Local Government Energy Audit Report

Pequest Trout Hatchery

May 24, 2019

Prepared for:

NJ DEP of EP, Division of Fish and Wildlife
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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 Energy Services (TRC) reviewed the energy conservation measures and estimates of energy savings were reviewed 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*. We encourage the owner of the facility is encouraged 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.

The 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. Review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

Perform any implementation of energy conservation measures in strict conformance with applicable local, state and federal requirements.

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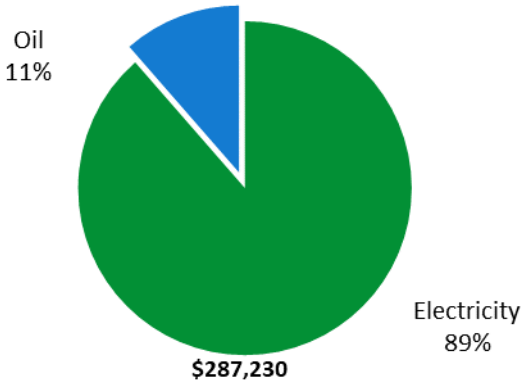
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Pequest Trout Hatchery. 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 Energy Services (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 help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $287,230 Electricity: 2,316,721 kWh No. 2 Fuel Oil: 14,447 Gallons	
ENERGY STAR® Benchmarking Score	N/A *(1-100 scale)*	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.

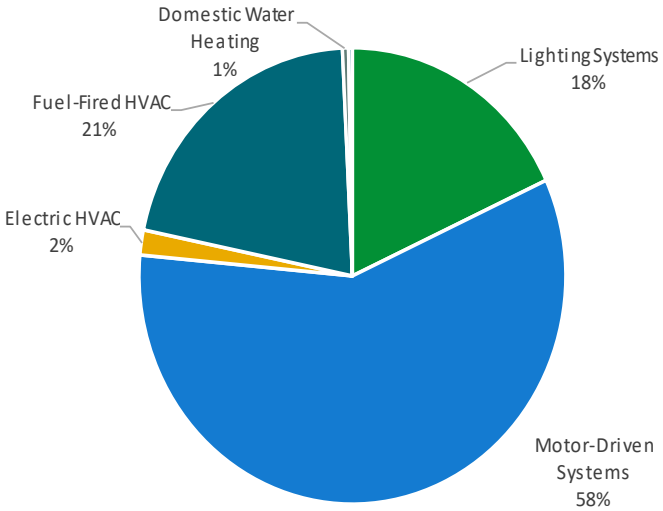


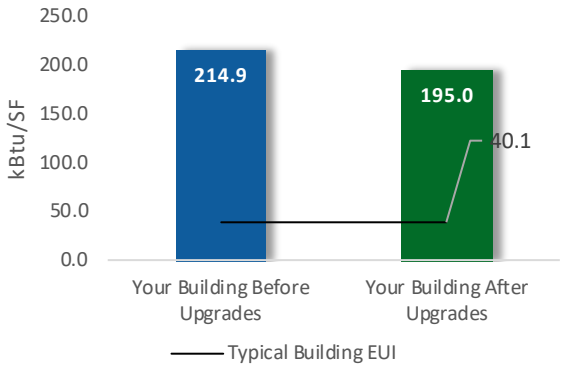
Figure 1 - Energy Use by System

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.

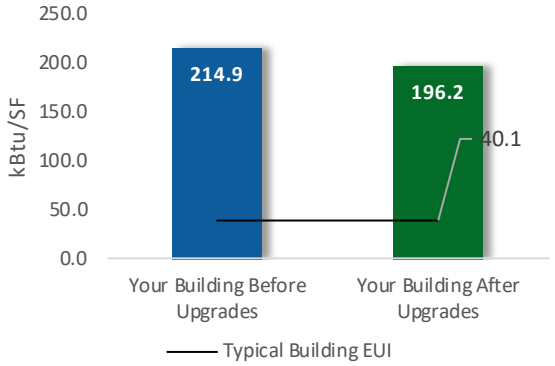
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$151,459
Potential Rebates & Incentives[1]	$11,470
Annual Cost Savings	$31,177
Annual Energy Savings	Electricity: 300,162 kWh
Greenhouse Gas Emission Savings	142 Tons
Simple Payback	4.5 Years
Site Energy Savings (all utilities)	9%



Scenario 2: Cost Effective Package[2]

Installation Cost	$109,579
Potential Rebates & Incentives	$10,270
Annual Cost Savings	$29,377
Annual Energy Savings	Electricity: 283,767 kWh
Greenhouse Gas Emission Savings	134 Tons
Simple Payback	3.4 Years
Site Energy Savings (all utilities)	9%



