa/docs/Understanding\\_Gas\\_Bill.pdf](https://www.nj.gov/rpa/docs/Understanding_Gas_Bill.pdf)

### **Why Utility Bills Vary**

Utility bills vary from one month to another for many reasons. For this reason, assessing the effects of your energy savings efforts can be difficult.

Billing periods vary, typically ranging between 28 and 33 days. Electric bills provide the kilowatt-hours (kWh) used per month while gas bills provide therms (or hundreds of cubic feet - CCF) per month consumption information. Monthly consumption information can be helpful as a tool to assess your efforts to reduce energy, particularly when compared to monthly usage from a similar calendar period in a prior year.

Bills typically vary seasonally, often with more gas consumed in the winter for heating, and more electricity used in the summer when air conditioning is used. Facilities with electric heating may experience higher electricity use in the winter. Seasonal variance will be impacted by the type of heating and cooling systems used. Normal seasonal fluctuations are further impacted by the weather. Extremely cold or hot weathers causes HVAC equipment to run longer, increasing usage. Other monthly fluctuations in usage can be caused by changes in building occupancy. Utility bills provide a comparison of usage between the current period and comparable billing month period of the prior year. Year-to-year monthly use comparisons can point to trends with energy savings for measures/projects that were implemented within the timeframe, but these comparisons do not account for changing weather of occupancy patterns.

The price of fuel and purchased power used to produce and delivery electricity and gas fluctuates. Any increase or decrease in these costs will be reflected in your monthly bill. Additionally, billing rates occasionally change after justification and approval of the NJBPU. For this reason, it is more useful to review energy use rather than cost when assessing energy use trends or the impact of energy conservation measures implemented.

## 4 ENERGY CONSERVATION MEASURES

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>			<b>10,397</b>	<b>2.1</b>	<b>-1</b>	<b>\$1,294</b>	<b>\$6,740</b>	<b>\$750</b>	<b>\$5,990</b>	<b>4.6</b>	<b>10,295</b>
ECM 1	Install LED Fixtures	Yes	4,515	0.4	0	\$567	\$2,860	\$300	\$2,560	4.5	4,505
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	1,386	0.3	0	\$171	\$650	\$70	\$580	3.4	1,362
ECM 3	Retrofit Fixtures with LED Lamps	Yes	4,496	1.4	-1	\$556	\$3,230	\$380	\$2,850	5.1	4,429
<b>Lighting Control Measures</b>			<b>31,705</b>	<b>6.0</b>	<b>-7</b>	<b>\$3,912</b>	<b>\$21,660</b>	<b>\$5,350</b>	<b>\$16,310</b>	<b>4.2</b>	<b>31,150</b>
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	26,878	5.0	-6	\$3,316	\$16,600	\$2,180	\$14,420	4.3	26,408
ECM 5	Install High/Low Lighting Controls	Yes	4,827	0.9	-1	\$596	\$5,060	\$3,170	\$1,890	3.2	4,743
<b>Variable Frequency Drive (VFD) Measures</b>			<b>34,211</b>	<b>4.6</b>	<b>0</b>	<b>\$4,340</b>	<b>\$35,300</b>	<b>\$800</b>	<b>\$34,500</b>	<b>8.0</b>	<b>34,451</b>
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	34,211	4.6	0	\$4,340	\$35,300	\$800	\$34,500	8.0	34,451
<b>Unitary HVAC Measures</b>			<b>24,434</b>	<b>16.4</b>	<b>0</b>	<b>\$3,099</b>	<b>\$151,100</b>	<b>\$6,400</b>	<b>\$144,700</b>	<b>46.7</b>	<b>24,605</b>
ECM 7	Install High Efficiency Air Conditioning Units	No	19,993	12.5	0	\$2,536	\$122,700	\$5,400	\$117,300	46.3	20,133
ECM 8	Install High Efficiency Heat Pumps	No	4,441	3.9	0	\$563	\$28,400	\$1,000	\$27,400	48.6	4,472
<b>HVAC System Improvements</b>			<b>0</b>	<b>0.0</b>	<b>71</b>	<b>\$1,182</b>	<b>\$1,870</b>	<b>\$200</b>	<b>\$1,670</b>	<b>1.4</b>	<b>8,360</b>
ECM 9	Install Pipe Insulation	Yes	0	0.0	71	\$1,182	\$1,870	\$200	\$1,670	1.4	8,360
<b>Domestic Water Heating Upgrade</b>			<b>875</b>	<b>0.0</b>	<b>12</b>	<b>\$311</b>	<b>\$370</b>	<b>\$170</b>	<b>\$200</b>	<b>0.6</b>	<b>2,299</b>
ECM 10	Install Low-Flow DHW Devices	Yes	875	0.0	12	\$311	\$370	\$170	\$200	0.6	2,299
<b>Food Service &amp; Refrigeration Measures</b>			<b>3,034</b>	<b>0.3</b>	<b>0</b>	<b>\$385</b>	<b>\$4,670</b>	<b>\$250</b>	<b>\$4,420</b>	<b>11.5</b>	<b>3,055</b>
ECM 11	Replace Refrigeration Equipment	No	1,422	0.2	0	\$180	\$4,400	\$200	\$4,200	23.3	1,432
ECM 12	Vending Machine Control	Yes	1,612	0.2	0	\$204	\$270	\$50	\$220	1.1	1,623
<b>TOTALS</b>			<b>104,656</b>	<b>29.4</b>	<b>75</b>	<b>\$14,523</b>	<b>\$221,710</b>	<b>\$13,920</b>	<b>\$207,790</b>	<b>14.3</b>	<b>114,215</b>

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

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

*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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>10,397</b>	<b>2.1</b>	<b>-1</b>	<b>\$1,294</b>	<b>\$6,740</b>	<b>\$750</b>	<b>\$5,990</b>	<b>4.6</b>	<b>10,295</b>
ECM 1	Install LED Fixtures	4,515	0.4	0	\$567	\$2,860	\$300	\$2,560	4.5	4,505
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,386	0.3	0	\$171	\$650	\$70	\$580	3.4	1,362
ECM 3	Retrofit Fixtures with LED Lamps	4,496	1.4	-1	\$556	\$3,230	\$380	\$2,850	5.1	4,429
<b>Lighting Control Measures</b>		<b>31,705</b>	<b>6.0</b>	<b>-7</b>	<b>\$3,912</b>	<b>\$21,660</b>	<b>\$5,350</b>	<b>\$16,310</b>	<b>4.2</b>	<b>31,150</b>
ECM 4	Install Occupancy Sensor Lighting Controls	26,878	5.0	-6	\$3,316	\$16,600	\$2,180	\$14,420	4.3	26,408
ECM 5	Install High/Low Lighting Controls	4,827	0.9	-1	\$596	\$5,060	\$3,170	\$1,890	3.2	4,743
<b>Variable Frequency Drive (VFD) Measures</b>		<b>34,211</b>	<b>4.6</b>	<b>0</b>	<b>\$4,340</b>	<b>\$35,300</b>	<b>\$800</b>	<b>\$34,500</b>	<b>8.0</b>	<b>34,451</b>
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	34,211	4.6	0	\$4,340	\$35,300	\$800	\$34,500	8.0	34,451
<b>HVAC System Improvements</b>		<b>0</b>	<b>0.0</b>	<b>71</b>	<b>\$1,182</b>	<b>\$1,870</b>	<b>\$200</b>	<b>\$1,670</b>	<b>1.4</b>	<b>8,360</b>
ECM 9	Install Pipe Insulation	0	0.0	71	\$1,182	\$1,870	\$200	\$1,670	1.4	8,360
<b>Domestic Water Heating Upgrade</b>		<b>875</b>	<b>0.0</b>	<b>12</b>	<b>\$311</b>	<b>\$370</b>	<b>\$170</b>	<b>\$200</b>	<b>0.6</b>	<b>2,299</b>
ECM 10	Install Low-Flow DHW Devices	875	0.0	12	\$311	\$370	\$170	\$200	0.6	2,299
<b>Food Service &amp; Refrigeration Measures</b>		<b>1,612</b>	<b>0.2</b>	<b>0</b>	<b>\$204</b>	<b>\$270</b>	<b>\$50</b>	<b>\$220</b>	<b>1.1</b>	<b>1,623</b>
ECM 12	Vending Machine Control	1,612	0.2	0	\$204	\$270	\$50	\$220	1.1	1,623
<b>TOTALS</b>		<b>78,800</b>	<b>12.8</b>	<b>75</b>	<b>\$11,243</b>	<b>\$66,210</b>	<b>\$7,320</b>	<b>\$58,890</b>	<b>5.2</b>	<b>88,179</b>

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

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

*Cost Effective ECMs*

## 4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>10,397</b>	<b>2.1</b>	<b>-1</b>	<b>\$1,294</b>	<b>\$6,740</b>	<b>\$750</b>	<b>\$5,990</b>	<b>4.6</b>	<b>10,295</b>
ECM 1	Install LED Fixtures	4,515	0.4	0	\$567	\$2,860	\$300	\$2,560	4.5	4,505
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,386	0.3	0	\$171	\$650	\$70	\$580	3.4	1,362
ECM 3	Retrofit Fixtures with LED Lamps	4,496	1.4	-1	\$556	\$3,230	\$380	\$2,850	5.1	4,429

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

### **ECM 1: Install LED Fixtures**

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

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

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

**Affected Building Areas:** kitchen and 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:** processing room

### **ECM 3: Retrofit Fixtures with LED Lamps**

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

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

**Affected Building Areas:** all areas with fluorescent fixtures with T8 tubes, T5 lamps, and CFLs

## 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>		<b>31,705</b>	<b>6.0</b>	<b>-7</b>	<b>\$3,912</b>	<b>\$21,660</b>	<b>\$5,350</b>	<b>\$16,310</b>	<b>4.2</b>	<b>31,150</b>
ECM 4	Install Occupancy Sensor Lighting Controls	26,878	5.0	-6	\$3,316	\$16,600	\$2,180	\$14,420	4.3	26,408
ECM 5	Install High/Low Lighting Controls	4,827	0.9	-1	\$596	\$5,060	\$3,170	\$1,890	3.2	4,743

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, interview rooms, locker rooms, restrooms, processing rooms, and lobby areas

### **ECM 5: Install High/Low Lighting Controls**

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

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

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



For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as occupants approach the area. This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

**Affected Building Areas:** hallways and stairwells

### 4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Variable Frequency Drive (VFD) Measures</b>		<b>34,211</b>	<b>4.6</b>	<b>0</b>	<b>\$4,340</b>	<b>\$35,300</b>	<b>\$800</b>	<b>\$34,500</b>	<b>8.0</b>	<b>34,451</b>
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	34,211	4.6	0	\$4,340	\$35,300	\$800	\$34,500	8.0	34,451

#### **ECM 6: Install VFD on Variable Air Volume (VAV) Fans**

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed. Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally require less maintenance than mechanical air volume control devices.

