# Local Government Energy Audit Report

Mount Holly Municipal Utility Authority (MUA)

August 26, 2020

*Prepared for:*

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# Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. 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 installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. Cost estimates include material and labor pricing associated with installation of primary recommended equipment only. Cost estimates do not include demolition or removal of hazardous waste. We encourage the owner of the facility to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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

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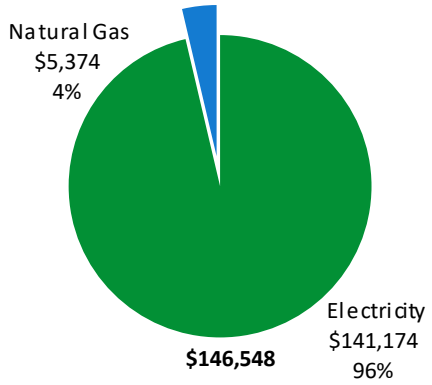
# 1 EXECUTIVE SUMMARY

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

## BUILDING PERFORMANCE REPORT

| | | |
|---|---|---|
| Annual Utilities | Costs: $146,548<br>Electricity: 1,615,964 kWh<br>Natural Gas: 5,268 Therms |  |
| ENERGY STAR® Benchmarking Score | N/A<br>*(1-100 scale)* | A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs. |

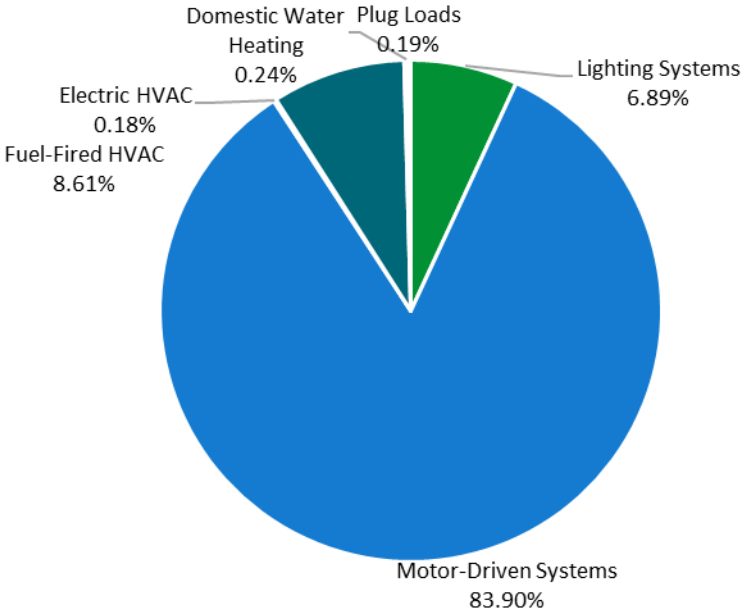


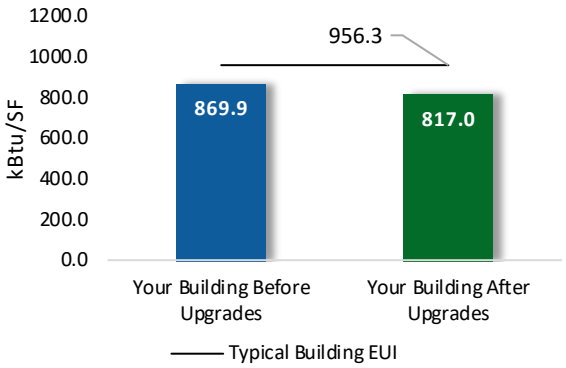

*Figure 1 - Energy Use by System*

## POTENTIAL IMPROVEMENTS

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

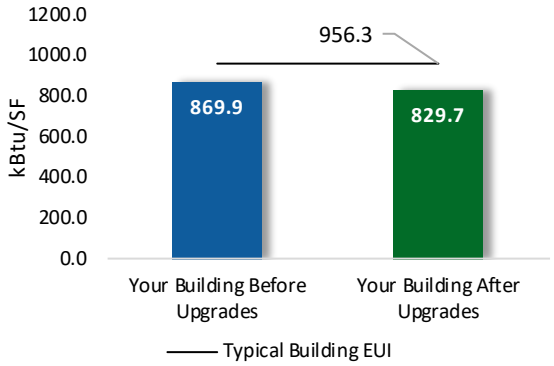
### Scenario 1: Full Package (all evaluated measures)

| | |
|---|---|
| Installation Cost | $115,689 |
| Potential Rebates & Incentives[1] | $20,423 |
| Annual Cost Savings | $9,300 |
| Annual Energy Savings | Electricity: 105,730 kWh<br>Natural Gas: 62 Therms |
| Greenhouse Gas Emission Savings | 54 Tons |
| Simple Payback | 10.2 Years |
| Site Energy Savings (all utilities) | 6% |




### Scenario 2: Cost Effective Package[2]

| | |
|---|---|
| Installation Cost | $79,461 |
| Potential Rebates & Incentives | $17,223 |
| Annual Cost Savings | $7,211 |
| Annual Energy Savings | Electricity: 83,117 kWh |
| Greenhouse Gas Emission Savings | 42 Tons |
| Simple Payback | 8.6 Years |
| Site Energy Savings (all utilities) | 5% |




### On-site Generation Potential

| | |
|---|---|
| Photovoltaic | None |
| Combined Heat and Power | None |

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **78,722** | **3.7** | **-6** | **$6,813** | **$76,723** | **$16,318** | **$60,405** | **8.9** | **78,533** |
| ECM 1 | Install LED Fixtures | Yes | 65,235 | 1.5 | -3 | $5,664 | $73,787 | $14,840 | $58,947 | 10.4 | 65,288 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 1,245 | 0.1 | 0 | $106 | $221 | $48 | $173 | 1.6 | 1,223 |
| ECM 3 | Retrofit Fixtures with LED Lamps | Yes | 12,241 | 2.1 | -3 | $1,043 | $2,715 | $1,430 | $1,285 | 1.2 | 12,022 |
| **Lighting Control Measures** | | | **10,799** | **0.7** | **-1** | **$934** | **$13,488** | **$855** | **$12,633** | **13.5** | **10,765** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | Yes | 3,360 | 0.6 | -1 | $286 | $2,238 | $420 | $1,818 | 6.4 | 3,300 |
| ECM 5 | Install Daylight Dimming/Photocell Controls | No | 6,403 | 0.0 | 0 | $559 | $10,800 | $0 | $10,800 | 19.3 | 6,448 |
| ECM 6 | Install High/Low Lighting Controls | Yes | 1,035 | 0.1 | 0 | $88 | $450 | $435 | $15 | 0.2 | 1,017 |
| **Motor Upgrades** | | | **14,592** | **4.1** | **0** | **$1,275** | **$18,660** | **$0** | **$18,660** | **14.6** | **14,694** |
| ECM 7 | Premium Efficiency Motors | No | 14,592 | 4.1 | 0 | $1,275 | $18,660 | $0 | $18,660 | 14.6 | 14,694 |
| **Variable Frequency Drive (VFD) Measures** | | | **1,617** | **0.7** | **0** | **$141** | **$3,987** | **$1,800** | **$2,187** | **15.5** | **1,628** |
| ECM 8 | Install Air Compressors with VFDs | No | 1,617 | 0.7 | 0 | $141 | $3,987 | $1,800 | $2,187 | 15.5 | 1,628 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **11** | **$108** | **$2,049** | **$800** | **$1,249** | **11.5** | **1,243** |
| ECM 9 | Install High Efficiency Hot Water Boilers | No | 0 | 0.0 | 11 | $108 | $2,049 | $800 | $1,249 | 11.5 | 1,243 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **3** | **$29** | **$782** | **$650** | **$132** | **4.5** | **338** |
| ECM 10 | Install Tankless Water Heater | No | 0 | 0.0 | 1 | $6 | $732 | $600 | $132 | 23.7 | 64 |
| ECM 11 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 2 | $24 | $50 | $50 | $0 | 0.0 | 275 |
| **TOTALS (COST EFFECTIVE MEASURES)** | | | **83,117** | **4.4** | **-5** | **$7,211** | **$79,461** | **$17,223** | **$62,238** | **8.6** | **83,124** |
| **TOTALS (ALL MEASURES)** | | | **105,730** | **9.2** | **6** | **$9,300** | **$115,689** | **$20,423** | **$95,266** | **10.2** | **107,200** |