On-site Generation Potential

Photovoltaic	High
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	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**226,864**	**31.1**	**-129**	**$22,791**	**$341,867**	**$72,556**	**$8,305**	**$64,251**	**2.8**	**207,295**
ECM 1	Install LED Fixtures	75,350	9.9	-38	$7,658	$114,865	$24,263	$1,970	$22,293	2.9	69,727
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	141,146	19.4	-88	$14,060	$210,903	$47,545	$6,256	$41,289	2.9	127,778
ECM 3	Retrofit Fixtures with LED Lamps	10,368	1.9	-4	$1,073	$16,099	$748	$79	$669	0.6	9,790
Lighting Control Measures		**14,713**	**1.8**	**-9**	**$1,466**	**$11,725**	**$9,580**	**$805**	**$8,775**	**6.0**	**13,320**
ECM 4	Install Occupancy Sensor Lighting Controls	14,304	1.7	-9	$1,425	$11,399	$9,180	$805	$8,375	5.9	12,950
ECM 5	Install High/Low Lighting Controls	409	0.0	0	$41	$326	$400	$0	$400	9.8	370
Motor Upgrades		**25,836**	**3.7**	**0**	**$2,837**	**$42,555**	**$15,064**	**$0**	**$15,064**	**5.3**	**26,017**
ECM 6	Premium Efficiency Motors	25,836	3.7	0	$2,837	$42,555	$15,064	$0	$15,064	5.3	26,017
Variable Frequency Drive (VFD) Measures		**17,833**	**4.7**	**0**	**$1,958**	**$29,372**	**$17,433**	**$1,160**	**$16,273**	**8.3**	**17,957**
ECM 7	Install VFDs on Constant Volume (CV) Fans	14,686	4.2	0	$1,613	$24,189	$12,072	$1,160	$10,912	6.8	14,788
	Install VFDs on Chilled Water Pumps	1,776	0.4	0	$195	$2,925	$2,729	$0	$2,729	14.0	1,788
	Install VFDs on Heating Water Pumps	1,371	0.1	0	$151	$2,259	$2,632	$0	$2,632	17.5	1,381
Electric Chiller Replacement		**13,248**	**12.1**	**0**	**$1,455**	**$29,095**	**$36,519**	**$1,200**	**$35,319**	**24.3**	**13,341**
	Install High Efficiency Chillers	13,248	12.1	0	$1,455	$29,095	$36,519	$1,200	$35,319	24.3	13,341
HVAC System Improvements		**0**	**0.0**	**30**	**$487**	**$5,358**	**$264**	**$0**	**$264**	**0.5**	**4,860**
ECM 8	Install Pipe Insulation	0	0.0	30	$487	$5,358	$264	$0	$264	0.5	4,860
Domestic Water Heating Upgrade		**1,668**	**0.0**	**0**	**$183**	**$1,832**	**$43**	**$0**	**$43**	**0.2**	**1,680**
ECM 9	Install Low-Flow DHW Devices	1,668	0.0	0	$183	$1,832	$43	$0	$43	0.2	1,680
TOTALS		**300,162**	**53.3**	**-109**	**$31,177**	**$461,805**	**$151,459**	**$11,470**	**$139,989**	**4.5**	**284,469**

* - 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

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 High/Low Lighting Controls			
ECM 6	Premium Efficiency Motors			
ECM 7	Install VFDs on Constant Volume (CV) HVAC	X		
ECM 8	Install Pipe Insulation			
ECM 9	Install Low-Flow Domestic Hot Water Devices			

Figure 3 – Funding Options

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

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** 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. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. 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. 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 their 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 Pequest Trout Hatchery. 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 November 9, 2018, TRC performed an energy audit at Pequest Trout Hatchery located in Oxford, New Jersey. TRC met with Kevin Blythe to review the facility operations and help focus our investigation on specific energy-using systems.

The New Jersey Division of Fish and Wildlife devotes itself to maintain a healthy, stable level in New Jersey's variety of fish and wildlife, as well as protecting and improving the habitats they live in. The Division operates both the Pequest and Hackettstown Hatcheries, which stock lakes and streams around New Jersey with various types of fish, providing great fishing opportunities.

The Pequest Trout Hatchery and Natural Resource Education Center is a complex facility comprised of various space types within several buildings totaling approximately 46,110 square feet. The complex includes: interpretation, education and administration building, nursery building, maintenance garage building, vehicle storage building, raceway building, a treatment plant and well pump buildings.

Lighting in the complex consists of old and inefficient linear fluorescent T8 and T12 fixtures, incandescent and metal halide fixtures. Recent improvements include a partial lighting retrofit in the administration, nursery and maintenance buildings.

The heating system consists of ten non-condensing hot water boilers and electric resistance heaters, while cooling is mainly provided in the administration building by an old, inefficient 30-ton water cooled chiller that produces chilled water for a multi-zone air handler and two constant volume air handlers.

There is a water treatment facility located towards the north end of the complex and two fish raceways. There are seven well stations at the complex.

The site is interested in reducing its fossil fuel consumption and lowering operating costs.

2.2 Building Occupancy

The complex has various occupancy types. The administration building is open 7:00 AM to 4:00 PM. The maintenance garage building has an eight-hour shift, and one person around the clock. The nursery, wells and treatment plant are operational 24-hours and seven days a week. Typical weekday occupancy is 30 people. The typical schedule is presented in the table below.

Building Name	Weekday/Weekend	Operating Schedule
Office Building	Weekday	7:00 AM - 4:00 PM
	Weekend	Closed
Nursery & Maintenance Garage Building	Weekday	12:00 AM - 12:00 AM
	Weekend	12:00 AM - 12:00 AM
Wells & Treatment Plant	Weekday	12:00 AM - 12:00 AM
	Weekend	12:00 AM - 12:00 AM

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

A- Interpretation, Education and Administration Building (IEA)

The Interpretation, Education and Administration Building is a two-story building constructed of concrete block over structural steel with front stone façade. The building has asphalt shingled, pitched roof sections, some with deep overhangs. The roof is supported with wood trusses and appears to be in good condition. The entrance doors are full-height glass with metal frames. The emergency exit doors are metal clad commercial grade units in fair condition with worn door seals.

Spaces in the building include: offices, an exhibition room, auditorium, conference room, laboratory, break room, basement mechanical space, main lobby, electrical room, storage and restrooms.

Image 1: Building's Walls & Roof

Image 2: Exterior Doors

B- Nursery Building

The nursery building has concrete masonry unit (CMU) walls and a flat roof. The roof was not accessible during the survey. It has double-pane glass windows with metal frames in good condition. The metal exterior doors have half-height glass panels and are in good condition.

The building's spaces include: the nursery area, offices and food storage room on the main level, and the mechanical support spaces on the lower level.


Image 3: Nursery Building Envelope

C- Maintenance Garage Building

The maintenance garage building has CMU walls and a flat roof. The roof was not accessible during the survey. It has double-pane glass windows with metal frames in fair condition. There are five garage bays which are used for vehicle maintenance, a workshop and storage areas. Additional spaces in the building include a break room, a locker room, staff restrooms, and a boiler room.


Image 4: Maintenance Garage Building Envelope

D- Vehicle Storage Building

The vehicle storage building is a flat roof, CMU-walled building. There are no windows and doors. The building is un-conditioned with no domestic plumbing system.