**Affected Air Handlers:** eight AHUs in the attic, attic courtroom, office 303, and mechanical space

### 4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Unitary HVAC Measures</b>		<b>24,434</b>	<b>16.4</b>	<b>0</b>	<b>\$3,099</b>	<b>\$151,100</b>	<b>\$6,400</b>	<b>\$144,700</b>	<b>46.7</b>	<b>24,605</b>
ECM 7	Install High Efficiency Air Conditioning Units	19,993	12.5	0	\$2,536	\$122,700	\$5,400	\$117,300	46.3	20,133
ECM 8	Install High Efficiency Heat Pumps	4,441	3.9	0	\$563	\$28,400	\$1,000	\$27,400	48.6	4,472

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

#### **ECM 7: Install High Efficiency Air Conditioning Units**

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

**Affected Units:** six ductless mini split AC, nine split- systems, and one packaged unit

### **ECM 8: Install High Efficiency Heat Pumps**

We evaluated replacing the 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:** six split system air source heat pumps

## 4.5 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>HVAC System Improvements</b>		<b>0</b>	<b>0.0</b>	<b>71</b>	<b>\$1,182</b>	<b>\$1,870</b>	<b>\$200</b>	<b>\$1,670</b>	<b>1.4</b>	<b>8,360</b>
ECM 9	Install Pipe Insulation	0	0.0	71	\$1,182	\$1,870	\$200	\$1,670	1.4	8,360

### **ECM 9: Install Pipe Insulation**

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

**Affected Systems:** heating hot water piping

## 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>		<b>875</b>	<b>0.0</b>	<b>12</b>	<b>\$311</b>	<b>\$370</b>	<b>\$170</b>	<b>\$200</b>	<b>0.6</b>	<b>2,299</b>
ECM 10	Install Low-Flow DHW Devices	875	0.0	12	\$311	\$370	\$170	\$200	0.6	2,299

### **ECM 10: Install Low-Flow DHW Devices**

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

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

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

## 4.7 Food Service and Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Food Service &amp; Refrigeration Measures</b>		<b>3,034</b>	<b>0.3</b>	<b>0</b>	<b>\$385</b>	<b>\$4,670</b>	<b>\$250</b>	<b>\$4,420</b>	<b>11.5</b>	<b>3,055</b>
ECM 11	Replace Refrigeration Equipment	1,422	0.2	0	\$180	\$4,400	\$200	\$4,200	23.3	1,432
ECM 12	Vending Machine Control	1,612	0.2	0	\$204	\$270	\$50	\$220	1.1	1,623

### **ECM 11: Replace Refrigeration Equipment**

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

### **ECM 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 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 Manchester Township may wish to consider. These potential upgrades typically require further analysis, involve substantial capital investment, and/or include significant system reconfiguration. These measure(s) are therefore beyond the scope of this energy audit. These measure(s) are described here to support a whole building approach to energy efficiency and sustainability.

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

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

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

### **Upgrade/Replace Building Automation System**

Based on our site survey and on conversations with facility staff, it appears that the existing building automation system (BAS) 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 BAS could increase the efficiency of your building HVAC system operation.

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

It is recommended that an HVAC engineer or contractor who specializes in BAS 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.

### **Upgrade to a Heat Pump System**

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

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

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

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

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

### **VRF Systems**

Consider variable refrigerant flow (VRF) systems as part of a comprehensive package unit upgrade project. (VRF systems use direct expansion (DX) heat pumps to transport heat between an outdoor condensing unit and a network of indoor evaporators, located near or within the conditioned space, through refrigerant piping installed in the building. Attributes that distinguish VRF from other DX system types are:

- Multiple indoor units connected to a common outdoor unit
- Scalability
- Variable capacity
- Distributed control
- Simultaneous heating and cooling capability

VRF provides flexibility by allowing for many different indoor units (with different capacities and configurations), individual zone control, the unique ability to offer simultaneous heating and cooling in separate zones on a common refrigerant circuit, and heat recovery from one zone to another. VRF systems are equipped with at least one variable-speed and/or variable-capacity compressor.

To match the building's load profiles, energy is transferred from one indoor space to another through the refrigerant line, and only one energy source is necessary to provide both heating and cooling. VRF systems also operate efficiently at part load because of the compressor's variable capacity control. VRF systems are ideal for applications with varying loads or where zoning is required. Some other advantages of VRF systems include consistent comfort, quiet operation, energy efficiency, installation flexibility, zoned heating and cooling, state-of-the-art controls, and reliability.

VRF systems are more expensive than conventional heat pump systems; however, the higher initial cost can be offset by improved cooling efficiency during part load operation—a SEER (cooling) rating of 18.0 is not uncommon for small packaged VRF-equipped heat pumps.

When you are replacing packaged HVAC equipment, we recommend a comprehensive approach. Work with your contractor or design engineer to make sure your systems are sized and zoned according to current space configurations and occupancy. Select high efficiency equipment and controls that match your heating and cooling needs. Commission the system and controls to ensure proper operation, comfort, ventilation, and energy use.

### **Replace Smooth V-Belts with Notched or Synchronous Belts**

This measure is for the replacement of smooth V-belts in non-residential package and split HVAC systems with notched V-belts or for the installation of new equipment with synchronous belts instead of smooth V-belts. Typically, there is a V-belt between the motor and the supply air fan and/or return air fan in larger package and split HVAC systems.

In general, there are two styles of grooved V-belts: notched and synchronous. The U.S. Department of Energy (DOE) compares these two types as follows:<sup>5</sup>

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<sup>5</sup> <https://www.nrel.gov/docs/fy13osti/56012.pdf> US DOE Motor Systems Tip Sheet #5

Characteristic	Notched V-Belts	Synchronous Belts
<u>Description</u>	A notched belt has grooves or notches that run perpendicular to the belt's length, which reduces the bending resistance of the belt.	They are also called cogged, timing, positive-drive, or high-torque drive belts, and are "toothed".
<u>Pulleys/Sprockets</u>	Can use the same pulleys as cross-section standard V-belts	Require the installation of mating grooved sprockets.
<u>Typical Efficiency</u>	Run cooler, last longer, and are about 2% more efficient than standard V-belts.	Operate with a consistent efficiency of 98% and maintain their efficiency over a wide load range.
<u>Constraints</u>	Have a sharp reduction in efficiency at high torque due to increased slippage.	Noisier than V-belts, less suited for use on shock-loaded applications, and transfer more vibration due to their stiffness.
<u>Other Benefits</u>	Lower cost than synchronous belts, overall.	Require minimal maintenance and re-tensioning. Operate in wet and oily environments, and run slip-free

The DOE offers the following suggested actions with respect to investigating the applicability of notched or synchronous V belts:

- Conducted a survey of belt-driven equipment. Gather application and operating-hour data. Then determine the cost effectiveness of replacing existing V-belts with notched belts or synchronous belts and sprockets.
- Consider synchronous belts for all new installations; the price premium is minimal due to the avoidance of conventional pulley costs.
- Consider having a power transmission specialist determine the energy and cost savings potential from retrofitting all V-belt drives with synchronous belts. Synchronous belts rely on tooth grip instead of friction to efficiently transfer power and provide a constant speed ratio.
- Install notched belts where the retrofit of a synchronous belt is not cost effective.

## 5 ENERGY EFFICIENT BEST PRACTICES

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

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

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

### **Energy Tracking with ENERGY STAR Portfolio Manager**



You've heard it before—you cannot manage what you do not measure. ENERGY STAR Portfolio Manager is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions<sup>6</sup>. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

### **Weatherization**

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

### **Doors and Windows**

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

### **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.

<sup>6</sup> <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

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

### **Lighting Controls**

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

### **Motor Controls**

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

### **Motor Maintenance**

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

### **Fans to Reduce Cooling Load**

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

### **Thermostat Schedules and Temperature Resets**



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

### **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.

### **Boiler Maintenance**

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

### **Label HVAC Equipment**

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

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

### **Optimize HVAC Equipment Schedules**

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

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

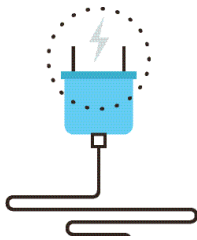
### **Water Heater Maintenance**

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

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

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

### **Plug Load Controls**



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips<sup>7</sup>. Your local utility may offer incentives or rebates for this equipment.

### **Computer Monitor Replacement**

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

### **Procurement Strategies**

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

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<sup>7</sup> For additional information refer to “Assessing and Reducing Plug and Process Loads in Office Buildings” <http://www.nrel.gov/docs/fy13osti/54175.pdf>, or “Plug Load Best Practices Guide” <http://www.advancedbuildings.net/plug-load-best-practices-guide-offices>.

## 6 WATER BEST PRACTICES

### Getting Started



The commercial and institutional sector is the second largest consumer of publicly supplied water in the United States, accounting for 17% of the withdrawals from public water supplies<sup>8</sup>. In New Jersey, excluding water used for power generation, approximately 80% of total water use was attributed to potable supply during the period of 2009 to 2018. Water withdrawals for potable supply have not changed noticeably during the period from 1990 to 2018<sup>9</sup>.

Water management planning serves as the foundation for any successful water reduction effort. It is the first step a commercial or institutional facility owner or manager should take to achieve and sustain long-term water savings. Understanding how water is used within a facility is critical for the water management planning process. A water assessment provides a comprehensive account of all known water uses at the facility. It allows the water management team to establish a baseline from which progress and program success can be measured. It also enables the water management team to set achievable goals and identify and prioritize specific projects based on the relative savings opportunities and project cost-effectiveness.

Water conservation devices may significantly reduce your water and sewer usage costs. Any reduction in water use reduces grid-level electricity use since a significant amount of electricity is used to treat and deliver water from reservoirs to end users.

For more information regarding water conservation or additional details regarding the practices shown below go to the EPA's WaterSense website<sup>10</sup> or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"<sup>11</sup> to get ideas for creating a water management plan and best practices for a wide range of water using systems.

### Toilets and Urinals

Toilets and urinals are considered sanitary fixtures and are found in most facilities. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously flushing, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older inefficient fixtures with current generation WaterSense labeled equipment.

Commercial facilities typically use tank toilets or wall-mount flushometers. Educate and inform users with restroom signage and other means to avoid flushing inappropriate objects. For tank toilets, periodically check to ensure fill valves are working properly and that water level is set correctly. Annually test toilets to ensure the flappers are not worn or allowing water to seep from the tank into the bowl and down the sewer. Control stops and piston valves on flushometer toilets should be checked at least annually.