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

*Figure 2 – Evaluated Energy Improvements*

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

## 1.1 Planning Your Project

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

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

### Pick Your Installation Approach

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.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

| Energy Conservation Measure | | SmartStart | Direct Install | Pay For Performance |
|---|---|---|---|---|
| ECM 1 | Install LED Fixtures | X | | |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | X | | |
| ECM 3 | Retrofit Fixtures with LED Lamps | X | | |
| ECM 4 | Install Occupancy Sensor Lighting Controls | X | | |
| ECM 5 | Install Daylight Dimming/Photocell Controls | | | |
| ECM 6 | Install High/Low Lighting Controls | X | | |
| ECM 7 | Premium Efficiency Motors | | | |
| ECM 8 | Install Air Compressors with VFDs | X | | |
| ECM 9 | Install High Efficiency Hot Water Boilers | X | | |
| ECM 10 | Install Tankless Water Heater | X | | |
| ECM 11 | Install Low-Flow DHW Devices | X | | |

*Figure 3 – Funding Options*

## New Jersey's Clean Energy Programs At-A-Glance

| | **SmartStart**<br>Flexibility to install at your own pace | **Direct Install**<br>Turnkey installation | **Pay for Performance**<br>Whole building upgrades |
|---|---|---|---|
| **Who should use it?** | Buildings installing individual measures or small group of measures. | Small to mid-size facilities that can bundle multiple measures together.<br>Average peak demand should be below 200 kW.<br>Not suitable for significant building shell issues. | Mid to large size facilities looking to implement as many measures as possible at one time.<br>Peak demand should be over 200 kW. |
| **How does it work?** | Use in-house staff or your preferred contractor. | Pre-approved contractors pass savings along to you via reduced material and labor costs. | Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives. |
| **What are the Incentives?** | Fixed incentives for specific energy efficiency measures. | Incentives pay up to 70% of eligible costs, up to $125,000 per project.<br>You pay the remaining 30% directly to the contractor. | Up to 25% of installation cost, calculated based on level of energy savings per square foot. |
| **How do I participate?** | Submit an application for the specific equipment to be installed. | Contact a participating contractor in your region. | Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets. |

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

*Individual Measures with SmartStart*

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 SmartStart 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 is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

*Turnkey Installation with Direct Install*

The Direct Install program provides turnkey installation of multiple measures through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures. Direct Install contractors will assess and verify individual measure eligibility and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

*Whole Building Approach with Pay for Performance*

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance 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. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings.

## More Options from Around the State

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

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

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

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

*Ongoing Electric Savings with Demand Response*

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

# 2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Mount Holly Municipal Utility Authority (MUA). 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. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing 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 January 25, 2020, TRC performed an energy audit at Mount Holly Municipal Utility Authority (MUA) located in Lumberton, New Jersey. TRC met with Robert Maybury to review the facility operations and help focus our investigation on specific energy-using systems.

Mount Holly Municipal Utility Authority (MUA) is a multi-story, 6,944 square foot complex built in 1980. Spaces include controls building, administration building, headworks area, clarifiers, blower room, pump room, aeration tanks, offices, hallways, storage room, and boiler room. Both of the main buildings are fully conditioned.

The facility upgraded and expanded its existing infrastructure in 2012 by replacing the submersible mixer motors and the aeration blower motors.

Facility concerns includes some existing motors and their condition.

## 2.2 Building Occupancy

The facility is occupied year-round. Typical weekday and weekend occupancy are 50 staff members.

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Maple Avenue Plant | Weekday | 24/7 |
| | Weekend | 24/7 |

*Figure 4 - Building Occupancy Schedule*

## 2.3 Building Envelope

The controls building walls are made of concrete masonry units (CMUs) with a rough granulated surface. The interior of the building includes painted CMUs and gypsum drywall sections. The roof is flat and insulated with a modified bitumen covering.

The administration building walls are made of concrete block over structural steel with a stucco façade. Gypsum drywall defines the interior of the building. The roof of the building is pitched and covered with a layer of asphalt shingles.

*Controls Building*

*Headworks*

*Controls Building-front*

*Sludge tanks*

## 2.4 Lighting Systems

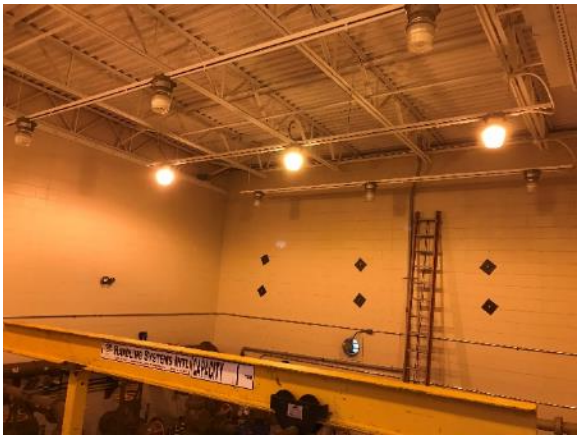
The primary interior lighting systems use 32-Watt linear fluorescent T8 lamps although some T12 lamps were noted. There are also several LED ambient fixtures. Additionally, there are some incandescent lamps. T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 2-, 3-, or 4-lamp, 4-foot long troffer and surface mounted fixtures and 2-foot fixtures with linear tube lamps.

Several 30-Watt LED ambient fixtures were found in the controls building. PAR 20 incandescent lamps are generally located in storage and closet areas. The blower room is equipped with low-bay LED fixtures. The pump room is equipped with 150-watt high pressure sodium ceiling mounted lamps.

The admin building is equipped mainly with T8 lighting fixtures. Restroom areas are equipped with 2-foot, 20-Watt, T12 fixtures. They are operated manually. The admin building boiler room is equipped with PAR38 incandescent lamp fixtures.

*Spots*



*Pump Room*

*Conference Room*

Most fixtures are in good condition. All exit signs are LED. Interior lighting levels were generally sufficient. The locker rooms in the controls building have occupancy sensors. The rest of the lighting fixtures at this plant are manually controlled.

*Pole Mount Light*

*Parking Lot Light*

*Wall mount LED*

*Wall mount fixture*

Building mounted exterior fixtures include wall packs, wall sconces, and decorative fixtures. Exterior fixtures use a mixture of high intensity discharge (HID) and LED lamps, varying in wattage from 22 to 70 Watts.

There are pole mounted fixtures with HID lamps throughout the plant. These fixtures vary in wattage from 70 to 200 Watts.

Exterior lighting is controlled by a time clock, switch, or photocell, depending on the fixture.

## 2.5 Air Handling Systems

**Packaged Units**

The Controls Building is served by multiple packaged rooftop units (RTUs), including:

| Unit | Area Served | Size | Efficiency |
|---|---|---|---|
| Carrier Packaged AC | Controls Building | 8.5 tons DX cooling, 166.70 MBh gas heating | 12.40 EER, 80% thermal efficiency |
| Carrier Packaged AC | Controls Building | 2.0 tons DX cooling, 43.30 MBh gas heating | 14.0 SEER, 80% thermal efficiency |
| Addison Packaged AC | Controls Building | 5.0 tons DX cooling, 120.0 MBh gas heating | 11.70 EER, 80% thermal efficiency |

Refer to Appendix A for detailed information about each unit.

## Air Conditioners

The controls building laboratory is served by a Fujitsu split system air source heat pump with 1.50-ton cooling capacity and 21.60 MBh heating capacity. The unit has a cooling efficiency of 11.00 EER and a heating efficiency of 3.0 COP. It is in good condition and is operated by a room thermostat.

The admin building is served for cooling primarily through window air conditioning units. Two 1-ton Friedrich ACs with 10.70 EER serve the admin office and the conference room. There is also a 0.67-ton GE window AC unit with an 11.40 EER located in the admin building.

*Make-up Air Unit*

*Packaged Unit*

*Split-system AC*

*Window AC*

## 2.6 Heating Systems

A Burnham 56 MBh non-condensing hot water boiler serves the admin building heating and domestic hot water loads. The burners are non-modulating with a nominal efficiency of 78%. The boiler was installed in 2000 and is in poor condition.

There are three gas furnaces located on the controls building's roof. These vary in the capacity between 43.30 MBh to 166.70 MBh, each with heating efficiency of 80%. They are in good operating condition.