Image 5: Vehicle Storage Building

E- Unheated Raceway Building

The unheated raceway building is a flat roof, CMU-walled building that is infrequently used. There are no windows and doors at the facility.

Image 6: Raceway Building

F- Treatment Plant and Well Pump Buildings

The facility treatment plant and well pump buildings are CMU walled with flat roofs. Windows at the treatment plant are single paned with metal frames in acceptable condition. The metal clad doors at both the treatment plant and wells buildings are in good condition.

Image 7: Treatment Plant

Image 8: Typical Well Pump Building

D- Fish Raceways

Two outdoor concrete-lined raceway systems are located to the South of the complex: the upper and lower raceways. Each system consists of four concrete raceways with paved service driveways between. Pumps and heavy equipment transfer fish between the raceways

Image 9: Raceway

2.4 Lighting Systems

G- Interpretation, Education and Administration Building (IEA)

The primary interior lighting system uses linear fluorescent T12 lamps. There are a few 32-Watt T8 fixtures. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use less efficient magnetic ballasts. A partial LED retrofit has been implemented in the break room, print shop, auditorium, second floor main area, conference room, offices, and lab room. Additionally, there are some LED screw-in lamps in the exhibition room. Mercury vapor fixtures with approximately 250-Watt lamps are found in the main lobby, auditorium and the exhibition room. Two 65-Watt incandescent lamps were found in closets. Interior lighting system is controlled with manual wall switches. Exit signs throughout the building are LED. Interior lighting levels were generally sufficient. Recessed 150-Watt incandescent lamps and 250-Watt wall pack and pole-mounted metal halide fixtures controlled by photocells illuminate the outside of the building.

Image 10: Fluorescent T12 and LED Linear Tubes

Image 11: Mercury Vapor and Exterior Fixtures

B- Nursery Building

Interior lighting at the nursery building is provided by linear fluorescent T12 fixtures using magnetic ballasts. Fixture types include 2-lamp, 4-foot troffer fixtures. A few 65-Watt and 150-Watt incandescent lamps were found in the nursery and the main entrance areas. Interior lighting system is controlled with manual wall switches. Exterior illumination is provided with four, 90-Watt halogen flood lamps and one, 175-Watt metal halide controlled with photocells, all wall mounted.

C- Maintenance Garage Building

Interior lighting at the nursery building is provided by a combination of linear fluorescent T12 fixtures using magnetic ballasts and LED linear tubes. Fixture types include 2-lamp, 4- foot troffers or 8-foot long industrial reflector fixtures. Lighting retrofit with LED linear tubes has been implemented in the restrooms, break room, and locker room. A few 65-Watt incandescent lamps were found in closets. Interior lighting system is controlled with manual wall switches. Exterior illumination system consists of 11 wall-mounted, photocell controlled LED fixtures with each having approximately a 150-Watt lamp.

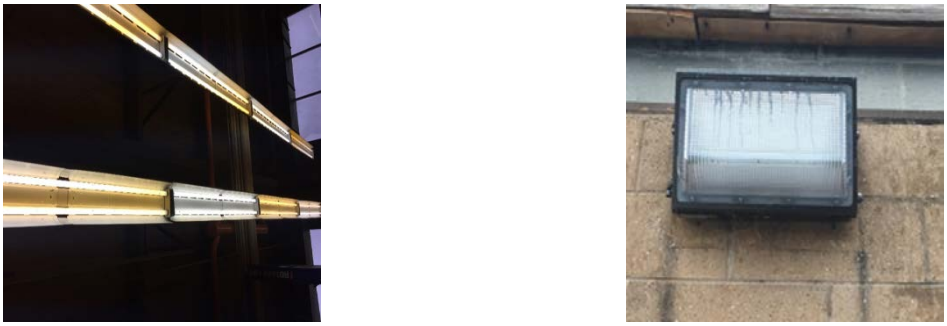


Image 12: Interior T12 and Exterior LED Fixtures

D- Other Buildings

Interior illumination in the water treatment plant, vehicle storage building, raceway building and the wells buildings consist mostly of aging and inefficient linear fluorescent T12 fixtures with magnetic ballasts. These sites are mostly unoccupied, with short visits from the maintenance staff. Fixture types include 2-lamp or 4-lamp, 4-foot manually controlled, industrial reflector fixtures. Interior lighting usage is lower in these areas of the complex.

Image 13: Typical Interior Fluorescent T12 Fixtures

The open raceways pole lighting system were retrofitted to LED fixtures with each having 300-Watt lamp. They are controlled with photocells.

2.5 Air Handling Systems

Air Conditioners

The nursery building office and the maintenance garage building's break room are each cooled using 0.67-ton LG window unit. They are in good condition.

One multi-zone air handler (HV-1) with a 7.5 hp constant speed supply fan and a 2 hp return fan supplies ventilation, heating, and cooling to four separate zones within the administration building. The two other constant volume air handlers each having a 2 hp supply and 0.5 hp return fan service the same building. The air handler units are equipped with hot water and chilled water coils. Heating and cooling temperature in spaces are controlled with local thermostats.

Ventilation in the spaces in the nursery building is provided on demand using large exhaust fans which provide temperature and humidity relief in the summer because there is no cooling in most of the building.

Four of the five bays of the maintenance garage building are ventilated by a 3 hp constant speed supply fan air handler unit (HV-1), which also ventilates the locker room and restrooms. The locker room and the restrooms are heated with hot water baseboards heat.

The vehicle storage building, treatment plant, and the raceway building are un-conditioned spaces. The well pump buildings are heated with electric unit heaters that likely run all winter long to prevent freezing. Most of the units are rated for 5 kW. Air is exhausted by a wall mounted exhaust fan. The heaters and exhaust fan are controlled with line voltage thermostats.