Most urinals use water to flush liquid. These standard single-user fixtures are present in most facilities. Non-water urinals use a specially designed trap that allows liquid waste to drain out of the fixture through

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<sup>8</sup> Estimated from analyzing data in: [Solley, Wayne B., et al, "Estimated Use of Water in the United States in 1995", U.S Geological Survey Circular 1200, \(1998\)](#)

<sup>9</sup> <https://dep.nj.gov/wp-content/uploads/dsr/trends-water-supply.pdf>

<sup>10</sup> <https://www.epa.gov/watersense>

<sup>11</sup> <https://www.epa.gov/watersense/watersense-work-0>

a trap seal, and into the drainage system. Flushing urinals should be inspected at least annually for proper valve and sensor operation. For non-water urinals, follow maintenance practices as directed by the manufacturer to ensure products perform as expected. Non-water urinals can be considered during urinal replacement, however, review the condition and design of the existing plumbing system and the expected usage patterns to ensure that these products will provide the anticipated performance.

### **Faucets and Showerheads**

Faucets and showerheads are sanitary fixtures that generally dispense heated water. Reducing water use by these fixtures translates into a reduction of site fuel or electric use depending on how water is heated. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously dripping, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older fixtures with current generation WaterSense labeled equipment.

Faucets are used for a variety of purposes, and standard flow rates are dictated by the intended use. Public use lavatory faucets and kitchen faucets are subject to maximum flow rates while service sinks are not. Periodically inspect faucet aerators for scale buildup to ensure flow is not being restricted. Clean or replace the aerator or other spout end device as needed. Check and adjust automatic sensors (where installed) to ensure they are operating properly to avoid faucets running longer than necessary. Post materials in restrooms and kitchens to ensure user awareness of the facility's water-efficiency goals. Remind users to turn off the tap when they are done and to consider turning the tap off during sanitation activities when it is not being used. Consider installing lavatory and kitchen faucet fixtures with reduced flow. Federal standards limit kitchen and restroom faucet flows to 2.2 gpm. To qualify for a WaterSense label a faucet cannot exceed 1.5 gpm.

Effective in 1992, the maximum allowable flow rate for all showerheads sold in the United States is 2.5 gpm. Since this standard was enacted, many showerheads have been designed to use even less water. WaterSense labeled equipment is designed to use 2.0 gpm, or less. For optimum showerhead efficiency, the system pressure should be tested to make sure that it is between 20 and 80 pounds per square inch (psi). Verify that plumbing lines are routed through a shower valve to prevent water pressure fluctuations. Periodically inspect showerheads for scale buildup to ensure flow is not being restricted. In general, replace showerheads with 2.5 gpm flow rates or higher with WaterSense labeled models. Note: Use of poor performing replacement reduced flow showerheads may result in increased use if the duration of use is increased to compensate for reduced performance. WaterSense labeled showerheads are independently certified to meet or exceed minimum performance requirements for spray coverage and force.

## 7 ON-SITE GENERATION

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

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

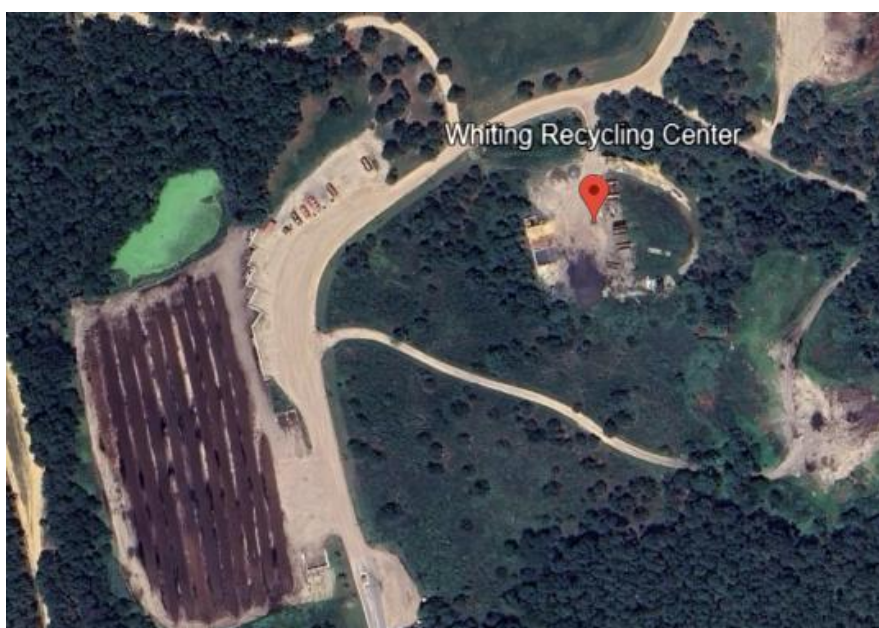
## 7.1 Solar Photovoltaic

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

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

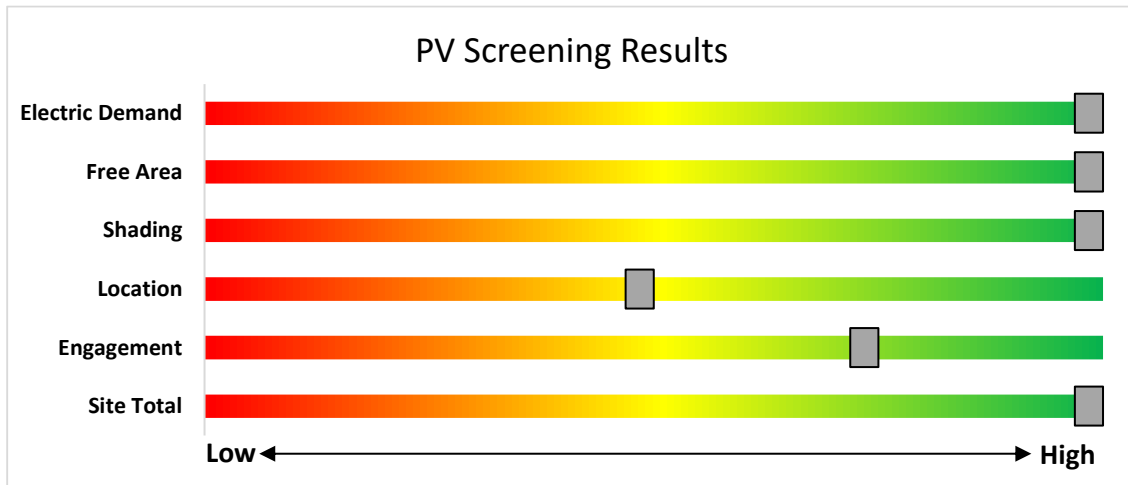
The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the ground may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The facility requested TRC to analyze the solar potential at a former landfill site owned by the township located at 110 Sam Pitts Rd, Manchester Township, NJ. The image below the rough area considered for the solar PV and constitutes approximately 100,000 sq. feet.



*Bird's eye view of Location*

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	133	kW DC STC
Electric Generation	158,452	kWh/yr
Displaced Cost	\$20,100	/yr
Installed Cost	\$380,400	

*Photovoltaic Screening*

### Successor Solar Incentive Program (SuSI)

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

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

- ◆ **Successor Solar Incentive Program (SuSI):** <https://www.njcleanenergy.com/renewable-energy/programs/susi-program>
- ◆ **Basic Info on Solar PV in NJ:** <http://www.njcleanenergy.com/whysolar>
- ◆ **NJ Solar Market FAQs:** [www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs](http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs)
- ◆ **Approved Solar Installers in the NJ Market:** [http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved\\_vendorsearch/?id=60&start=1](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1)



## 7.2 Combined Heat and Power

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

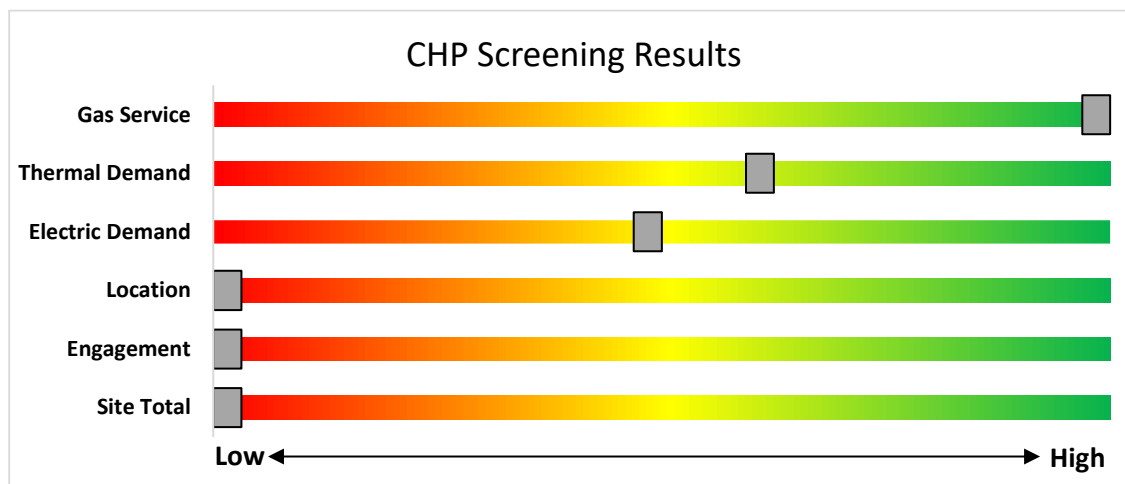
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

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

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

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

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



*Combined Heat and Power Screening*

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

## 8 ELECTRIC VEHICLES

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

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

### 8.1 EV Charging

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

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

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

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

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

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



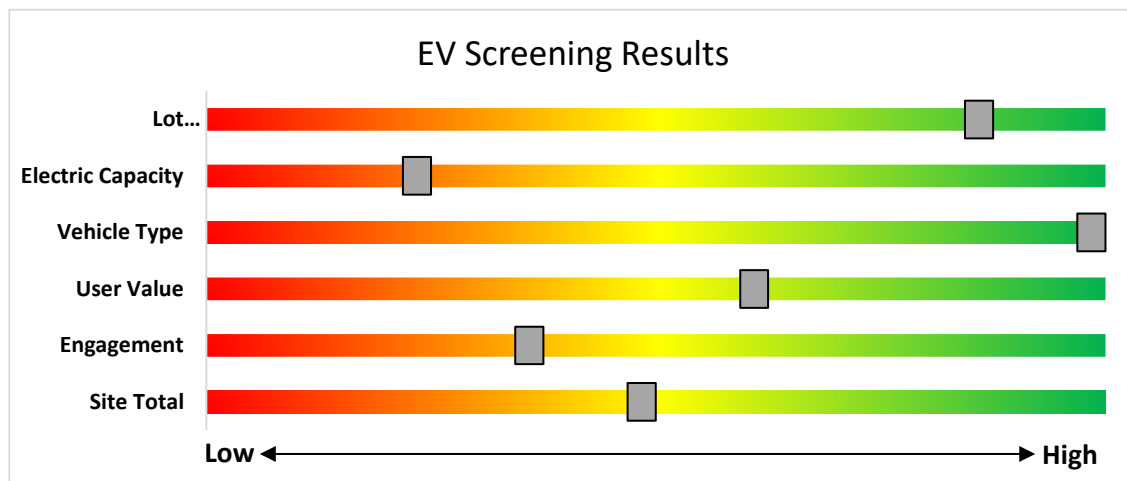
The facility has four EV chargers at the main municipal building parking lot. They were installed very recently; around the time the audit was conducted.