*Boiler*

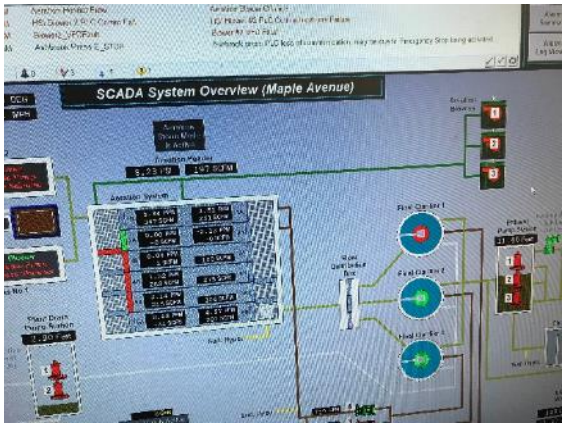
*Gas Furnace*

## 2.7 Building Energy Management Systems (EMS)

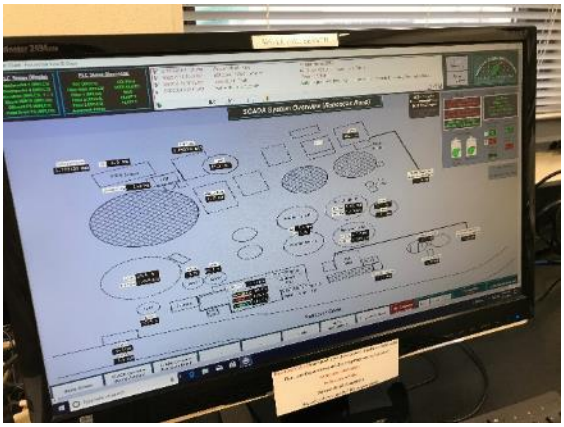
There is no BMS for control of building HVAC systems. Plant operation, however, is managed by a SCADA system located in the controls building. This system monitors and controls the operation of aeration tanks, mixers, RAS pumps, plant drain pump station, effluent pump station, utility water pumps, and two headworks system.

*SCADA System Overview*

*Aeration System*




*Clarifiers*



*Plant Process*

## 2.8 Domestic Hot Water

Hot water for the Controls Building is produced by a 40 gallon 40 MBh gas-fired storage water heater with an 80% efficiency rating. Installed in 2013, it is in good condition.

Admin Building hot water needs are provided by a 56 MBh indirect system that is tied to the heating hot water boiler. The storage tank has a 26-gallon tank capacity while the boiler has thermal efficiency rating of 78%. The system overall is in poor condition.

*Domestic Hot Water Heater*


*DHW Nameplate*

## 2.9 Plug Load & Vending Machines

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

There are approximately 5 computers workstations throughout the facility. Plug loads throughout the building include general café and office equipment such as microwaves, printers, and TVs.

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


*Grinder*

## 2.10 Water-Using Systems

There are multiple restrooms with toilets, urinals, and sinks. Faucet flow rates are at 1.50 gallons per minute (gpm) or higher.

## 2.11 Process Equipment

The bulk of energy at this site is consumed by process equipment, mainly motor driven loads.

There are three 300 hp HSI blowers, equipped with VFDs, located in the controls building. As of now, the main source of air is a 200 hp Gardner Denver blower while two HSI blowers' function as stand-by capacity. The third HSI blower is out of service. Aeration blowers account for more than half of the site energy use.

Two 25 hp submersible pumps serve the drain pump station. The plant drain uses two 2 hp BioAir blowers. The headworks BioAir system also has two 2 hp blowers which were adjusted on start-up to get the specific differential pressure across the unit.

Two 3 hp headworks screening pumps are used to screen the sludge before it goes to the mixers. There also are two Aerzen 7.5 hp blowers with VFDs at the headworks which were set to maximize settling the Grit removal area. They are currently operated at constant speed.

There are seven 6.2 hp mixers. Six mixers are operated continuously, and one is on stand-by in case there is a loss of air. They are adding and removing oxygen as needed.

Two 25 hp effluent pumps are used to send water to Rancocas Road for tertiary treatment. Two 15 hp Baldor utility water pumps located in the controls building are used for plant wash down, including for headworks bio-solids wash. There are two 5 hp SEW-Eurodrive aeration pumps in the aeration tanks.


*Air Blowers*

*BioAir Blowers*

*Odor Control Blower*


*Headworks Blower*

## 2.12 On-Site Generation

Mount Holly Municipal Utility Authority (MUA) has a 1200 kW photovoltaic (PV) array that was installed in September 2011. This system provides approximately 85% of the electricity used at this facility.

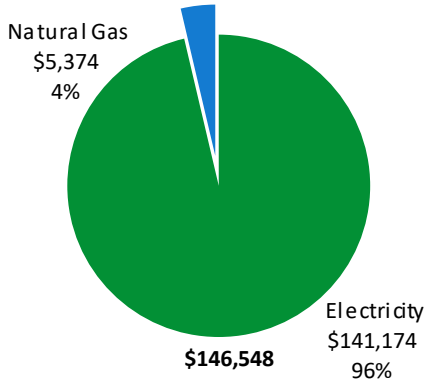
Mount Holly Municipal Utility Authority (MUA) has an emergency diesel generator, which in the event of a power outage, serves critical services (lighting, elevator, heating - boiler and pumps) and is only used for emergency needs.

*Solar Plant*

# 3 Energy Use and Costs

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

| Utility Summary | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 1,615,964 kWh | $141,174 |
| Natural Gas | 5,268 Therms | $5,374 |
| **Total** | | **$146,548** |




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

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

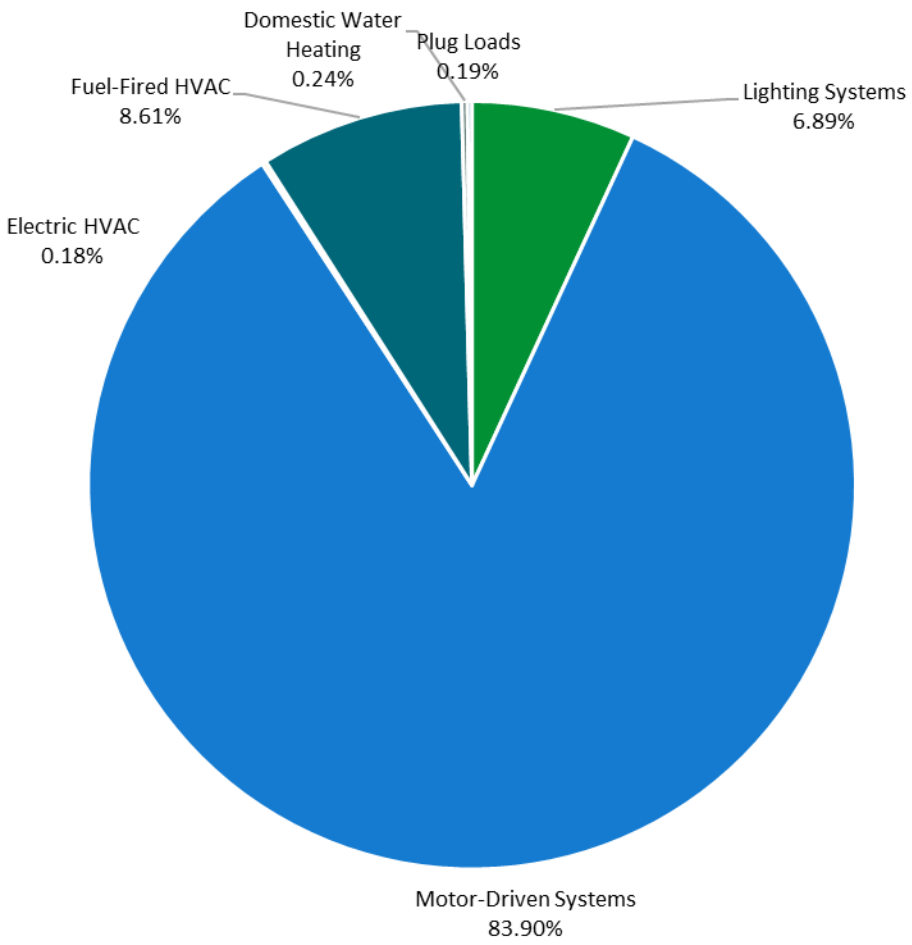
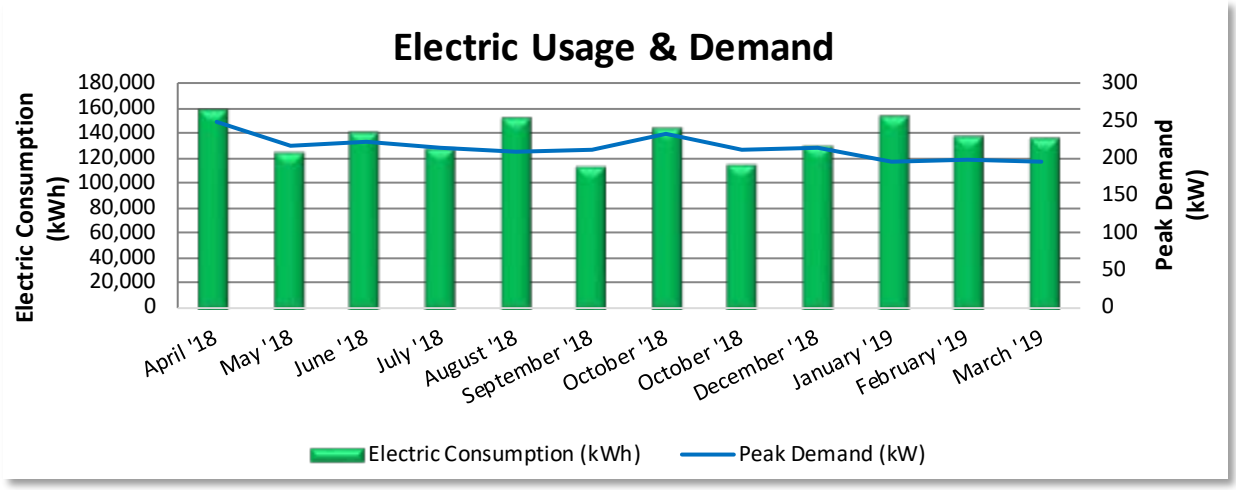



*Figure 5 - Energy Balance*

## 3.1 Electricity

PSE&G delivers electricity under rate class Residential Service (RS)/General Lighting & Power (GLP)/LPLP. The graph below includes usage which is supplied by on-site solar production.