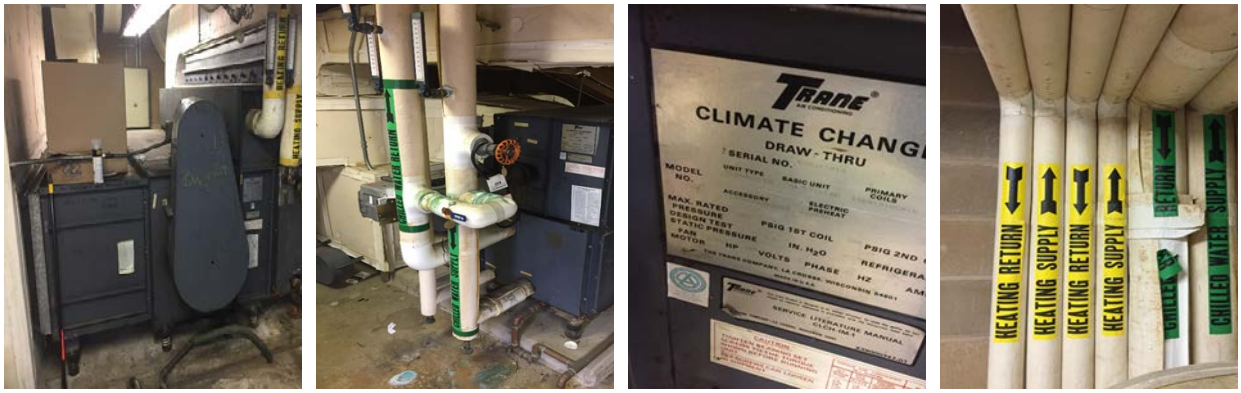


Image 14: A Multi-Zone and A Single Zone AHU – Administration Building

Image 15: Typical Local Thermostats

Image 16: AHU (HV-1) - Maintenance Garage Building

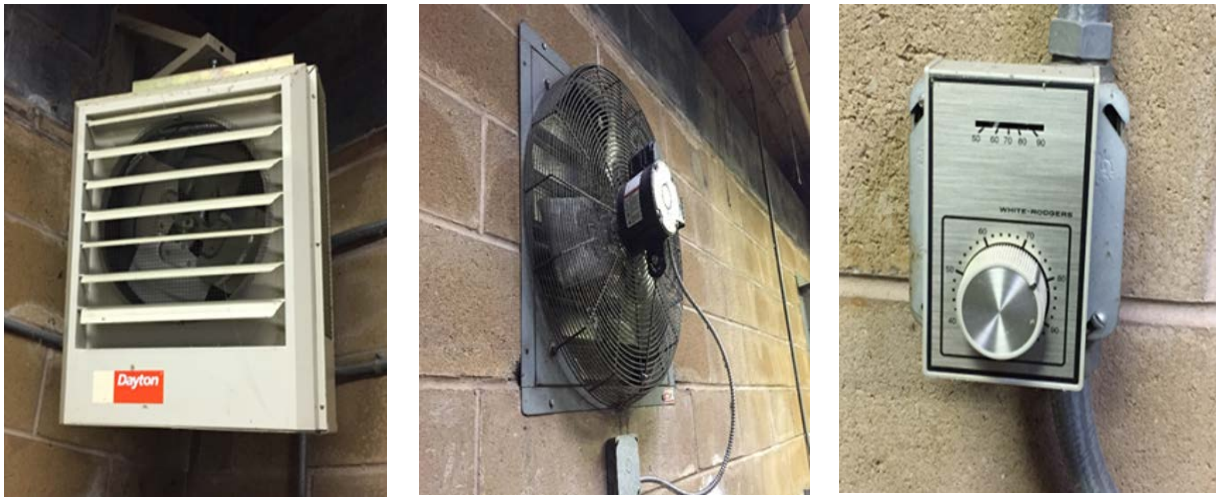


Image 17: Electric Heater, Exhaust Fan & Line Voltage Thermostat

2.6 Heating Hot Water System

The heating source for the administration building consists of three, Slant/Fin 326 MBh oil-fired hot water non-condensing boilers, each with a nominal combustion efficiency of 80%. Two 0.3 hp constant speed pumps are used to supply hot water to a multi-zone air handler (HV-1) and two constant volume air handlers (HV-1,2). The boilers are controlled based on outside air temperature. A Honeywell aquastat is used to control the temperature of the water inside the boiler's jacket. Heating temperature in spaces is controlled using local thermostats. There two 0.3 hp oil pumps. The boilers are 13 years old and appear in good condition.

The heating source for the nursery building consists of two, Slant/Fin 326 MBh oil-fired hot water non-condensing boilers, each with a nominal combustion efficiency of 80%. One 0.5 hp constant speed pump is used to supply hot water to hot water unit heaters. There is a 0.5 hp oil pump. The boilers are controlled by a pneumatic control system that uses a 5 hp compressor. The boilers are 13 years old and appear in good condition.

Image 18: Oil-Fired Hydronic Boilers – Administration Building

Image 19: Hot Water Pump and Aquastat – Administration Building

The heating source for the maintenance garage building consists of five, Slant/Fin 331 MBh oil-fired hot water non-condensing boilers, each with a nominal combustion efficiency of 80%. One 0.5 hp and one 1.5 hp constant speed pump are used to supply hot water to a constant volume air handler (HV-1), hot water unit heaters and hydronic baseboards. There are two 0.5 hp oil pumps. The boilers operate in a lead/lag configuration and are controlled by a pneumatic control system that uses a 10 hp compressor. The boilers are newer and appear in good condition.

Image 20: Hot Water Heating System - Nursery Building

Image 21: Hot Water Heating System - Maintenance Garage Building

2.7 Chilled Water System

Chilled water for the administration building is produced by a single 30-ton Trane water-cooled chiller with a semi hermetic reciprocating compressor. A 2 hp constant speed pump distributes chilled water to three AHUs equipped with chilled water coils. The chilled water supply temperature is reset based on outside air temperature. Chilled water is distributed at 42°F when the outside air temperature is above 65°F and the setpoint is reset to 55°F when the outside air is below 60°F. The chiller plant is locked out when the outside air temperature is below 50°F. The chiller is 36 years old, has passed its normal useful life, and appears in poor condition. There is a 1.5 hp condenser water pump that runs at constant speed located in the basement.