*EV Charger – Municipal Building*

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

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



*EV Charger Screening*



### **Electric Vehicle Programs Available**

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

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

EV Charging incentive information is available from Atlantic City Electric, PSE&G and JCP&L. For more information and to keep up to date on all EV programs please visit <https://www.njcleanenergy.com/commercial-industrial/programs/electric-vehicle-programs>

## 9 PROJECT FUNDING AND INCENTIVES

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

### NJBPU and NJCEP Administered Programs



- New Construction (residential, commercial, industrial, government)
  - Large Energy Users
  - Energy Savings Improvement Program (financing)
  - State Facilities Initiative\*
  - Local Government Energy Audits
  - Combined Heat & Power & Fuel Cells
- \*State facilities are also eligible for utility programs

### Utility Administered Programs



- Existing buildings (residential, commercial, industrial, government)
- Efficient Products
  - Lighting & Marketplace
  - HVAC
  - Appliance Rebates
  - Appliance Recycling

## 9.1 New Jersey's Clean Energy Program

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

### Large Energy Users

The Large Energy Users Program (LEUP) is designed to foster self-directed investment in energy projects. This program is offered to New Jersey's largest energy customers. To qualify entities must have incurred at least \$5 million in total energy costs in the prior fiscal year.

#### **Incentives**

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

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

#### **How to Participate**

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

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

## Combined Heat and Power

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

### Incentives<sup>12</sup>

Eligible Technology	Size (Installed Rated Capacity)	Incentive (\$/Watt) <sup>5</sup>	% of Total Cost Cap per Project	\$ Cap per Project
CHPs powered by non-renewable or renewable fuel source, or a combination: <sup>4</sup> - Gas Internal Combustion Engine - Gas Combustion Turbine - Microturbine	≤500 kW <sup>1</sup>	\$2.00	30-40% <sup>2</sup>	\$2 million
	>500 kW - 1 MW <sup>1</sup>	\$1.00		
	> 1 MW - 3 MW <sup>1</sup>	\$0.55	30%	\$3 million
	>3 MW <sup>1</sup>	\$0.35		
Fuel Cells ≥60%	Same as above <sup>1</sup>	Applicable amount above	30%	\$1 million
Waste Heat to Power (WHP) <sup>3</sup> Powered by non-renewable fuel source. Heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine)	≤1MW <sup>1</sup>	\$1.00	30%	\$2 million
	> 1MW <sup>1</sup>	\$.50	30%	\$3 million

<sup>12</sup>

<sup>1</sup> Incentives are tiered, which means the incentive levels vary based upon the installed rated capacity, as listed in the chart above. For example, a 4 MW CHP system would receive \$2.00/watt for the first 500 kW, \$1.00/watt for the second 500 kW, \$0.55/watt for the next 2 MW and \$0.35/watt for the last 1 MW (up to the caps listed).

<sup>2</sup> The maximum incentive will be limited to 30% of total project. For CHP projects up to 1 MW, this cap will be increased to 40% where a cooling application is used or included with the CHP system (e.g. absorption chiller).

<sup>3</sup> Projects will be eligible for incentives shown above, not to exceed the lesser of % of total project cost per project cap or maximum \$ per project cap. Projects installing CHP or FC with WHP will be eligible for incentive shown above, not to exceed the lesser caps of the CHP or FC incentive. Minimum efficiency will be calculated based on annual total electricity generated, utilized waste heat at the host site (i.e. not lost/rejected), and energy input.

<sup>4</sup> Systems fueled by a Class 1 Renewable Fuel Source, as defined by N.J.A.C. 14:8-2.5, are eligible for a 30% incentive bonus. If the fuel is mixed, the bonus will be prorated accordingly. For example, if the mix is 60/40 (60% being a Class 1 renewable), the bonus will be 18%. This bonus will be included in the final performance incentive payment, based on system performance and fuel mix consumption data. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

<sup>5</sup> CHP-FC systems located at Critical Facility and incorporating blackstart and islanding technology are eligible for a 25% incentive bonus. This bonus incentive will be paid with the second/Installation incentive payment. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.



### **How to Participate**

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



## Successor Solar Incentive Program (SuSI)

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

### **Administratively Determined Incentive (ADI) Program**

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

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

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

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

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

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

### **Competitive Solar Incentive (CSI) Program**

The CSI Program opened on April 15, 2023, and will serve as the permanent program within the SuSI Program providing incentives to larger solar facilities. The CSI Program is open to qualifying grid supply solar facilities, non-residential net metered solar installations with a capacity greater than five (5) megawatts (“MW”), and to eligible grid supply solar facilities installed in combination with energy storage.

CSI eligible facilities will only be allowed to register in the CSI program upon award of a bid pursuant to N.J.A.C. 14:8-11.10.

The CSI program structure has separate categories, or tranches, to ensure that a range of solar project types, including those on preferred sites, are able to participate despite potentially different project cost profiles. The Board has approved four tranches for grid supply and large net metered solar and an additional fifth tranche for storage in combination with grid supply solar. The following table lists procurement targets for the first solicitation:

Tranche	Project Type	MW (dc) Targets
Tranche 1.	Basic Grid Supply	140
Tranche 2.	Grid Supply on the Built Environment	80
Tranche 3.	Grid Supply on Contaminated Sites and Landfills	40
Tranche 4.	Net Metered Non- Residential	40
Tranche 5.	*Storage Paired with Grid	160 MWh

\*The storage tranche of 160 MWh corresponds to a 4-hour storage pairing of 40 MW of solar

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

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

## Energy Savings Improvement Program

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

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

### **How to Participate**

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

- (1) Use an energy services company or "ESCO."
- (2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
- (3) Use a hybrid approach of the two options described above where the ESCO is used for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

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

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

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

## Demand Response (DR) Energy Aggregator

Demand Response Energy Aggregator is a program designed to reduce the electric load when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Grid operators call upon curtailment service providers and commercial facilities to reduce electric usage during times of peak demand, making the grid more reliable and reducing transmission costs for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary, and participants receive payments whether or not their facility is called upon to curtail its electric usage.

Typically, an electric customer must be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with greater capability to quickly curtail their demand during peak hours receive higher payments. Customers with back-up generators on site may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in DR programs often find it to be a valuable source of revenue for their facility, because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature setpoints on thermostats (so that air conditioning units run less frequently) or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a DR activity in most situations.

The first step toward participation in a DR program is to contact a curtailment service provider. A list of these providers is available on the website of the independent system operator, PJM, and it includes contact information for each company, as well as the states where they have active business<sup>13</sup>. PJM also posts training materials for program members interested in specific rules and requirements regarding DR activity along with a variety of other DR program information<sup>14</sup>.

Curtailment service providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities, and they may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

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<sup>13</sup> <http://www.pjm.com/markets-and-operations/demand-response.aspx>.

<sup>14</sup> <http://www.pjm.com/training/training-events.aspx>.

## 9.2 Utility Energy Efficiency Programs

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

### Prescriptive and Custom

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

#### **Equipment Examples**

*Lighting*

*Lighting Controls*

*HVAC Equipment*

*Refrigeration*

*Gas Heating*

*Gas Cooling*

*Commercial Kitchen Equipment*

*Food Service Equipment*

*Variable Frequency Drives*

*Electronically Commutate Motors*

*Variable Frequency Drives*

*Plug Loads Controls*

*Washers and Dryers*

*Agricultural*

*Water Heating*

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

### Direct Install

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

#### **Incentives**

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

#### **How to Participate**

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

## Engineered Solutions

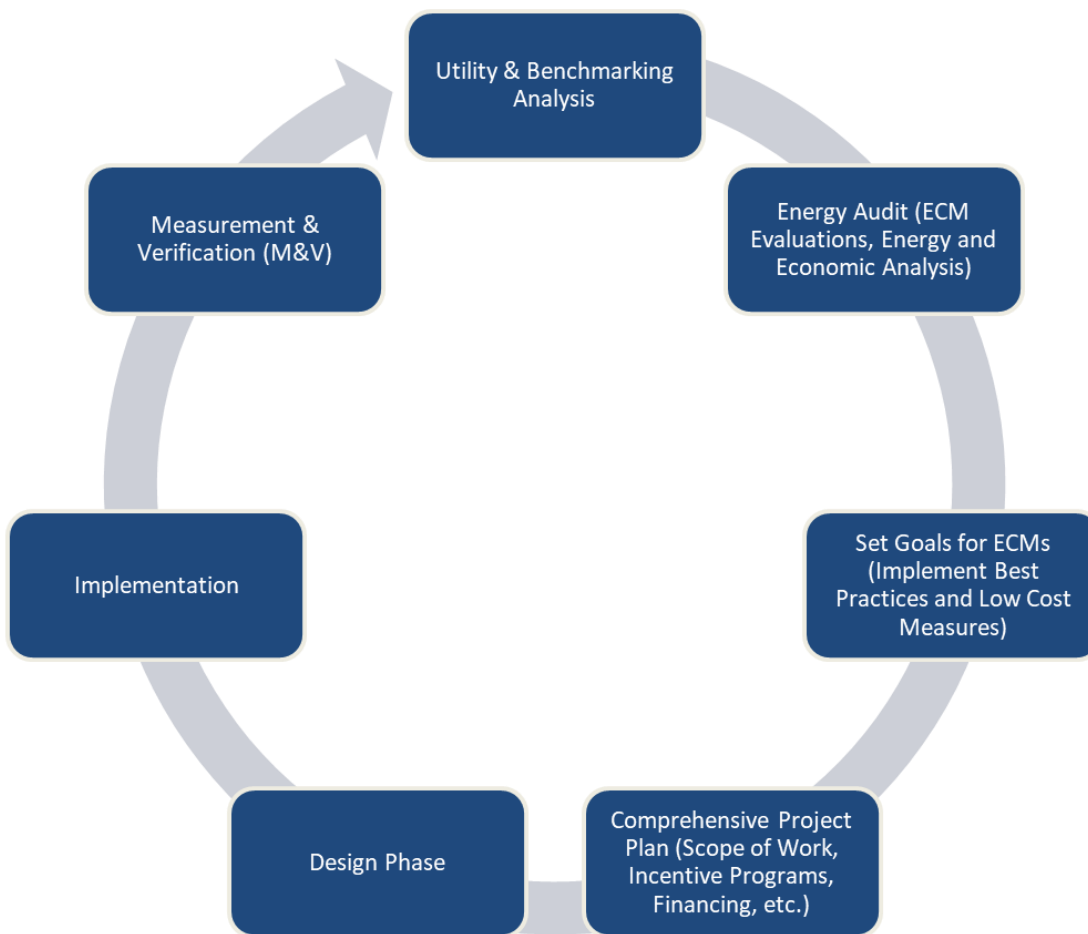
The Engineered Solutions Program provides tailored energy-efficiency assistance and services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. Customers receive expert guided services, including investment-grade energy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

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

## 10 PROJECT DEVELOPMENT

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



*Project Development Cycle*

## 11 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

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### 11.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website<sup>15</sup>.