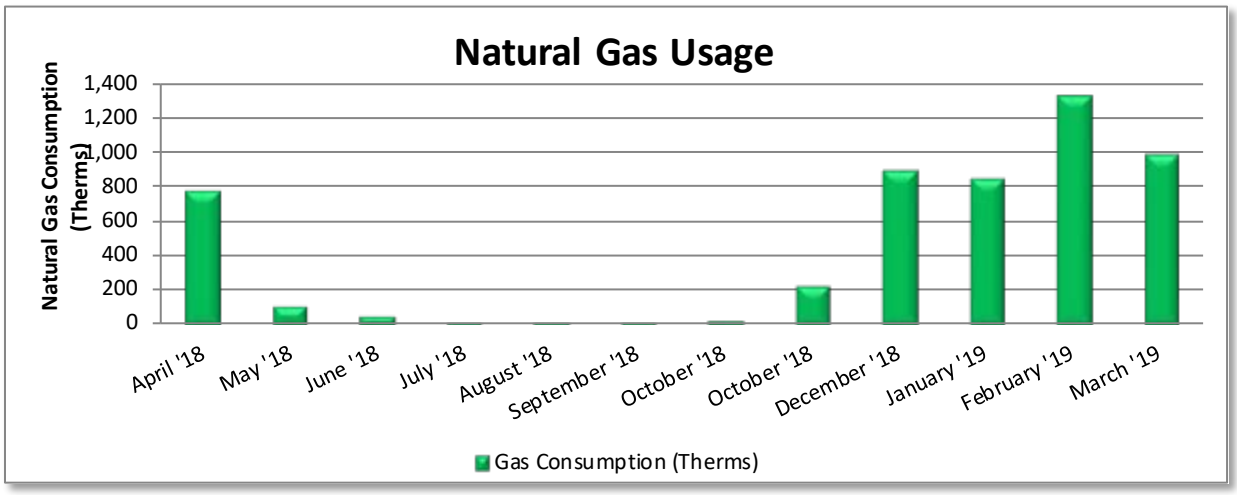

| Electric Billing Data | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 4/19/18 | 30 | 157,582 | 249 | $431 | $13,216 |
| 5/18/18 | 29 | 123,814 | 215 | $370 | $11,421 |
| 6/19/18 | 32 | 139,993 | 222 | $2,330 | $15,365 |
| 7/19/18 | 30 | 126,755 | 214 | $2,348 | $15,156 |
| 8/17/18 | 29 | 149,947 | 208 | $2,262 | $14,820 |
| 9/18/18 | 32 | 112,138 | 210 | $2,307 | $11,617 |
| 10/17/18 | 29 | 143,191 | 231 | $398 | $10,194 |
| 11/15/18 | 29 | 113,086 | 211 | $363 | $7,645 |
| 12/17/18 | 32 | 127,637 | 212 | $376 | $6,677 |
| 1/18/19 | 32 | 151,433 | 194 | $344 | $9,815 |
| 2/19/19 | 32 | 136,422 | 199 | $352 | $11,293 |
| 3/20/19 | 29 | 133,966 | 196 | $349 | $13,955 |
| **Totals** | **365** | **1,615,964** | **249** | **$12,231** | **$141,174** |
| **Annual** | **365** | **1,615,964** | **249** | **$12,231** | **$141,174** |

Notes:

- Peak demand of 249 kW occurred in April '18.
- Average demand over the past 12 months was 213 kW.
- The average electric cost over the past 12 months was $0.087/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

## 3.2 Natural Gas

PSE&G delivers natural gas under rate class GSG(HTG).




| Gas Billing Data | | | |
|---|---|---|---|
| **Period Ending** | **Days in Period** | **Natural Gas Usage (Therms)** | **Natural Gas Cost** |
| 4/19/18 | 30 | 773 | $659 |
| 5/18/18 | 29 | 108 | $113 |
| 6/19/18 | 32 | 52 | $67 |
| 7/19/18 | 30 | 14 | $36 |
| 8/17/18 | 29 | 14 | $36 |
| 9/18/18 | 32 | 16 | $37 |
| 10/17/18 | 29 | 25 | $46 |
| 11/15/18 | 29 | 223 | $235 |
| 12/17/18 | 32 | 888 | $936 |
| 1/18/19 | 32 | 843 | $921 |
| 2/19/19 | 32 | 1,326 | $1,332 |
| 3/20/19 | 29 | 986 | $956 |
| **Totals** | **365** | **5,268** | **$5,374** |
| **Annual** | **365** | **5,268** | **$5,374** |

Notes:

- The average gas cost for the past 12 months is $1.020/therm, which is the blended rate used throughout the analysis.
- Summer usage is attributed to the domestic hot water load, which is fed from the boiler.

## 3.3 Benchmarking

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

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

| Benchmarking Score | N/A |
|---|---|

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

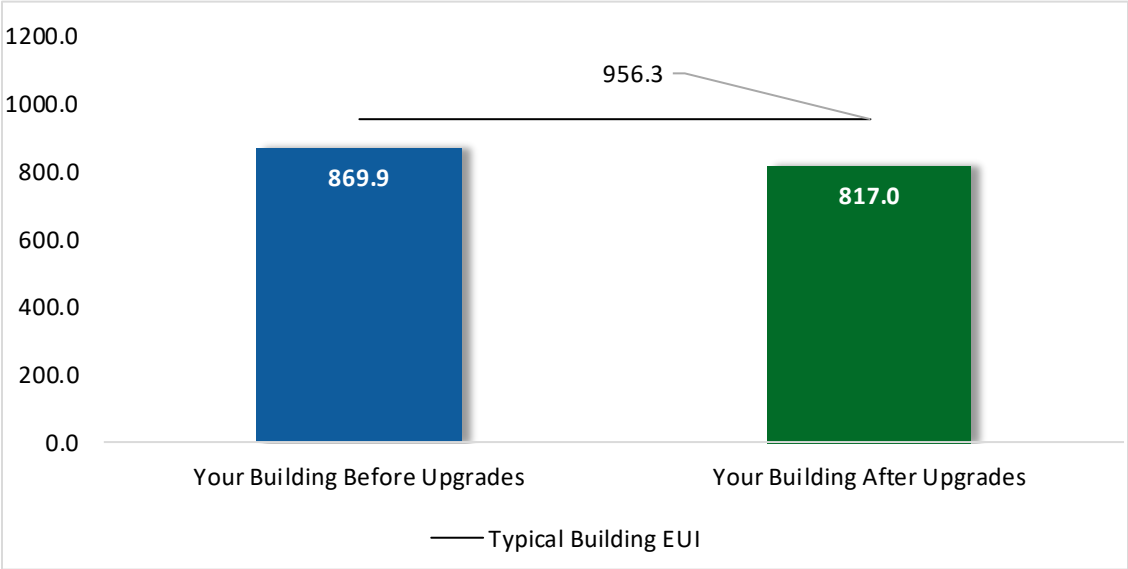



*Figure 6 - Energy Use Intensity Comparison*[3]

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

For wastewater treatment plants the energy use intensity is the total source energy use of the property divided by the average influent flow (in gallons per day).