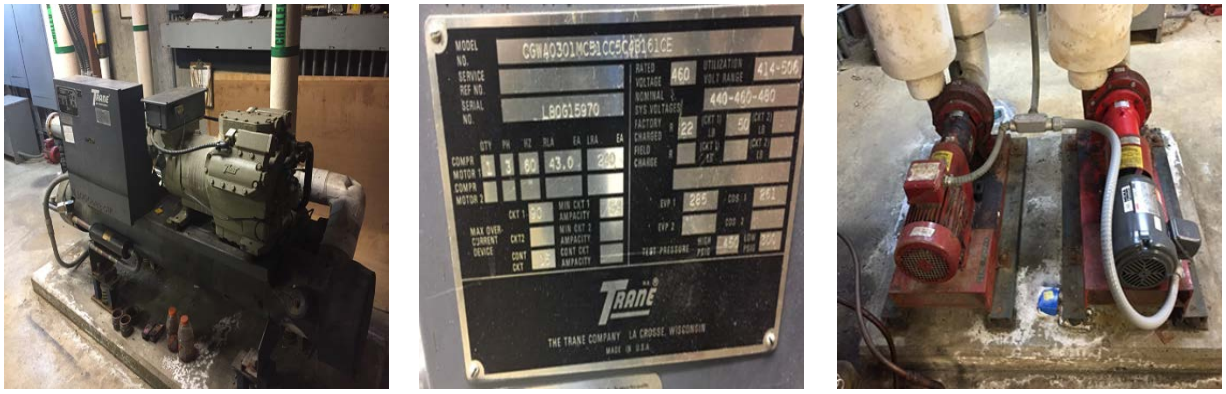


Image 22: Reciprocating Water-Cooled Chiller, Chilled and Condenser Water Pumps

2.8 Well Pumps

Pequest Trout Hatchery uses a substantial amount of pump energy to move 4,500 to 7,000 gallon per minute (gpm) of well water through the nursery and raceways. There are seven well pump stations and one treatment plant. The well pump motors vary in size significantly from one well to the next. They were all (except Well 6) retrofitted with variable frequency drives. The power consumption is directly related to the pump horsepower and hours of operation per month. It varies seasonally, depending on the growth stage of the trout being reared (the biggest fish need more water). The wells are cycled to allow for aquifer recharge and for maintenance. The water temperature is 52 degrees directly from the wells and maintained through the process. The water is stripped of gases, including nitrogen, then oxygen is return to the water in an aeration process. Water is transferred into the upper raceways, then water is split into the Nursery and then directed to the lower raceways. The well pump motors appear in good condition and well maintained. The well pump water flow is monitored using a flow monitoring control panel located in the Nursery Building. Additionally, there are two 15 hp constant speed pumps located in the Nursery Building that are uses from the end of August to June first. See the well pump motors horsepower and flow in the below table.

Well Number	Horsepower (HP)	Variable Frequency Drive (VFD)	Flow (gpm)	Condition
Well #1	50	Yes	800	Good
Well #2	40	Yes	500	Good
Well #3	50	Yes	1,500	Good
Well #4	40	Yes	450	Good
Well #5	150	Yes	32,000	Good
Well #6	30	No	400	Good
Well #7	200	Yes	32,000	Good

Image 23: Typical Well Pump Motors

Image 24: 15 hp Pump motors and Flow Monitoring Control Panel

Image 25: Typical VFD

2.9 Domestic Hot Water

Hot water for the complex is produces using a number of electric storage tank water heaters and one oil-fired storage tank water heater. See the table below for the location, input and storage tank capacities, and the condition of each water heater. Domestic hot water pipes are not insulated for the Nursery and Maintenance Garage Buildings.

Location	Area Served	Fuel Type	Input Capacity	Tank Capacity (gallon)	Condition
Boiler Room	Adm Building	Electric	4.5 kW	40	Good
2nd Floor Closet	Adm building	Electric	4.5 kW	38	Good
Mechanical Room	Adm Building	Electric	2.5 kW	15	Good
Boiler Room	Nursery Building	Electric	4.5 kW	80	Good
Boiler Room	Maintenance Garage building	#2 Fuel Oil	245 MBh	86	Good
Treatment Plant	Treatment plant	Electric	2 kW	10	Good

Image 26: Vanguard Electric Water Heaters and an A. O Smith Oil-Fired Water Heater

2.10 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 0.29% of total building energy use. This is lower than a typical building.

The staff seems to be doing a great job managing the building's electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are 14 computer work stations throughout the complex. Plug loads include printers, copy machines, lab equipment, refrigerators, water coolers, coffee machines, and microwaves.

Image 27: Plug Load Equipment

2.11 Water-Using Systems

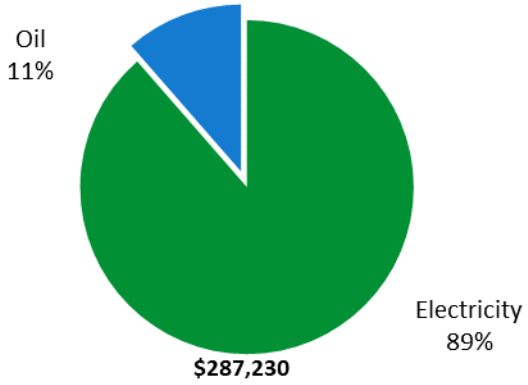
There are several restrooms with toilets, urinals and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf. The restrooms are located in the administration, nursery and maintenance garage buildings.

Image 28: Typical Restroom Sink

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	2,316,721 kWh	$254,395
No. 2 Fuel Oil	14,447 Gallons	$32,835
Total		**$287,230**



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.