### 11.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website<sup>16</sup>.

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<sup>15</sup> [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html)

<sup>16</sup> [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html)



# APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

## Lighting Inventory & Recommendations

Location	Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis							
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
400 Maintenance	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.1	73	0	\$9	\$200	\$40	17.9
Attic	8	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	500	3	Relamp	No	8	LED Lamps: (1) 10.5W Plug-In Lamp	Wall Switch	14	500	0.0	26	0	\$3	\$200	\$10	58.3
Civic Center	1	Exit Signs: LED - 2 W Lamp	None	S	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
Civic Center	18	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	18	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.2	2,151	0	\$265	\$290	\$40	0.9
Civic Center	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	8,760	4	None	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	87	0	\$11	\$150	\$20	12.2
Conference	5	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.1	597	0	\$74	\$150	\$20	1.8
Corridor Basement	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Corridor Basement	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	4,380	5	None	Yes	1	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	28	3,022	0.0	42	0	\$5	\$0	\$0	0.0
Corridor Basement	9	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	4,380	5	None	Yes	9	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	3,022	0.1	538	0	\$66	\$560	\$320	3.6
Corridor Civil Center	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Corridor Civil Center	8	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	4,380	5	None	Yes	8	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	28	3,022	0.1	335	0	\$41	\$560	\$280	6.8
Corridor First Floor Police	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 First Floor Police	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	4,380		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Corridor First Floor Police	18	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	4,380	5	None	Yes	18	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	3,022	0.2	1,075	0	\$133	\$850	\$630	1.7
Corridor Police Second Floor	2	Exit Signs: LED - 2 W Lamp	None	S	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 Police Second Floor	10	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	4,380	5	None	Yes	10	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	3,022	0.1	597	0	\$74	\$560	\$350	2.8
Electrical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.1	36	0	\$4	\$100	\$20	17.9
Elevator Room	1	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	500	3	Relamp	No	1	LED Lamps: (1) 12W Plug-In Lamp	Wall Switch	14	500	0.0	3	0	\$0	\$30	\$0	73.7
Exterior Ground Police	4	LED Lamps: (1) 25W A19 Screw-In Lamp	Photocell		25	4,380		None	No	4	LED Lamps: (1) 25W A19 Screw-In Lamp	Photocell	25	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	4	LED Lamps: (1) 54W Corn Bulb Screw-In Lamp	Photocell		54	4,380		None	No	4	LED Lamps: (1) 54W Corn Bulb Screw-In Lamp	Photocell	54	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	4	LED Lamps: (1) 54W Corn Bulb Screw-In Lamp	Photocell		54	4,380		None	No	4	LED Lamps: (1) 54W Corn Bulb Screw-In Lamp	Photocell	54	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell		54	4,380		None	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Photocell	54	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	1	Metal Halide: (1) 100W Lamp	Photocell		128	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	30	4,380	0.0	429	0	\$54	\$330	\$50	5.1
Exterior Ground Police	1	Mercury Vapor: (1) 500 W	Photocell		500	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	150	4,380	0.0	1,533	0	\$194	\$680	\$50	3.2
Gymnasium Police	11	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	11	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.1	1,314	0	\$162	\$330	\$40	1.8

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Interview Room 1	6	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.1	717	0	\$88	\$150	\$20	1.5
Interview Room 2	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.0	239	0	\$29	\$150	\$20	4.4
Investigation Bureau	16	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	16	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.2	1,912	0	\$236	\$290	\$40	1.1
Janitorial	1	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	S	12	500		None	No	1	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	12	500	0.0	0	0	\$0	\$0	\$0	0.0
Locker Room	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.0	478	0	\$59	\$330	\$40	4.9
Locker Room	7	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	7	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.1	836	0	\$103	\$0	\$0	0.0
Locker Room 402	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.0	239	0	\$29	\$330	\$40	9.8
Locker Room 402	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	14	8,760	4	None	Yes	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	14	6,044	0.0	42	0	\$5	\$0	\$0	0.0
Locker Room 402	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	8,760	4	None	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	6,044	0.0	43	0	\$5	\$0	\$0	0.0
Locker Room Basement	15	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	8,760	4	None	Yes	15	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	6,044	0.1	1,255	0	\$155	\$330	\$40	1.9
Locker Room Basement	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.0	358	0	\$44	\$330	\$40	6.6
Locker Room Basement	2	LED - Fixtures: Ceiling Mount	Wall Switch	S	14	8,760	4	None	Yes	2	LED - Fixtures: Ceiling Mount	Occupancy Sensor	14	6,044	0.0	84	0	\$10	\$0	\$0	0.0
Locker Room Female	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	8,760		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Locker Room Female	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.0	239	0	\$29	\$330	\$40	9.8
Locker Room Female	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	14	8,760		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	14	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Lounge Raea	6	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	8,760	4	None	Yes	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	6,044	0.1	717	0	\$88	\$330	\$40	3.3
Mechanical Municipal Building	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.4	1,617	0	\$199	\$660	\$120	2.7
Mechanical Police	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.2	635	0	\$78	\$250	\$50	2.6
Office	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Armory	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Captain	9	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	9	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	430	0	\$53	\$150	\$20	2.5
Office - Detective	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Dispatch	1	Compact Fluorescent: (2) 20W Spiral Plug-In Lamps	Wall Switch	S	40	3,500	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	Wall Switch	28	3,500	0.0	46	0	\$6	\$40	\$0	7.0
Office - Dispatch	7	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	7	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	334	0	\$41	\$150	\$20	3.2
Office - Emergency Management	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5

Location	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Office - Evidence 28	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	570	0	\$70	\$330	\$60	3.8
Office - Evidence 302	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	143	0	\$18	\$150	\$20	7.4
Office - Interview Room	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - IT	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.0	162	0	\$20	\$50	\$10	2.0
Office - IT	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	143	0	\$18	\$150	\$20	7.4
Office - Lieutenant	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$0	\$0	0.0
Office - Lieutenant	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Lieutenant 1	5	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	239	0	\$29	\$0	\$0	0.0
Office - Lieutenant 1	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Muster Room	1	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	3,500	3	Relamp	No	1	LED Lamps: (1) 12W Plug-In Lamp	Wall Switch	14	3,500	0.0	23	0	\$3	\$30	\$0	10.5
Office - Muster Room	15	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	15	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.2	716	0	\$88	\$150	\$20	1.5
Office - PBA	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Police	1	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	3,500	3	Relamp	No	1	LED Lamps: (1) 12W Plug-In Lamp	Wall Switch	14	3,500	0.0	23	0	\$3	\$30	\$0	10.5
Office - Police	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Records	12	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	12	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	573	0	\$71	\$150	\$20	1.8
Office - Sergeant	1	Compact Fluorescent: (2) 20W Spiral Plug-In Lamps	Wall Switch	S	40	3,500	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	Wall Switch	28	3,500	0.0	46	0	\$6	\$40	\$0	7.0
Office - Sergeant	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5
Office - Training	8	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	8	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	382	0	\$47	\$150	\$20	2.8
Office - Watch Commander	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5
Office Captain	6	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	286	0	\$35	\$150	\$20	3.7
Office Chief of Police	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	143	0	\$18	\$150	\$20	7.4
Office Chief of Police Inside	1	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	3,500	3, 4	Relamp	Yes	1	LED Lamps: (1) 12W Plug-In Lamp	Occupancy Sensor	14	2,415	0.0	40	0	\$5	\$30	\$0	6.1
Office Chief of Police Inside	1	LED Lamps: (2) 9W A19 Screw-In Lamps	Wall Switch	S	18	3,500	4	None	Yes	1	LED Lamps: (2) 9W A19 Screw-In Lamps	Occupancy Sensor	18	2,415	0.0	21	0	\$3	\$0	\$0	0.0
Office Chief of Police Inside	8	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	8	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	382	0	\$47	\$150	\$20	2.8
Processing Room	11	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	11	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	525	0	\$65	\$0	\$0	0.0

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Processing Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	S	127	3,500	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,415	0.4	1,494	0	\$184	\$510	\$60	2.4
Processing Room	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	S	60	3,500	2, 4	Relamp & Reballast	Yes	1	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	2,415	0.0	141	0	\$17	\$290	\$30	15.0
Restroom - Female 1st Floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Female 1st Floor	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$330	\$40	24.6
Restroom - Female 2nd Floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Female 2nd Floor	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$330	\$40	24.6
Restroom - Female Civic Center	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,500	4	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,415	0.0	52	0	\$6	\$330	\$40	45.3
Restroom - Female First Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Female Second Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	3,500	4	None	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,415	0.0	35	0	\$4	\$330	\$40	67.9
Restroom - Male 1st Floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male 1st Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male 2nd Floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male 2nd Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male First Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male Second Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Stairs Police	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	67	0	\$8	\$280	\$70	25.5
Stairs Police	1	Exit Signs: LED - 2 W Lamp	None	S	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 Police	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$280	\$70	17.8
Stairs Police	3	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	100	0	\$12	\$0	\$0	0.0
Storage	1	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	500	3	Relamp	No	1	LED Lamps: (1) 12W Plug-In Lamp	Wall Switch	14	500	0.0	3	0	\$0	\$30	\$0	73.7
Storage	1	Compact Fluorescent: (2) 20W Spiral Plug-In Lamps	Wall Switch	S	40	500	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	Wall Switch	28	500	0.0	7	0	\$1	\$40	\$0	49.1
Storage Records	1	Compact Fluorescent: (2) 20W Spiral Plug-In Lamps	Wall Switch	S	40	500	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	Wall Switch	28	500	0.0	7	0	\$1	\$40	\$0	49.1
Storage Records	1	LED Lamps: (2) 9W A19 Screw-In Lamps	Wall Switch	S	18	500		None	No	1	LED Lamps: (2) 9W A19 Screw-In Lamps	Wall Switch	18	500	0.0	0	0	\$0	\$0	\$0	0.0
Traffic office	4	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	S	12	3,500	4	None	Yes	4	LED Lamps: (1) 12W A19 Screw-In Lamp	Occupancy Sensor	12	2,415	0.0	57	0	\$7	\$150	\$20	18.4