[3] Based on all evaluated ECMs

## Tracking Your Energy Performance

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

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

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

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

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

# 4 Energy Conservation Measures

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

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

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

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

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 ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **78,722** | **3.7** | **-6** | **$6,813** | **$76,723** | **$16,318** | **$60,405** | **8.9** | **78,533** |
| ECM 1 | Install LED Fixtures | Yes | 65,235 | 1.5 | -3 | $5,664 | $73,787 | $14,840 | $58,947 | 10.4 | 65,288 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 1,245 | 0.1 | 0 | $106 | $221 | $48 | $173 | 1.6 | 1,223 |
| ECM 3 | Retrofit Fixtures with LED Lamps | Yes | 12,241 | 2.1 | -3 | $1,043 | $2,715 | $1,430 | $1,285 | 1.2 | 12,022 |
| **Lighting Control Measures** | | | **10,799** | **0.7** | **-1** | **$934** | **$13,488** | **$855** | **$12,633** | **13.5** | **10,765** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | Yes | 3,360 | 0.6 | -1 | $286 | $2,238 | $420 | $1,818 | 6.4 | 3,300 |
| ECM 5 | Install Daylight Dimming/Photocell Controls | No | 6,403 | 0.0 | 0 | $559 | $10,800 | $0 | $10,800 | 19.3 | 6,448 |
| ECM 6 | Install High/Low Lighting Controls | Yes | 1,035 | 0.1 | 0 | $88 | $450 | $435 | $15 | 0.2 | 1,017 |
| **Motor Upgrades** | | | **14,592** | **4.1** | **0** | **$1,275** | **$18,660** | **$0** | **$18,660** | **14.6** | **14,694** |
| ECM 7 | Premium Efficiency Motors | No | 14,592 | 4.1 | 0 | $1,275 | $18,660 | $0 | $18,660 | 14.6 | 14,694 |
| **Variable Frequency Drive (VFD) Measures** | | | **1,617** | **0.7** | **0** | **$141** | **$3,987** | **$1,800** | **$2,187** | **15.5** | **1,628** |
| ECM 8 | Install Air Compressors with VFDs | No | 1,617 | 0.7 | 0 | $141 | $3,987 | $1,800 | $2,187 | 15.5 | 1,628 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **11** | **$108** | **$2,049** | **$800** | **$1,249** | **11.5** | **1,243** |
| ECM 9 | Install High Efficiency Hot Water Boilers | No | 0 | 0.0 | 11 | $108 | $2,049 | $800 | $1,249 | 11.5 | 1,243 |
| **Domestic Water Heating Upgrade** | | | **0** | **0.0** | **3** | **$29** | **$782** | **$650** | **$132** | **4.5** | **338** |
| ECM 10 | Install Tankless Water Heater | No | 0 | 0.0 | 1 | $6 | $732 | $600 | $132 | 23.7 | 64 |
| ECM 11 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 2 | $24 | $50 | $50 | $0 | 0.0 | 275 |
| **TOTALS** | | | **105,730** | **9.2** | **6** | **$9,300** | **$115,689** | **$20,423** | **$95,266** | **10.2** | **107,200** |

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

*Figure 7 – All Evaluated ECMs*

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **78,722** | **3.7** | **-6** | **$6,813** | **$76,723** | **$16,318** | **$60,405** | **8.9** | **78,533** |
| ECM 1 | Install LED Fixtures | 65,235 | 1.5 | -3 | $5,664 | $73,787 | $14,840 | $58,947 | 10.4 | 65,288 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 1,245 | 0.1 | 0 | $106 | $221 | $48 | $173 | 1.6 | 1,223 |
| ECM 3 | Retrofit Fixtures with LED Lamps | 12,241 | 2.1 | -3 | $1,043 | $2,715 | $1,430 | $1,285 | 1.2 | 12,022 |
| **Lighting Control Measures** | | **4,395** | **0.7** | **-1** | **$374** | **$2,688** | **$855** | **$1,833** | **4.9** | **4,317** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 3,360 | 0.6 | -1 | $286 | $2,238 | $420 | $1,818 | 6.4 | 3,300 |
| ECM 6 | Install High/Low Lighting Controls | 1,035 | 0.1 | 0 | $88 | $450 | $435 | $15 | 0.2 | 1,017 |
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **2** | **$24** | **$50** | **$50** | **$0** | **0.0** | **275** |
| ECM 11 | Install Low-Flow DHW Devices | 0 | 0.0 | 2 | $24 | $50 | $50 | $0 | 0.0 | 275 |
| **TOTALS** | | **83,117** | **4.4** | **-5** | **$7,211** | **$79,461** | **$17,223** | **$62,238** | **8.6** | **83,124** |

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

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

*Figure 8 – 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 ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **78,722** | **3.7** | **-6** | **$6,813** | **$76,723** | **$16,318** | **$60,405** | **8.9** | **78,533** |
| ECM 1 | Install LED Fixtures | 65,235 | 1.5 | -3 | $5,664 | $73,787 | $14,840 | $58,947 | 10.4 | 65,288 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 1,245 | 0.1 | 0 | $106 | $221 | $48 | $173 | 1.6 | 1,223 |
| ECM 3 | Retrofit Fixtures with LED Lamps | 12,241 | 2.1 | -3 | $1,043 | $2,715 | $1,430 | $1,285 | 1.2 | 12,022 |

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

### ECM 1: Install LED Fixtures

Replace existing fixtures containing high-pressure sodium, fluorescent, or incandescent 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. Note that wastewater facilities typically contain locations where combustible materials are found, and that the National Fire Protection Association (NFPA) publication 820 has characterized such areas by Class, Division, and Zone in determining various safety standards, including for light fixtures and the associated wiring and controls. It is recommended for the site to work with electrical safety and design personnel when specifying new fixtures for such locations.

**Affected building areas:** pump room, parking lot, headworks, clarifiers, and aeration tanks.

### 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**: common area restroom, kitchen restroom (areas currently served by T-12 lamps).

### ECM 3: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, CFL, or incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

**Affected building areas:** all areas with fluorescent fixtures with T8 tubes; areas with incandescent lamps.

## 4.2 Lighting Controls

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Control Measures** | | **10,799** | **0.7** | **-1** | **$934** | **$13,488** | **$855** | **$12,633** | **13.5** | **10,765** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 3,360 | 0.6 | -1 | $286 | $2,238 | $420 | $1,818 | 6.4 | 3,300 |
| ECM 5 | Install Daylight Dimming/Photocell Controls | 6,403 | 0.0 | 0 | $559 | $10,800 | $0 | $10,800 | 19.3 | 6,448 |
| ECM 6 | Install High/Low Lighting Controls | 1,035 | 0.1 | 0 | $88 | $450 | $435 | $15 | 0.2 | 1,017 |

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:** controls room, storage, office, lab, conference room, and men's locker room.

## ECM 5: Install Photocell Controls

We evaluated installing photocells to eliminate exterior lighting use during daytime periods.

Photocells or photocell sensors are lighting controls used for dusk to dawn applications to automatically turn the fixtures on or off. Photo controls detect the amount of light outside and once the light level reaches a low point, the fixture will switch on. During the day the photocell will detect higher amounts of light and will turn the fixture off.

Photocells may be fixture mounted or wired externally and connected by line voltage to a single light fixture or to a series of fixtures.

This measure reduces energy use in exterior areas to restrict operation to non-daylight periods.

**Affected building areas**: exterior fixtures, headworks, clarifiers, and aeration tanks.

## ECM 6: Install High/Low Lighting Controls

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

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

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

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

**Affected building areas**: hallways.

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

## 4.3 Motors

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Motor Upgrades** | | **14,592** | **4.1** | **0** | **$1,275** | **$18,660** | **$0** | **$18,660** | **14.6** | **14,694** |
| ECM 7 | Premium Efficiency Motors | 14,592 | 4.1 | 0 | $1,275 | $18,660 | $0 | $18,660 | 14.6 | 14,694 |

### ECM 7: Premium Efficiency Motors

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

**Affected motors:**

| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Additional Motor Description |
|---|---|---|---|---|---|
| Maple Ave | Effluent | 3 | Process Pump | 25.0 | |
| Pump Station | Submersible Plant Drain | 2 | Process Pump | 25.0 | |

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

## 4.4 Variable Frequency Drives (VFD)

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variable Frequency Drive (VFD) Measures** | | **1,617** | **0.7** | **0** | **$141** | **$3,987** | **$1,800** | **$2,187** | **15.5** | **1,628** |
| ECM 8 | Install Air Compressors with VFDs | 1,617 | 0.7 | 0 | $141 | $3,987 | $1,800 | $2,187 | 15.5 | 1,628 |

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

### ECM 8: Install Air Compressors with VFDs

We evaluated installing VFDs on air compressors. The VFD allows the air compressor to operate more efficiently at partial load conditions, modulating speed to match the demand for compressed air rather than mechanically unloading.