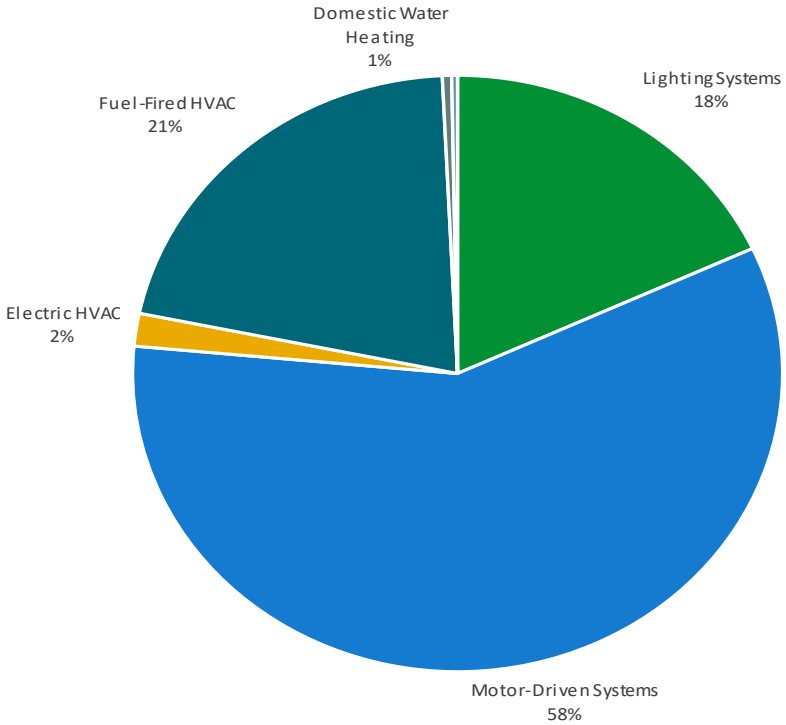
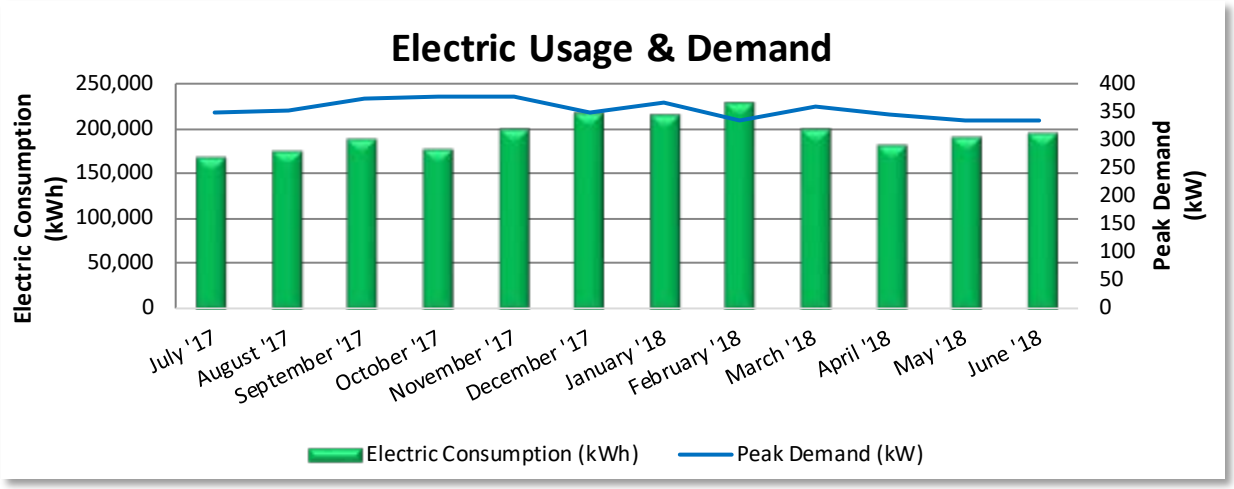


Figure 5 - Energy Balance

3.1 Electricity

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



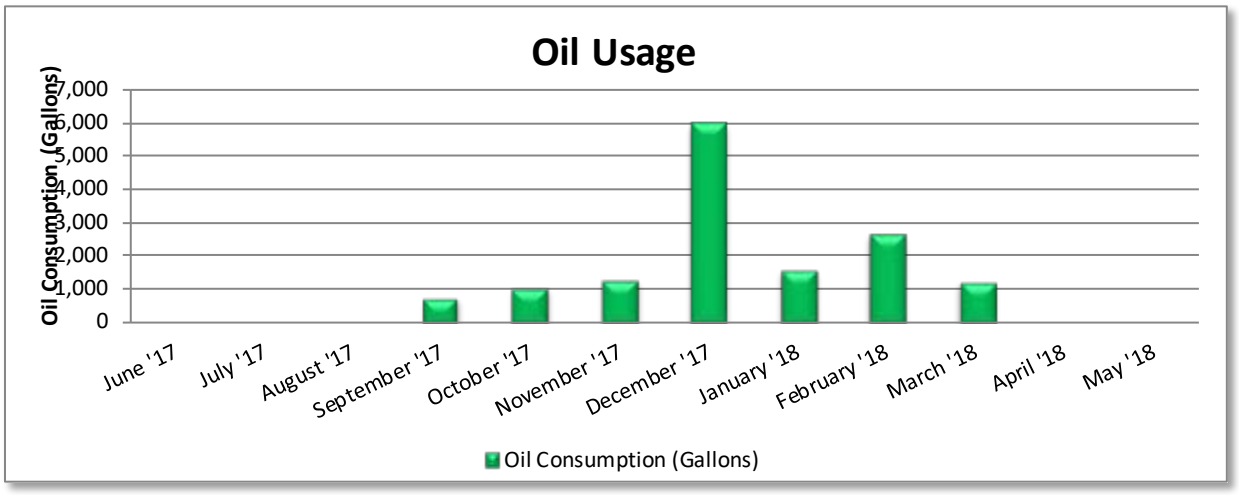
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
8/2/17	31	167,490	347	$2,041	$18,520
9/1/17	30	172,705	352	$2,072	$19,205
10/3/17	31	185,776	374	$2,101	$20,585
11/2/17	30	175,626	378	$2,128	$19,298
12/5/17	31	197,575	378	$2,132	$21,387
1/4/18	31	215,264	351	$2,319	$23,294
2/2/18	28	213,940	365	$2,430	$25,272
3/5/18	31	226,940	334	$2,139	$24,053
4/3/18	30	197,155	358	$2,062	$21,822
5/1/18	31	180,460	347	$1,894	$19,384
5/31/18	30	190,141	333	$1,924	$20,356
7/2/18	31	193,649	333	$1,990	$21,218
Totals	**365**	**2,316,721**	**378**	**$25,232**	**$254,395**
Annual	**365**	**2,316,721**	**378**	**$25,232**	**$254,395**

Notes:

- Peak electric usage occurred in February 2018.
- The average electric cost over the past 12 months was $0.110/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. The electricity profile is fairly constant throughout the year.