Existing Conditions							Proposed Conditions							Energy Impact & Financial Analysis							
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Traffic office	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Attic	8	Compact Fluorescent: (1) 18W Plug-In Lamp	Wall Switch	S	18	500	3, 4	Relamp	Yes	8	LED Lamps: (1) 10.5W Plug-In Lamp	Occupancy Sensor	11	345	0.1	47	0	\$6	\$350	\$30	54.8
Attic Courtroom	15	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	500	3, 4	Relamp	Yes	15	LED Lamps: (1) 12W Plug-In Lamp	Occupancy Sensor	14	345	0.1	85	0	\$11	\$530	\$40	46.6
Break Room- 302	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	3,500	4	None	Yes	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	2,415	0.0	32	0	\$4	\$150	\$20	32.7
Conference 205	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,553		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,553	0.0	0	0	\$0	\$0	\$0	0.0
Copier Room	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Corridor Basement	5	LED - Fixtures: Ambient 2x4 Fixture	None	S	40	4,380	5	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	3,022	0.1	299	0	\$37	\$280	\$180	2.7
Corridor Basement	18	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	18	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Corridor First Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	4,380		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Corridor First Floor	12	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	4,380	5	None	Yes	12	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	28	3,022	0.1	502	0	\$62	\$560	\$420	2.3
Corridor Second Floor	3	LED - Fixtures: Ambient 2x4 Fixture	None	S	40	4,380	5	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	3,022	0.0	179	0	\$22	\$280	\$110	7.7
Corridor Second Floor	7	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Courtroom	20	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	20	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.2	955	0	\$118	\$290	\$40	2.1
Courtroom	1	Compact Fluorescent: (4) 20W Spiral Plug-In Lamps	None	S	80	3,500	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	None	56	3,500	0.0	92	0	\$11	\$180	\$0	15.8
Courtroom	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Courtroom	28	LED Lamps: (1) 20W A19 Screw-In Lamp	Wall Switch	S	20	3,500	4	None	Yes	28	LED Lamps: (1) 20W A19 Screw-In Lamp	Occupancy Sensor	20	2,415	0.2	668	0	\$82	\$290	\$40	3.0
Elevator	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	127	0	\$16	\$50	\$10	2.6
Exterior	3	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Photocell		20	4,380	3	Relamp	No	3	LED Lamps: (1) 12W Plug-In Lamp	Photocell	14	4,380	0.0	79	0	\$10	\$80	\$0	8.0
Exterior	1	LED Lamps: (1) 18.5W Plug-In Lamp	Photocell		100	4,380	3	Relamp	No	1	LED Lamps: A19 Lamps	Photocell	15	4,380	0.0	372	0	\$47	\$30	\$0	0.6
Exterior	1	LED Lamps: (1) 25W A19 Screw-In Lamp	Photocell		25	4,380		None	No	1	LED Lamps: (1) 25W A19 Screw-In Lamp	Photocell	25	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	1	LED Lamps: (3) 25W A19 Screw-In Lamps	Photocell		75	4,380		None	No	1	LED Lamps: (3) 25W A19 Screw-In Lamps	Photocell	75	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	5	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell		200	4,380		None	No	5	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell	200	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	4	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Photocell		100	4,380		None	No	4	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Photocell	100	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	6	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Photocell		100	4,380		None	No	6	LED Lamps: (1) 100W Corn Bulb Screw-In Lamp	Photocell	100	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	14	LED Lamps: (1) 54W Corn Bulb Screw-In Lamp	Photocell		54	4,380		None	No	14	LED Lamps: (1) 54W Corn Bulb Screw-In Lamp	Photocell	54	4,380	0.0	0	0	\$0	\$0	\$0	0.0

Location	Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis							
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		100	4,380		None	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	100	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	2	Metal Halide: (1) 100W Lamp	Photocell		128	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	30	4,380	0.0	858	0	\$109	\$660	\$100	5.1
Kitchen	2	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	3,500	1, 4	Fixture Replacement	Yes	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Occupancy Sensor	75	2,415	0.5	1,873	0	\$231	\$1,340	\$120	5.3
Kitchen	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Lobby Court	1	LED - Fixtures: Ambient 2x4 Fixture	None	S	40	4,380		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	None	40	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Lobby Court	14	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	14	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Lobby Main	13	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	4,380	5	None	Yes	13	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	28	3,022	0.1	544	0	\$67	\$850	\$460	5.8
Lobby Main	1	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	None	S	20	4,380	3	Relamp	No	1	LED Lamps: (1) 12W Plug-In Lamp	None	14	4,380	0.0	29	0	\$4	\$30	\$0	8.4
Lobby Main	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Lobby Main	12	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	4,380	5	None	Yes	12	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	3,022	0.1	717	0	\$88	\$560	\$420	1.6
Office - 303	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,500	4	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,415	0.0	69	0	\$9	\$150	\$20	15.2
Office - Building and Ground	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	143	0	\$18	\$150	\$20	7.4
Office - Building and Zone	1	LED - Fixtures: Ambient 2x4 Fixture	None	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	None	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Building and Zone	35	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	35	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Office - Business	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5
Office - Code Enforcement	7	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	7	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	334	0	\$41	\$150	\$20	3.2
Office - Code Enforcement	7	LED Lamps: (1) 12W A19 Screw-In Lamp	Wall Switch	S	12	3,500	4	None	Yes	7	LED Lamps: (1) 12W A19 Screw-In Lamp	Occupancy Sensor	12	2,415	0.0	100	0	\$12	\$150	\$20	10.5
Office - Copier	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,553		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,553	0.0	0	0	\$0	\$0	\$0	0.0
Office - Court Admin	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Courtlobby	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Courtroom	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	67	0	\$8	\$150	\$20	15.8
Office - Finance	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	3,500		None	No	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Finance 207	10	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	10	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	477	0	\$59	\$150	\$20	2.2
Office - IT	5	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	5	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	239	0	\$29	\$150	\$20	4.4
Office - IT	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0

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 - Judge	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	323	0	\$40	\$250	\$40	5.3
Office - Mayor	9	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	9	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.1	430	0	\$53	\$150	\$20	2.5
Office - Open	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5
Office - Open	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5
Office - Open	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	191	0	\$24	\$150	\$20	5.5
Office - Open Court	2	LED - Fixtures: Ambient 2x4 Fixture	None	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Open Court	2	Exit Signs: LED - 2 W Lamp	None	S	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 Court	13	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	13	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.1	434	0	\$54	\$150	\$20	2.4
Office - Open Court	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Office - Open Mayor	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	3,500	3, 4	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,415	0.2	677	0	\$84	\$530	\$80	5.4
Office - Open Township Clerk	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,250		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	2,250	0.0	0	0	\$0	\$0	\$0	0.0
Office - Open Township Clerk	24	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	24	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Office - Personnel 204	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	1,553		None	No	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,553	0.0	0	0	\$0	\$0	\$0	0.0
Office - Public Works	1	LED - Fixtures: Ambient 2x4 Fixture	None	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	None	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Public Works	18	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	18	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Office - Records	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Records	2	Compact Fluorescent: (1) 20W Spiral Plug-In Lamp	Wall Switch	S	20	3,500	3, 4	Relamp	Yes	2	LED Lamps: (1) 12W Plug-In Lamp	Occupancy Sensor	14	2,415	0.0	80	0	\$10	\$200	\$20	18.3
Office - Tax	22	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	22	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.3	1,050	0	\$130	\$660	\$70	4.6
Office - Tax Collector 101	20	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	20	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.2	955	0	\$118	\$660	\$70	5.0
Office - Joseph	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	48	0	\$6	\$0	\$0	0.0
Office - Joseph	8	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	8	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.1	267	0	\$33	\$150	\$20	3.9
Restroom - Female	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Female Basement	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	95	0	\$12	\$150	\$20	11.0
Restroom - Female Basement	1	Compact Fluorescent: (2) 20W Spiral Plug-In Lamps	Wall Switch	S	40	3,500	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	Wall Switch	28	3,500	0.0	46	0	\$6	\$40	\$0	7.0
Restroom - Female Basement	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Female First Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	48	0	\$6	\$0	\$0	0.0
Restroom - Female First Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	48	0	\$6	\$0	\$0	0.0
Restroom - Female First Floor	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	67	0	\$8	\$330	\$40	35.2
Restroom - Female second Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	48	0	\$6	\$0	\$0	0.0
Restroom - Female second Floor	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	67	0	\$8	\$330	\$40	35.2
Restroom - Male	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,415	0.0	143	0	\$18	\$330	\$40	16.4
Restroom - Male	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,500		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male Basement	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male Basement	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male First Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male First Floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male second Floor	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male second Floor	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	28	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Unisex Basement	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	3,500		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Women	2	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	67	0	\$8	\$150	\$20	15.8
Stairs	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	3,500	4	None	Yes	3	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,415	0.0	61	0	\$8	\$330	\$40	38.6
Stairs Back	3	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	S	28	3,500	4	None	Yes	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	28	2,415	0.0	100	0	\$12	\$330	\$40	23.4
Stairs Courthouse	2	LED - Fixtures: Ambient 2x2 Fixture	Photocell	S	28	4,380		None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Photocell	28	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Stairs Courthouse	1	Compact Fluorescent: (2) 20W Spiral Plug-In Lamps	None	S	40	2,250	3	Relamp	No	1	LED Lamps: (2) 18.5W Plug-In Lamps	None	28	2,250	0.0	30	0	\$4	\$40	\$0	10.9
Stairs Courthouse	1	Exit Signs: LED - 2 W Lamp	None	S	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
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.0	18	0	\$2	\$50	\$10	17.9