Energy saving results from reducing compressor speed (and power) when there is a reduced load. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

## 4.5 Gas-Fired Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Heating (HVAC/Process) Replacement** | | **0** | **0.0** | **11** | **$108** | **$2,049** | **$800** | **$1,249** | **11.5** | **1,243** |
| ECM 9 | Install High Efficiency Hot Water Boilers | 0 | 0.0 | 11 | $108 | $2,049 | $800 | $1,249 | 11.5 | 1,243 |

### ECM 9: Install High Efficiency Hot Water Boilers

We evaluated replacing older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load at this facility. In many cases installing multiple modular boilers rather than one or two large boilers will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers [are nearing, have reached] the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

## 4.6 Domestic Water Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic Water Heating Upgrade** | | **0** | **0.0** | **3** | **$29** | **$782** | **$650** | **$132** | **4.5** | **338** |
| ECM 10 | Install Tankless Water Heater | 0 | 0.0 | 1 | $6 | $732 | $600 | $132 | 23.7 | 64 |
| ECM 11 | Install Low-Flow DHW Devices | 0 | 0.0 | 2 | $24 | $50 | $50 | $0 | 0.0 | 275 |

### ECM 10: Install Tankless Water Heater

We evaluated replacing the existing indirect hot water heating system with a tankless water heating system. Tankless water heaters (a.k.a. “on-demand water heaters”) only heat water when hot water is needed. Water is heated as it flows through the pipe to the hot water tap. Energy savings from a tankless water heater are based on eliminating heat losses associated with maintaining unnecessary standby hot water capacity. This project would permit a decoupling of the hot water heating system from the space heating boiler system. However, summer gas usage for the site is minimal, so the savings associated with installing a tankless domestic hot water system is likely minimal.

## ECM 11: Install Low-Flow DHW Devices

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

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

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

Additional cost savings may result from reduced water usage.

# 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 between 5 to 20 percent of the energy usage in your building without substantial capital investment. A successful plan includes your records of energy usage trends and costs, building equipment lists, current maintenance practices, planned capital upgrades, and incorporates your ideas for improved building operation. Your plan will address goals for energy-efficient operation, provide detail on how to reach the goals, and will outline procedures for measuring and reporting whether goals have been achieved.

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

## Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[5] . Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

## Economizer Maintenance

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

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

## AC System Evaporator/Condenser Coil Cleaning

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

## HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating

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

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.

## Label HVAC Equipment

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

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

## Optimize HVAC Equipment Schedules

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

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

## Water Heater Maintenance

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

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

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

## Compressed Air System Maintenance

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

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

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

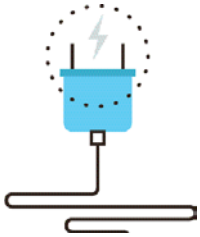
## Refrigeration Equipment Maintenance

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

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

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

## Plug Load Controls



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

## Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense® website[7] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[8] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

## Procurement Strategies

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

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

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

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

# 6 On-site Generation

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

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

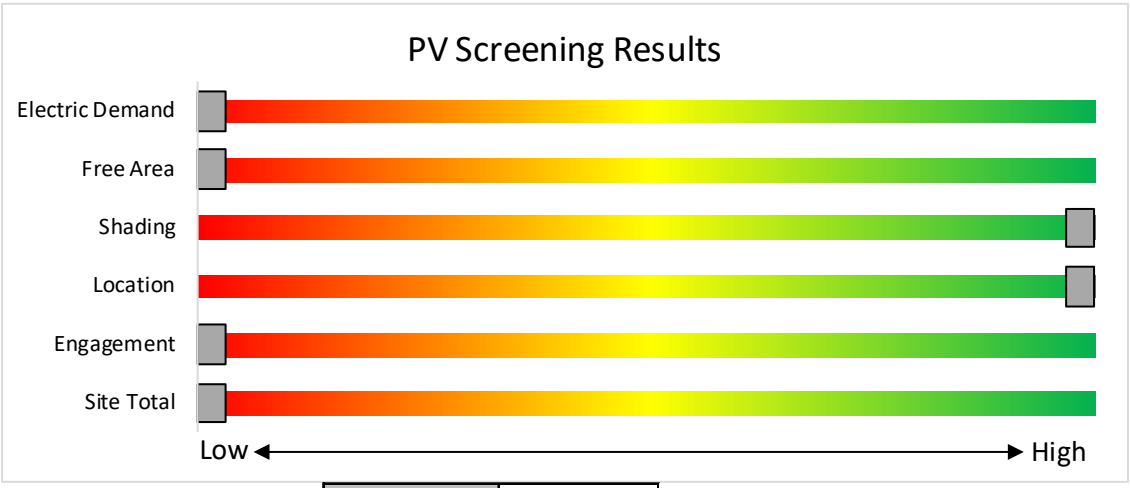
## 6.1 Solar Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has **no** potential for installing a PV array.

This facility does not appear to meet the minimum criteria for a cost-effective solar PV installation. To be cost-effective, a solar PV array needs certain minimum criteria, such as sufficient and sustained electric demand and sufficient flat or south-facing rooftop or other unshaded space on which to place the PV panels.

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** | None | |
| **System Potential** | 10 | kW DC STC |
| **Electric Generation** | 11,914 | kWh/yr |
| **Displaced Cost** | $1,040 | /yr |
| **Installed Cost** | $26,000 | |

*Figure 9 - Photovoltaic Screening*

**Transition Incentive (TI) Program**

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installation.

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

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

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

## 6.2 Combined Heat and Power

Combined heat and power (CHP) generate 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.

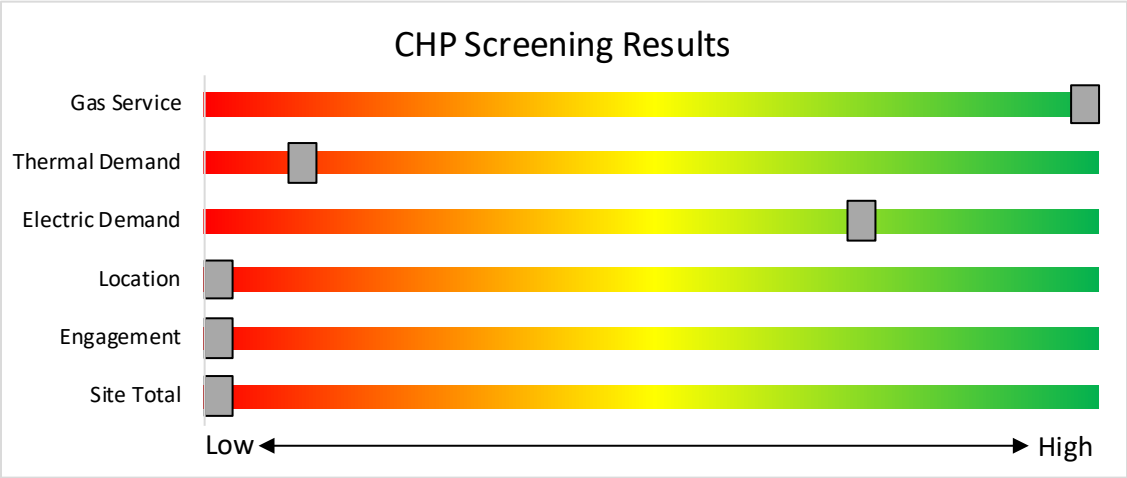



*Figure 10 - Combined Heat and Power Screening*

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

# 7 Project Funding and Incentives

Ready to improve your building's performance? New Jersey's Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available New Jersey's Clean Energy Programs.

| | **SmartStart**<br>*Flexibility to install at your own pace* | **Direct Install**<br>*Turnkey installation* | **Pay for Performance**<br>*Whole building upgrades* |
|---|---|---|---|
| **Who should use it?** | Buildings installing individual measures or small group of measures. | Small to mid-size facilities that can bundle multiple measures together.<br>Average peak demand should be below 200 kW.<br>Not suitable for significant building shell issues. | Mid to large size facilities looking to implement as many measures as possible at one time.<br>Peak demand should be over 200 kW. |
| **How does it work?** | Use in-house staff or your preferred contractor. | Pre-approved contractors pass savings along to you via reduced material and labor costs. | Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives. |
| **What are the Incentives?** | Fixed incentives for specific energy efficiency measures. | Incentives pay up to 70% of eligible costs, up to $125,000 per project.<br>You pay the remaining 30% directly to the contractor. | Up to 25% of installation cost, calculated based on level of energy savings per square foot. |
| **How do I participate?** | Submit an application for the specific equipment to be installed. | Contact a participating contractor in your region. | Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets. |
| Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor. | | | |

## 7.1 SmartStart

SmartStart 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.

SmartStart routinely adds, removes, or modifies incentives from year-to-year for various energy efficient equipment based on market trends and new technologies.

**Equipment with Prescriptive Incentives Currently Available:**

*Electric Chillers*
*Electric Unitary HVAC*
*Gas Cooling*
*Gas Heating*
*Gas Water Heating*
*Ground Source Heat Pumps*
*Lighting*
*Lighting Controls*
*Refrigeration Doors*
*Refrigeration Controls*
*Refrigerator/Freezer Motors*
*Food Service Equipment*
*Variable Frequency Drives*

**Incentives**

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are capped at 50% of the total installed incremental project cost, or a project cost buy down to a one-year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

**How to Participate**

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

## 7.2 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 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.

Based on the site building and utility data provided, the facility does not meet the requirements of the current DI program.

**Incentives**

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Each entity is limited to incentives up to $250,000 per fiscal year.