3.2 No. 2 Fuel Oil

Taylor Fuel Oil delivers No. 2 Fuel Oil to the project site.



No. 2 Fuel Oil Billing Data			
Period Ending	**Days in Period**	**Oil Usage (Gallons)**	**Fuel Cost**
7/4/17	31	0	$0
8/3/17	30	0	$0
9/2/17	31	0	$0
10/4/17	30	724	$1,569
11/3/17	31	1,027	$1,027
12/6/17	31	1,268	$2,902
1/5/18	28	5,974	$14,667
2/3/18	31	1,581	$3,680
3/1/18	30	2,658	$6,109
4/4/18	31	1,215	$2,881
5/2/18	30	0	$0
6/1/18	31	0	$0
Totals	**365**	**14,447**	**$32,835**
Annual	**365**	**14,447**	**$32,835**

Notes:

- The average No. 2 Fuel Oil cost for the past 12 months is $2.273/Gallon, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, 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.

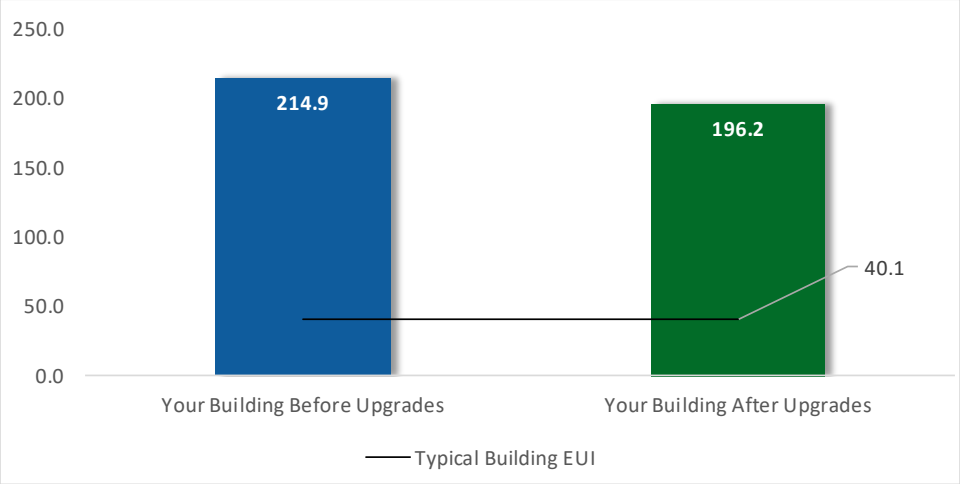


Figure 6 - Energy Use Intensity Comparison

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.

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[3].

[3] 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.

Appendix A: Equipment Inventory & Recommendations

This appendix provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

#	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		**226,864**	**31.1**	**-129**	**$22,791**	**$72,556**	**$8,305**	**$64,251**	**2.8**	**207,295**
ECM 1	Install LED Fixtures	75,350	9.9	-38	$7,658	$24,263	$1,970	$22,293	2.9	69,727
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	141,146	19.4	-88	$14,060	$47,545	$6,256	$41,289	2.9	127,778
ECM 3	Retrofit Fixtures with LED Lamps	10,368	1.9	-4	$1,073	$748	$79	$669	0.6	9,790
Lighting Control Measures		**14,713**	**1.8**	**-9**	**$1,466**	**$9,580**	**$805**	**$8,775**	**6.0**	**13,320**
ECM 4	Install Occupancy Sensor Lighting Controls	14,304	1.7	-9	$1,425	$9,180	$805	$8,375	5.9	12,950
ECM 5	Install High/Low Lighting Controls	409	0.0	0	$41	$400	$0	$400	9.8	370
Motor Upgrades		**25,836**	**3.7**	**0**	**$2,837**	**$15,064**	**$0**	**$15,064**	**5.3**	**26,017**
ECM 6	Premium Efficiency Motors	25,836	3.7	0	$2,837	$15,064	$0	$15,064	5.3	26,017
Variable Frequency Drive (VFD) Measures		**17,833**	**4.7**	**0**	**$1,958**	**$17,433**	**$1,160**	**$16,273**	**8.3**	**17,957**
ECM 7	Install VFDs on Constant Volume (CV) Fans	14,686	4.2	0	$1,613	$12,072	$1,160	$10,912	6.8	14,788
	Install VFDs on Chilled Water Pumps	1,776	0.4	0	$195	$2,729	$0	$2,729	14.0	1,788
	Install VFDs on Heating Water Pumps	1,371	0.1	0	$151	$2,632	$0	$2,632	17.5	1,381
Electric Chiller Replacement		**13,248**	**12.1**	**0**	**$1,455**	**$36,519**	**$1,200**	**$35,319**	**24.3**	**13,341**
	Install High Efficiency Chillers	13,248	12.1	0	$1,455	$36,519	$1,200	$35,319	24.3	13,341
HVAC System Improvements		**0**	**0.0**	**30**	**$487**	**$264**	**$0**	**$264**	**0.5**	**4,860**
ECM 8	Install Pipe Insulation	0	0.0	30	$487	$264	$0	$264	0.5	4,860
Domestic Water Heating Upgrade		**1,668**	**0.0**	**0**	**$183**	**$43**	**$0**	**$43**	**0.2**	**1,680**
ECM 9	Install Low-Flow DHW Devices	1,668	0.0	0	$183	$43	$0	$43	0.2	1,680
TOTALS		**300,162**	**53.3**	**-109**	**$31,177**	**$151,459**	**$11,470**	**$139,989**	**4.5**	**284,469**