**Motor Inventory & Recommendations**

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Attic Courtroom	Exhaust Fan	1	Exhaust Fan	0.50	75.0%	No	GreenHeck	SG-24-VG-X	W	6,500		No	75.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Attic Courtroom	Exhaust Fan	3	Exhaust Fan	0.50	75.0%	No	Unknown	Unknown	W	6,500		No	75.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Elevator	Other	1	Other	15.00	80.0%	No	Dover	EP-80-15	W	50		No	80.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Exterior Roof	Exterior Roof	3	Exhaust Fan	0.50	75.0%	No	Unknown	Unknown	W	6,500		No	75.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Exterior Roof	Exterior Roof	2	Exhaust Fan	0.75	77.0%	No	Unknown	Unknown	W	6,500		No	77.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Locker Room Female	Locker Room Female	1	Exhaust Fan	0.20	64.0%	No	Unknown	Unknown	W	6,500		No	64.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Office Chief of Police Inside	Office Chief of Police Inside	1	Exhaust Fan	0.25	70.0%	No	Unknown	Unknown	W	8,760		No	70.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	1	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	1	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	1	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	1,625		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	1	Heating Hot Water Pump	0.13	70.0%	No	Taco	0014-F1	W	6,500		No	70.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	5	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	1	Heating Hot Water Pump	0.03	61.0%	No	Taco	006-BC4	W	6,500		No	61.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Municipal Building	Mechanical Municipal Building	1	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Mechanical Police	1	DHW Circulation Pump	0.90	80.0%	No	Grundfos	UPS 40-160	W	6,500		No	80.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Mechanical Police	1	Heating Hot Water Pump	0.13	60.0%	No	Taco	0014-F1	W	6,500		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Mechanical Police	1	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Mechanical Police	1	Heating Hot Water Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Mechanical Police	1	DHW Circulation Pump	0.90	84.0%	No	Grundfos	UPS 40-160	W	6,500		No	84.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Elevator Room	Elevator Room	1	Other	15.00	80.0%	No	Dover	EP-60	W	50		No	80.0%	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
Attic	Attic	1	Supply Fan	2.00	75.0%	No	Carrier	4-ORR-014-530	B	6,500	6	No	86.5%	Yes	1	0.7	5,226	0	\$663	\$4,700	\$100	6.9
Attic Courtroom	Attic Courtroom	1	Supply Fan	2.00	75.0%	No	Unknown	Unknown	B	6,500	6	No	86.5%	Yes	1	0.7	5,226	0	\$663	\$4,700	\$100	6.9
Attic Courtroom	Attic Courtroom	2	Supply Fan	2.00	75.0%	No	Unknown	Unknown	B	6,500	6	No	86.5%	Yes	2	1.4	10,453	0	\$1,326	\$9,400	\$200	6.9
Office - 303	Office - 303	1	Supply Fan	2.00	75.0%	No	Unknown	Unknown	B	6,500	6	No	86.5%	Yes	1	0.7	5,226	0	\$663	\$4,700	\$100	6.9
Attic	Attic	1	Supply Fan	1.00	75.0%	No	Unknown	Unknown	W	6,500	6	No	85.5%	Yes	1	0.3	2,569	0	\$326	\$3,900	\$100	11.7
Mechanical Police	Mechanical Police	2	Supply Fan	1.00	75.0%	No	Unknown	Unknown	W	8,760	6	No	85.5%	Yes	2	0.7	5,511	0	\$699	\$7,900	\$200	11.0
Gymnasium Police	Gymnasium Police	1	Ventilation Fan	1.00	75.0%	No	Mircrocon	Unknown	W	8,760		No	75.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Exterior Roof Lower	Exterior Roof Lower	1	Exhaust Fan	0.25	68.0%	No	Unknown	Unknown	W	6,500		No	68.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Office Captain	Office Captain	1	Supply Fan	0.25	68.0%	No	Unknown	Unknown	W	6,500		No	68.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Muncipal Building	Mechanical Muncipal Building	1	Supply Fan	2.00	75.0%	No	Unknown	Unknown	W	6,500		No	75.0%	No		0.0	0	0	\$0	\$0	\$0	0.0

**Packaged HVAC Inventory & Recommendations**

Location	Area(s)/System(s) Served	Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
		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	Exterior	1	Ductless Mini-Split AC	0.75		12.06		Unknown	Unknown	B	7	Yes	1	Ductless Mini-Split AC	0.75		18.00		0.1	197	0	\$25	\$2,500	\$0	100.0
Exterior	Exterior	1	Ductless Mini-Split AC	0.75		12.06		Thermal Zone	MS29A13115CA	B	7	Yes	1	Ductless Mini-Split AC	0.75		18.00		0.1	197	0	\$25	\$2,500	\$0	100.0
Exterior	Exterior	1	Ductless Mini-Split AC	0.75		14.84		Sanyo	C0911	B	7	Yes	1	Ductless Mini-Split AC	0.75		18.00		0.1	85	0	\$11	\$2,500	\$0	231.5
Exterior	Exterior	1	Ductless Mini-Split AC	0.75		14.84		Sanyo	C0911	B	7	Yes	1	Ductless Mini-Split AC	0.75		18.00		0.1	85	0	\$11	\$2,500	\$0	231.5
Exterior	Exterior	1	Split-System	12.00		11.13		Carrier	38AE-014-500	B	7	Yes	1	Split-System	12.00		14.00		1.3	2,121	0	\$269	\$20,200	\$1,100	71.0
Exterior	Exterior	1	Split-System	3.50		9.46		Sanyo	C4232	B	7	Yes	1	Split-System	3.50		16.00		0.9	1,451	0	\$184	\$7,000	\$400	35.9
Exterior	Exterior	1	Split-System	3.50		9.46		Unknown	Unknown	B	7	Yes	1	Split-System	3.50		16.00		0.9	1,451	0	\$184	\$7,000	\$400	35.9
Exterior	Exterior	1	Split-System Air-Source HP	0.75	10.00	17.62	10 HSPF	Inverter	9H49YOMI	B	8	Yes	1	Split-System Air-Source HP	0.75	10.00	15.50	8.5 HSPF	0.2	-674	0	-\$85	\$3,600	\$100	-41.0
Exterior	Exterior	1	Split-System Air-Source HP	2.88	37.50	9.92	7 HSPF	Sanyo	CH3642	B	8	Yes	1	Split-System Air-Source HP	2.88	37.50	15.50	8.5 HSPF	1.6	4,309	0	\$547	\$6,700	\$300	11.7
Exterior	Exterior	1	Split-System Air-Source HP	1.00	16.00	14.10	14 HSPF	Fujitsu	AOU12RLS3	B	8	Yes	1	Split-System Air-Source HP	1.00	16.00	15.50	8.5 HSPF	0.2	-2,527	0	-\$320	\$3,900	\$100	-11.9
Exterior	Exterior	1	Ductless Mini-Split AC	0.75		14.84		Sanyo	C0911	B	7	Yes	1	Ductless Mini-Split AC	0.75		18.00		0.1	85	0	\$11	\$2,500	\$0	231.5
Exterior	Exterior	1	Ductless Mini-Split AC	12.00		11.13		Sanyo	C4232	B	7	Yes	1	Ductless Mini-Split AC	12.00		18.00		2.5	3,950	0	\$501	\$7,000	\$0	14.0
Exterior	Exterior	1	Split-System Air-Source HP	2.88	37.50	9.92	7 HSPF	Sanyo	CH3642	B	8	Yes	1	Split-System Air-Source HP	2.88	37.50	15.50	8.5 HSPF	1.6	4,309	0	\$547	\$6,700	\$300	11.7
Exterior	Exterior	1	Split-System	12.00		11.13		Carrier	38AE-014-500	B	7	Yes	1	Split-System	12.00		14.00		1.3	2,121	0	\$269	\$20,200	\$1,100	71.0
Conference 205	Conference 205	1	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Business	Office - Business	1	Packaged Terminal AC	1.00		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Court Admin	Office - Court Admin	1	Packaged Terminal AC	1.00		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Finance	Office - Finance	1	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Finance 207	Office - Finance 207	3	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Office - Judge	Office - Judge	1	Packaged Terminal AC	1.00		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Mayor	Office - Mayor	2	Packaged Terminal AC	1.00		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Open	Office - Open	1	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Open Court	Office - Open Court	3	Packaged Terminal AC	1.00		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Open Mayor	Office - Open Mayor	1	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Open Township Clerk	Office - Open Township Clerk	6	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Personnel 204	Office - Personnel 204	2	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Public Works	Office - Public Works	3	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Tax	Office - Tax	5	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Tax Collector 101	Office - Tax Collector 101	3	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Tax Collector 101	Office - Tax Collector 101	1	Packaged Terminal AC	1.00		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office- Joseph	Office- Joseph	2	Packaged Terminal AC	0.75		10.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Open	Office - Open	1	Window AC	0.65		7.20		GE Appliances	APWD07	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Electrical Room	Electrical Room	1	Package Unit	10.00		10.39		Carrier	50XCA12AAJF5AA F0AA	B	7	Yes	1	Package Unit	10.00		14.00		1.5	2,384	0	\$302	\$14,800	\$800	46.3
Electrical Room	Electrical Room	1	Fan Coil	2.50				Carrier	40QBC42300	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.00		17.50		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Ductless Mini-Split AC	3.04		9.60		Mitsubishi	PU36EK	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.00		17.50		Sanyo	CL4132	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.00		17.50		Fujitsu	AOU24CL1	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Ductless Mini-Split HP	0.75	12.00	14.50	13.5 HSPF	Fujitsu	AOU9RLFC	W		No							0.0	0	0	\$0	\$0	\$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Ground Police	Exterior Ground Police	1	Split-System	9.83		10.30		International Comfort Products	CAE120HAA	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Split-System	9.83		10.30		International Comfort Products	CAE120HAA	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.50		17.99		Sanyo	C3032A	B	7	Yes	1	Split-System	2.50		16.00		-0.1	-166	0	-\$21	\$5,100	\$300	-227.6
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.00		7.98		Unknown	NAC024AKC3	B	7	Yes	1	Split-System	2.00		16.00		0.8	1,207	0	\$153	\$4,400	\$200	27.4
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.00		9.28		York	H1CE180A25B	B	7	Yes	1	Split-System	2.00		16.00		0.5	870	0	\$110	\$4,400	\$200	38.1
Exterior Ground Police	Exterior Ground Police	1	Split-System	2.00		9.28		Carrier	6982212893	B	7	Yes	1	Split-System	2.00		16.00		0.5	870	0	\$110	\$4,400	\$200	38.1
Exterior Ground Police	Exterior Ground Police	1	Split-System	8.83		9.28		International Comfort Products	CAE180HAA	B	7	Yes	1	Split-System	8.83		14.00		1.9	3,085	0	\$391	\$15,700	\$700	38.3
Exterior Ground Police	Exterior Ground Police	1	Split-System Air-Source HP	1.00	10.00	17.62	10 HSPF	Thermal Zone	Unknown	B	8	Yes	1	Split-System Air-Source HP	1.00	10.00	15.50	8.5 HSPF	0.1	-692	0	-\$88	\$3,900	\$100	-43.3
Exterior Roof Lower	Exterior Roof Lower	1	Split-System Air-Source HP	0.75	10.00	17.62	9 HSPF	Fujitsu	AOU9RL2	B	8	Yes	1	Split-System Air-Source HP	0.75	10.00	15.50	8.5 HSPF	0.3	-285	0	-\$36	\$3,600	\$100	-96.9
Conference	Conference	3	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Interview Room 1	Interview Room 1	2	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Investigation Bureau	Investigation Bureau	3	Packaged Terminal AC	1.00	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office	Office	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Captain	Office - Captain	2	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Detective	Office - Detective	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Dispatch	Office - Dispatch	2	Packaged Terminal AC	1.00	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Emergency Management	Office - Emergency Management	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Lieutenant	Office - Lieutenant	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Lieutenant	Office - Lieutenant	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Lieutenant 1	Office - Lieutenant 1	2	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Office - Lieutenant 1	Office - Lieutenant 1	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Muster Room	Office - Muster Room	3	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - PBA	Office - PBA	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Records	Office - Records	4	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Sergeant	Office - Sergeant	1	Packaged Terminal HP	0.96	12.00	10.70	3.1 COP	Amana	PTH123G35	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office - Watch Commander	Office - Watch Commander	1	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office Chief of Police	Office Chief of Police	1	Packaged Terminal HP	0.96	12.00	10.70	3.1 COP	Amana	PTH123G35	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Office Chief of Police Inside	Office Chief of Police Inside	2	Packaged Terminal AC	1.00	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Processing Room	Processing Room	2	Packaged Terminal AC	0.73	50.00	14.00		Unknown	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Locker Room	Locker Room	1	Unit Heater		50.00			Sterling	Unknown	W		No							0.0	0	0	\$0	\$0	\$0	0.0

### Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Municipal Building	Municipal and Police	5	Condensing Hot Water Boiler	289	Weil Mclain	Ultra -299	W		No						0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Court Building	2	Condensing Hot Water Boiler	364	Weil Mclain	Ultra 399	W		No						0.0	0	0	\$0	\$0	\$0	0.0

### Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Municipal Building	Police and Municipal Buildings	10	70	1.50	0.0	0	47	\$775	\$1,310	\$140	1.5
Mechanical Municipal Building	Police and Municipal Buildings	10	30	2.00	0.0	0	25	\$407	\$560	\$60	1.2

### 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 Municipal Building	Mechanical Municipal Building	1	Storage Tank Water Heater (≤ 50 Gal)	AO Smith	ENT 50 100	W		No						0.0	0	0	\$0	\$0	\$0	0.0
Mechanical Police	Mechanical Police	1	Storage Tank Water Heater (> 50 Gal)	HTP	SSC-119	W		No						0.0	0	0	\$0	\$0	\$0	0.0

**Low-Flow Device Recommendations**

Location	Recommendation Inputs					Energy Impact & Financial Analysis						
	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
Kitchen	11	1	Faucet Aerator (Kitchen)	2.50	1.50	0.0	82	0	\$10	\$10	\$0	1.0
Office - Records	11	1	Faucet Aerator (Lavatory)	2.20	0.50	0.0	139	0	\$18	\$10	\$0	0.6
Restroom	11	8	Faucet Aerator (Lavatory)	1.50	0.50	0.0	654	0	\$83	\$70	\$30	0.5
Restroom	11	4	Faucet Aerator (Lavatory)	1.50	0.50	0.0	0	1	\$18	\$30	\$20	0.5
Restroom-Police Bldg	11	13	Faucet Aerator (Lavatory)	1.50	0.50	0.0	0	4	\$60	\$110	\$50	1.0
Restroom-Police Bldg	11	2	Faucet Aerator (Lavatory)	1.80	0.50	0.0	0	1	\$12	\$20	\$10	0.8
Restroom-Police Bldg	11	14	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	7	\$110	\$120	\$60	0.5

**Commercial Refrigerator/Freezer Inventory & Recommendations**

Location	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Unknown	Unknown	No	12	Yes	0.1	790	0	\$100	\$2,400	\$100	22.9
Lounge Raea	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Turbo Air	Unknown	Yes		No	0.0	0	0	\$0	\$0	\$0	0.0
Lounge Raea	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Whirlpool	Unknown	No	12	Yes	0.1	631	0	\$80	\$2,000	\$100	23.7

**Plug Load Inventory**

Existing Conditions						
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Municipal Bldg	4	Car Charging station	7,680	No	Various	Various
Municipal Bldg	85	Desktop	200	No	Various	Various
Police Building	103	Desktop	150	No	Various	Various
Municipal Bldg	11	Microwave	1,000	No	Various	Various
Municipal Bldg	1	Server Equipments	200	No	Unknown	Unknown
Police Building	1	Other	200	No	Unknown	Unknown
Police Building	1	Other	200	No	Unknown	Unknown
Police Building	5	Printer/Copier (Large)	600	No	Various	Various
Municipal Bldg	6	Coffee Machine	800	No	Various	Various
Municipal Bldg	9	Printer/Copier (Large)	600	No	Various	Various
Police Building	4	Toaster Oven	800	No	Various	Various
Police Building	10	Printer (Medium/Small)	150	No	Various	Various
Municipal Bldg	21	Printer (Medium/Small)	200	No	Various	Various
Police Building	17	Television	100	No	Various	Various
Police Building	7	Refrigerator (Mini)	150	No	Various	Various
Municipal Bldg	3	Toaster Oven	800	No	Various	Various
Police Building	3	Coffee Machine	800	No	Various	Various
Municipal Bldg	1	Cooktop / Oven	1,000	No	Various	Various
Municipal Bldg	4	Water Cooler	100	No	Various	Various
Police Building	2	Refrigerator (Residential)	172	No	Various	Various
Police Building	1	Microwave	1,000	No	Unknown	Unknown
Municipal Bldg	3	Paper Shredder	300	No	Various	Various
Municipal Bldg	8	Refrigerator (Mini)	100	No	Various	Various
Municipal Bldg	8	Television	100	No	Various	Various
Police Building	1	Paper Shredder	100	No	Unknown	Unknown
Municipal Bldg	1	Large copier	600	No	Ricoh	MPW6700
Municipal Bldg	1	Large Printer	600	No	HP Desing Het T1700	Unknown
Municipal Bldg	1	Large Printer	600	No	Unknown	Unknown
Police Building	1	Other	100	No	Unknown	Unknown
Municipal Bldg	1	Microfilm Scanner	300	No	Canon	Unknown
Police Building	2	Laptop	45	No	Various	Various
Municipal Bldg	3	Fan (Portable)	50	No	Various	Various
Police Building	1	Other	200	No	Unknown	Unknown
Police Building	2	Fan (Portable)	40	No	Various	Various
Police Building	1	Other	50	No	Unknown	Unknown

**Vending Machine Inventory & Recommendations**

Location	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
	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
Municipal Building	1	Refrigerated	13	Yes	0.2	1,612	0	\$204	\$270	\$50	1.1
Municipal Building	2	Non-Refrigerated	N/A	No	0.0	0	0	\$0	\$0	\$0	0.0



**Miscellaneous Fuel Inventory**

Existing Conditions						
Location	Quantity	Equipment Description	Input Capacity per Unit (MBh)	ENERGY STAR Qualified?	Manufacturer	Model
Exterior	1	Back up Generator	140.0	No	Kohler	Unknown

# APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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

**ENERGY STAR<sup>®</sup> Statement of Energy Performance**

LEARN MORE AT [energystar.gov](http://energystar.gov)

N/A

**Manchester Township Municipal Building  
(Police/EOC/Courthouse)**

**Primary Property Type:** Mixed Use Property  
**Gross Floor Area (ft<sup>2</sup>):** 48,610  
**Built:** 1967

**ENERGY STAR<sup>®</sup>  
Score<sup>1</sup>**

**For Year Ending:** October 31, 2023  
**Date Generated:** September 08, 2024

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

**Property & Contact Information**

<b>Property Address</b> Manchester Township Municipal Building (Police/EOC/Courthouse) 1 Colonial Drive Manchester, New Jersey 08759	<b>Property Owner</b> Manchester Township 1 Colonial Drive Manchester, NJ 08759	<b>Primary Contact</b> Joseph P. Veni 1 Colonial Drive Manchester, NJ 08759 732-657-8121 jveni@manchestertwp.com
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**Property ID:** 6031167

**Energy Consumption and Energy Use Intensity (EUI)**

<b>Site EUI</b> 71.2 kBtu/ft <sup>2</sup>	<b>Annual Energy by Fuel</b>		<b>Annual Emissions</b>	
	Electric - Grid (kBtu)	2,237,788 (65%)	Total (Location-Based) GHG Emissions (Metric Tons CO <sub>2</sub> e/year)	261
	Natural Gas (kBtu)	1,222,889 (35%)		
<b>Source EUI</b> 155.3 kBtu/ft <sup>2</sup>	<b>National Median Comparison</b>		<b>Green Power</b>	
	National Median Site EUI (kBtu/ft <sup>2</sup> )	40.9	Green Power – Onsite (kWh)	N/A
	National Median Source EUI (kBtu/ft <sup>2</sup> )	89.3	Green Power – Offsite (kWh)	N/A
	% Diff from National Median Source EUI	74%	Percent of RECs Retained	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
<b>Blended Rate</b>	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.
<b>Btu</b>	<i>British thermal unit</i> : a unit of energy equal to the amount of heat required to increase the temperature of one pound of water by one-degree Fahrenheit.
<b>CHP</b>	<i>Combined heat and power</i> . Also referred to as cogeneration.
<b>COP</b>	<i>Coefficient of performance</i> : a measure of efficiency in terms of useful energy delivered divided by total energy input.
<b>Demand Response</b>	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.
<b>DCV</b>	<i>Demand control ventilation</i> : a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need.
<b>US DOE</b>	<i>United States Department of Energy</i>
<b>EC Motor</b>	<i>Electronically commutated motor</i>
<b>ECM</b>	<i>Energy conservation measure</i>
<b>EER</b>	<i>Energy efficiency ratio</i> : a measure of efficiency in terms of cooling energy provided divided by electric input.
<b>EUI</b>	<i>Energy Use Intensity</i> : measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance.
<b>Energy Efficiency</b>	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.
<b>ENERGY STAR</b>	ENERGY STAR is the government-backed symbol for energy efficiency. The ENERGY STAR program is managed by the EPA.
<b>EPA</b>	<i>United States Environmental Protection Agency</i>
<b>Generation</b>	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
<b>GHG</b>	<i>Greenhouse gas</i> 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.
<b>gpf</b>	<i>Gallons per flush</i>

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

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