**How to Participate**

To participate in Direct Install, you will need to contact the participating contractor assigned to the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. 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 program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

## 7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings.

P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program 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.

The scope of work presented in this audit report does not quite meet the requirements of the current P4P program. However, due to the size of the facility and existing conditions, should additional measures be identified at a later point in time, for example through further evaluation or the Energy Savings Improvement Program process, this facility could potentially meet the requirements necessary to participate in the P4P program.

**Incentives**

Incentives are based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

**How to Participate**

Contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

## 7.4 Combined Heat and Power

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

**Incentives**

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

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

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

**How to Participate**

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

## 7.5 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 in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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

**How to Participate**

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

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

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

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

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

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

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

## 7.6 Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installation.

NJBPU calculates the value of a Transition Renewable Energy Certificate (TREC) by multiplying the base compensation rate ($152/MWh) by the project's assigned factor (i.e. $152 x 0.85 = $129.20/MWh).

The TREC factors are defined based on the chart below:

| Project Type | Factor |
|---|---|
| Subsection (t): landfill, brownfield, areas of historic fill | 1.0 |
| Grid supply (Subsection (r)) rooftop | 1.0 |
| Net metered non-residential rooftop and carport | 1.0 |
| Community solar | 0.85 |
| Grid supply (Subsection (r)) ground mount | 0.6 |
| Net metered residential ground mount | 0.6 |
| Net metered residential rooftop and carport | 0.6 |
| Net metered non-residential ground mount | 0.6 |

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

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

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

TRECs will be purchased monthly by a TREC Administrator who will allocate the TRECs to the Load Serving Entities (BGS Providers and Third-Party Suppliers) annually based on their market share of retail electricity sold during the relevant Energy Year. The TREC Administrator has not been selected at this time. The EDCs issued a Request for Proposals on April 10, 2020 and will be jointly selecting the TREC Administrator based on the bids received.

Solar projects help the state of new jersey reach renewable energy goals outlined in the state's Energy Master Plan. The Transition Incentive Program online portal is now open to new applications effective May 1, 2020. There are instructions on "How and When to Transfer my SRP Registration to the Transition

Incentive Program." If you are considering installing solar photovoltaics on your building, visit the following link for more information:

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

# 8 Energy Purchasing and Procurement Strategies

## 8.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[9].

## 8.2 Retail Natural Gas Supply Options

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

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

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

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

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

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

# APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

## Lighting Inventory & Recommendations

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Controls Room | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 8,736 | 3, 4 | Relamp | Yes | 8 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 6,028 | 0.4 | 4,754 | -1 | $405 | $708 | $310 | 1.0 |
| Controls Room | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mens Locker Room | 3 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | S | 30 | 364 | | None | No | 3 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | 30 | 364 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Mens Locker Room | 2 | Incandescent: Par 20 | Wall Switch | S | 50 | 364 | 3, 4 | Relamp | Yes | 2 | LED Lamps: PAR20 | Occupancy Sensor | 8 | 251 | 0.1 | 35 | 0 | $3 | $314 | $8 | 101.9 |
| Storage | 4 | LED - Fixtures: Ambient 2x2 Fixture | Wall Switch | S | 30 | 364 | 4 | None | Yes | 4 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | 30 | 251 | 0.0 | 15 | 0 | $1 | $116 | $0 | 93.1 |
| Office | 4 | LED - Fixtures: Ambient 2x2 Fixture | Wall Switch | S | 30 | 2,912 | 4 | None | Yes | 4 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | 30 | 2,009 | 0.0 | 117 | 0 | $10 | $270 | $70 | 20.1 |
| Lab | 6 | LED - Fixtures: Ambient 2x2 Fixture | Wall Switch | S | 30 | 8,736 | 4 | None | Yes | 6 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | 30 | 6,028 | 0.0 | 526 | 0 | $45 | $270 | $70 | 4.5 |
| Mechanical Room | 4 | LED - Fixtures: Ambient 2x2 Fixture | Wall Switch | S | 30 | 364 | | None | No | 4 | LED - Fixtures: Ambient 2x2 Fixture | Wall Switch | 30 | 364 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Womens Room | 3 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | S | 30 | 364 | | None | No | 3 | LED - Fixtures: Ambient 2x2 Fixture | Occupancy Sensor | 30 | 364 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Womens Room | 1 | LED - Fixtures: Ceiling Mount | Wall Switch | S | 20 | 364 | | None | No | 1 | LED - Fixtures: Ceiling Mount | Wall Switch | 20 | 364 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Hallway | 6 | LED - Fixtures: Ambient 2x2 Fixture | Wall Switch | S | 30 | 8,736 | 6 | None | Yes | 6 | LED - Fixtures: Ambient 2x2 Fixture | High/Low Control | 30 | 6,028 | 0.0 | 526 | 0 | $45 | $225 | $225 | 0.0 |
| Hallway | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Electrical Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 364 | 3 | Relamp | No | 4 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 364 | 0.2 | 78 | 0 | $7 | $219 | $120 | 14.9 |
| Electrical Room | 3 | Exit Signs: LED - 2 W Lamp | None | | 6 | 364 | | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 364 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Electrical Room | 4 | Incandescent: Par 20 | Wall Switch | S | 50 | 364 | 3 | Relamp | No | 4 | LED Lamps: PAR20 | Wall Switch | 8 | 364 | 0.2 | 67 | 0 | $6 | $88 | $16 | 12.6 |
| Blower Room | 8 | LED - Fixtures: Low-Bay | Wall Switch | S | 75 | 8,736 | | None | No | 8 | LED - Fixtures: Low-Bay | Wall Switch | 75 | 8,736 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Pump Room | 12 | High-Pressure Sodium: (1) 150W Lamp | Wall Switch | S | 188 | 8,736 | 1 | Fixture Replacement | No | 12 | LED - Fixtures: Ceiling Mount | Wall Switch | 45 | 8,736 | 1.5 | 16,190 | -3 | $1,379 | $3,565 | $240 | 2.4 |
| Pump room | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exterior | 10 | High-Pressure Sodium: Wall Sconces | Photocell | | 70 | 4,380 | 1 | Fixture Replacement | No | 10 | LED - Fixtures: Wall Sconces | Photocell | 21 | 4,380 | 0.0 | 2,146 | 0 | $187 | $2,266 | $200 | 11.0 |
| Exterior | 1 | LED - Fixtures: Architectural Flood/Spot Luminaire | Photocell | | 53 | 4,380 | | None | No | 1 | LED - Fixtures: Architectural Flood/Spot Luminaire | Photocell | 53 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Common Area | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 8,736 | 3, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 6,028 | 0.1 | 1,189 | 0 | $101 | $380 | $130 | 2.5 |
| Common Area | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 8,736 | 3 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 8,736 | 0.0 | 528 | 0 | $45 | $73 | $40 | 0.7 |
| Common Area Rest Room | 1 | Linear Fluorescent - T12: 2' T12 (20W) - 4L | Wall Switch | S | 100 | 8,736 | 2 | Relamp & Reballast | No | 1 | LED - Linear Tubes: (4) 2' Lamps | Wall Switch | 34 | 8,736 | 0.1 | 623 | 0 | $53 | $110 | $24 | 1.6 |
| Office | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,912 | 3, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,009 | 0.2 | 698 | 0 | $59 | $489 | $190 | 5.0 |
| Office Storage | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 364 | 3, 4 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 251 | 0.4 | 174 | 0 | $15 | $554 | $240 | 21.1 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen Office | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 8,736 | 3 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 8,736 | 0.0 | 311 | 0 | $27 | $37 | $20 | 0.6 |
| Kitchen Rest room | 1 | Linear Fluorescent - T12: 2' T12 (20W) - 4L | Wall Switch | S | 100 | 8,736 | 2 | Relamp & Reballast | No | 1 | LED - Linear Tubes: (4) 2' Lamps | Wall Switch | 34 | 8,736 | 0.1 | 623 | 0 | $53 | $110 | $24 | 1.6 |
| Storage | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 364 | 3, 4 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 251 | 0.3 | 116 | 0 | $10 | $408 | $160 | 25.0 |
| Conference Room | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 8,736 | 3, 4 | Relamp | Yes | 7 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 6,028 | 0.5 | 4,886 | -1 | $416 | $781 | $350 | 1.0 |
| Hallway | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 8,736 | 3, 6 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | High/Low Control | 58 | 6,028 | 0.2 | 2,094 | 0 | $178 | $444 | $330 | 0.6 |
| Boiler Room | 1 | Incandescent: Par38 | Wall Switch | S | 65 | 8,736 | 3 | Relamp | No | 1 | LED Lamps: PAR38 | Wall Switch | 10 | 8,736 | 0.0 | 521 | 0 | $44 | $27 | $6 | 0.5 |
| Exterior | 1 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | | 22 | 4,380 | | None | No | 1 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | 22 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Parking Lot | 18 | High-Pressure Sodium: Pole mount | Photocell | | 200 | 4,380 | 1 | Fixture Replacement | No | 18 | LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture | Photocell | 60 | 4,380 | 0.0 | 11,038 | 0 | $964 | $16,750 | $3,600 | 13.6 |
| Headworks | 14 | High-Pressure Sodium: Pole mount | Wall Switch | | 150 | 8,736 | 1, 5 | Fixture Replacement | Yes | 14 | LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture | Photocell | 45 | 4,380 | 0.0 | 15,586 | 0 | $1,362 | $15,828 | $2,800 | 9.6 |
| Clarifiers | 13 | High-Pressure Sodium: Pole mount | Wall Switch | | 70 | 8,736 | 1, 5 | Fixture Replacement | Yes | 13 | LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture | Photocell | 21 | 4,380 | 0.0 | 6,754 | 0 | $590 | $14,697 | $2,600 | 20.5 |
| Aeration Tanks | 27 | High-Pressure Sodium: (1) 70W Lamp | Wall Switch | | 95 | 8,736 | 1, 5 | Fixture Replacement | Yes | 27 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Photocell | 21 | 4,380 | 0.0 | 19,924 | 0 | $1,741 | $31,481 | $5,400 | 15.0 |

## 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? | 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 | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Controls building | Air Compressor | 1 | Air Compressor | 5.0 | 86.5% | No | W | 1,000 | 8 | No | 86.5% | Yes | 1 | 0.7 | 1,617 | 0 | $141 | $3,987 | $1,800 | 15.5 |
| Roof | Controls Building | 7 | Exhaust Fan | 0.3 | 65.0% | No | W | 2,745 | | No | 65.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Headworks Area | Headworks Blower | 2 | Process Blower | 7.5 | 88.5% | No | W | 1,696 | | No | 88.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Headworks Area | Headworks Screen Motor | 2 | Process Pump | 3.0 | 84.0% | Yes | W | 1,373 | | No | 84.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Headworks Area | Headworks Horizontanl Screw | 2 | Process Pump | 0.8 | 70.0% | No | W | 1,373 | | No | 70.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Headworks Area | Headworks Grit Removal | 2 | Process Pump | 1.5 | 86.5% | No | W | 0 | | No | 86.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Maple Ave | Recirculation Pumps | 2 | Process Pump | 15.0 | 87.0% | No | W | 1,696 | | No | 87.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Maple Ave | Effluent | 3 | Process Pump | 25.0 | 86.0% | No | W | 2,920 | 7 | Yes | 93.0% | No | | 2.7 | 10,724 | 0 | $937 | $12,975 | $0 | 13.8 |
| Pump Station | Submersible Plant Drain | 2 | Process Pump | 25.0 | 88.0% | No | W | 2,034 | 7 | Yes | 93.6% | No | | 1.4 | 3,868 | 0 | $338 | $5,685 | $0 | 16.8 |
| Headworks Area | BioAir | 2 | Process Blower | 2.0 | 88.5% | No | W | 1,373 | | No | 88.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Controls building | Utility Water Pump | 3 | Process Pump | 15.0 | 91.0% | Yes | W | 1,130 | | No | 91.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Controls building | Return Activated Sldg to Aeration Tanks - RAS | 4 | Process Pump | 15.0 | 92.4% | Yes | W | 848 | | No | 92.4% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Maple Ave | Controls Building | 2 | Process Blower | 300.0 | 95.4% | Yes | W | 600 | | No | 95.4% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Maple Ave | Controls Building | 1 | Process Blower | 300.0 | 95.4% | Yes | W | 0 | | No | 95.4% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Aeration Tanks | Maple Ave Aeration Tanks | 2 | Process Pump | 5.0 | 87.5% | No | W | 1,373 | | No | 87.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Maple Ave | Mixers | 7 | Other | 6.2 | 78.0% | No | W | 6,257 | | No | 78.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Maple Ave | Controls Building | 1 | Process Blower | 200.0 | 95.4% | Yes | W | 8,160 | | No | 95.4% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Headworks Area | Pant Drain BioAir | 2 | Process Blower | 2.0 | 88.5% | No | W | 1,373 | | No | 88.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Electric HVAC Inventory & Recommendations

| | | Existing Conditions | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (MBh) | 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/EER) | Heating Mode Efficiency (COP) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Controls Building | 1 | Packaged AC | 8.50 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Controls Building | 1 | Packaged AC | 2.00 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Controls Building | 1 | Packaged AC | 5.00 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Admin Building | Admin Offices, Conference Rm | 2 | Window AC | 1.00 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Admin Building | Admin Offices | 1 | Window AC | 0.67 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Outdoor | Controls Building Lab | 1 | Split-System Air-Source HP | 1.50 | 21.60 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Fuel Heating 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) | 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 | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Controls building MUA-1 | 1 | Furnace | 167 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Controls building | 1 | Furnace | 120 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Admin Mech Room | Admin Building | 1 | Non-Condensing Hot Water Boiler | 56 | B | 9 | Yes | 1 | Non-Condensing Hot Water Boiler | 56 | 85.00% | AFUE | 0.0 | 0 | 11 | $108 | $2,049 | $800 | 11.5 |
| Roof | Controls building | 1 | Furnace | 43 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## DHW Inventory & Recommendations

| | | Existing Conditions | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | 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 | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Controls Building Storage | Controls building | 1 | Storage Tank Water Heater (≤ 50 Gal) | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Admin Building Storage | Admin Building | 1 | Indirect System | B | 10 | Yes | 1 | Tankless Water Heater | Natural Gas | 82.00% | EF | 0.0 | 0 | 1 | $6 | $732 | $600 | 23.7 |

## Low-Flow Device Recommendations

| | Recommedation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | ECM # | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Controls Building | 11 | 1 | Faucet Aerator (Lavatory) | 2.20 | 0.50 | 0.0 | 0 | 0 | $5 | $7 | $7 | 0.0 |
| Controls Building | 11 | 4 | Faucet Aerator (Lavatory) | 1.50 | 0.50 | 0.0 | 0 | 1 | $11 | $29 | $29 | 0.0 |
| Admins Building | 11 | 1 | Faucet Aerator (Lavatory) | 2.20 | 0.50 | 0.0 | 0 | 0 | $5 | $7 | $7 | 0.0 |
| Admins Building | 11 | 1 | Faucet Aerator (Lavatory) | 1.50 | 0.50 | 0.0 | 0 | 0 | $3 | $7 | $7 | 0.0 |

## Plug Load Inventory

| | Existing Conditions | | | |
|---|---|---|---|---|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Maple Avenue Plant | 5 | Computers | 175 | Yes |
| Maple Avenue Plant | 2 | Printer | 350 | Yes |
| Maple Avenue Plant | 1 | Microwave | 750 | Yes |
| Maple Avenue Plant | 1 | Mini Fridge | 40 | Yes |
| Maple Avenue Plant | 1 | Large Fridge | 200 | Yes |
| Maple Avenue Plant | 1 | TV | 150 | Yes |

# APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

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## ENERGY STAR® Statement of Energy Performance

**N/A**

ENERGY STAR® Score[1]

### Maple Avenue Wastewater Treatment Plant

**Primary Property Type:** Wastewater Treatment Plant
**Gross Floor Area (ft²):** 6,944
**Built:** 1980

**For Year Ending:** February 28, 2019
**Date Generated:** April 06, 2020

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

### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Maple Avenue Wastewater Treatment Plant<br>26 Maple Avenue<br>Lumberton, New Jersey 08048 | Mount Holly Municipal Utitlites Authority<br>1 Park Drive<br>PO Box 486<br>Mount Holly, NJ 08060<br>(609) 267-0015 | Robert Maybury<br>1 Park Drive<br>PO Box 486<br>Mount Holly, NJ 08060<br>(609) 267-0015<br>mayburyb@mhmua.com |

**Property ID:** 9310115

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

**Site EUI**
874.2 kBtu/ft²

**Source EUI**
1,841.6 kBtu/ft²

| Annual Energy by Fuel | |
|---|---|
| Natural Gas (kBtu) | 518,325 (8%) |
| Electric - Solar (kBtu) | 1,834,240 (30%) |
| Electric - Grid (kBtu) | 3,717,637 (61%) |

| National Median Comparison | |
|---|---|
| National Median Site EUI () | N/A |
| National Median Source EUI () | N/A |
| % Diff from National Median Source EUI | N/A% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 590 |

### Signature & Stamp of Verifying Professional

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

LP Signature: _____Date: _____

**Licensed Professional**

____ _____
,
(____)____-_____
_____

**Professional Engineer or Registered Architect Stamp (if applicable)**

# APPENDIX C: GLOSSARY

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

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

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