* - 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		**226,864**	**31.1**	**-129**	**$22,791**	**$72,556**	**$8,305**	**$64,251**	**2.8**	**207,295**
ECM 1	Install LED Fixtures	75,350	9.9	-38	$7,658	$24,263	$1,970	$22,293	2.9	69,727
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	141,146	19.4	-88	$14,060	$47,545	$6,256	$41,289	2.9	127,778
ECM 3	Retrofit Fixtures with LED Lamps	10,368	1.9	-4	$1,073	$748	$79	$669	0.6	9,790
Lighting Control Measures		**14,713**	**1.8**	**-9**	**$1,466**	**$9,580**	**$805**	**$8,775**	**6.0**	**13,320**
ECM 4	Install Occupancy Sensor Lighting Controls	14,304	1.7	-9	$1,425	$9,180	$805	$8,375	5.9	12,950
ECM 5	Install High/Low Lighting Controls	409	0.0	0	$41	$400	$0	$400	9.8	370
Motor Upgrades		**25,836**	**3.7**	**0**	**$2,837**	**$15,064**	**$0**	**$15,064**	**5.3**	**26,017**
ECM 6	Premium Efficiency Motors	25,836	3.7	0	$2,837	$15,064	$0	$15,064	5.3	26,017
Variable Frequency Drive (VFD) Measures		**17,833**	**4.7**	**0**	**$1,958**	**$17,433**	**$1,160**	**$16,273**	**8.3**	**17,957**
ECM 7	Install VFDs on Constant Volume (CV) Fans	14,686	4.2	0	$1,613	$12,072	$1,160	$10,912	6.8	14,788
HVAC System Improvements		**0**	**0.0**	**30**	**$487**	**$264**	**$0**	**$264**	**0.5**	**4,860**
ECM 8	Install Pipe Insulation	0	0.0	30	$487	$264	$0	$264	0.5	4,860
Domestic Water Heating Upgrade		**1,668**	**0.0**	**0**	**$183**	**$43**	**$0**	**$43**	**0.2**	**1,680**
ECM 9	Install Low-Flow DHW Devices	1,668	0.0	0	$183	$43	$0	$43	0.2	1,680
TOTALS		**300,162**	**53.3**	**-109**	**$31,177**	**$151,459**	**$11,470**	**$139,989**	**4.5**	**284,469**

* - 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		**226,864**	**31.1**	**-129**	**$22,791**	**$72,556**	**$8,305**	**$64,251**	**2.8**	**207,295**
ECM 1	Install LED Fixtures	75,350	9.9	-38	$7,658	$24,263	$1,970	$22,293	2.9	69,727
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	141,146	19.4	-88	$14,060	$47,545	$6,256	$41,289	2.9	127,778
ECM 3	Retrofit Fixtures with LED Lamps	10,368	1.9	-4	$1,073	$748	$79	$669	0.6	9,790

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

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

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

Affected building areas: main lobby, exhibition room, auditorium, exterior fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

Affected building areas: all areas with fluorescent fixtures with T12 tubes – all buildings.

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent T8 and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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 – Administration Building

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		**14,713**	**1.8**	**-9**	**$1,466**	**$9,580**	**$805**	**$8,775**	**6.0**	**13,320**
ECM 4	Install Occupancy Sensor Lighting Controls	14,304	1.7	-9	$1,425	$9,180	$805	$8,375	5.9	12,950
ECM 5	Install High/Low Lighting Controls	409	0.0	0	$41	$400	$0	$400	9.8	370

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 lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

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

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

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

Affected building areas: offices, conference room, restrooms, locker and break rooms, and storage rooms

ECM 5: Install High/Low Lighting Controls

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

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. 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.

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		**25,836**	**3.7**	**0**	**$2,837**	**$15,064**	**$0**	**$15,064**	**5.3**	**26,017**
ECM 6	Premium Efficiency Motors	25,836	3.7	0	$2,837	$15,064	$0	$15,064	5.3	26,017

ECM 6: Premium Efficiency Motors

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

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Boiler Room	Cooling System	1	Chilled Water Pump	2.0	Chilled Water Pump
Boiler Room	Condenser Water	1	Condenser Water Pump	1.5	Condenser Water Pump
Boiler Room	Air Handler HV-1	1	Supply Fan	7.5	Supply Fan Motor
Mechanical Room	Air Handler HV-2	1	Supply Fan	2.0	Century Motors
Nursery Pump Room	Water Recirculation	2	Water Supply Pump	15.0	GE
Nursery Boiler Room	Oil Pump	1	Process Pump	0.5	Oil Pump
Maintenance Bldg Boiler Room	Oil Pump	2	Process Pump	0.5	Oil Pump
Maintenance Bldg Boiler Room	Compressed Air System	1	Air Compressor	10.0	Compressed Air System

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Maintenance Bldg Boiler Room	Heating System	1	Heating Hot Water Pump	1.5	Heating Hot Water Pump
Maintenance Bldg Boiler Room	Air Handler HV-1	1	Supply Fan	3.0	Supply Fan Motor
Well #6	Well #6	1	Water Supply Pump	30.0	Water Supply Pump
Boiler Room	Air Handler HV-1	1	Return Fan	2.0	Return Fan

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		**17,833**	**4.7**	**0**	**$1,958**	**$17,433**	**$1,160**	**$16,273**	**8.3**	**17,957**
ECM 7	Install VFDs on Constant Volume (CV) Fans	14,686	4.2	0	$1,613	$12,072	$1,160	$10,912	6.8	14,788
	Install VFDs on Chilled Water Pumps	1,776	0.4	0	$195	$2,729	$0	$2,729	14.0	1,788
	Install VFDs on Heating Water Pumps	1,371	0.1	0	$151	$2,632	$0	$2,632	17.5	1,381

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 motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

ECM 7: Install VFDs on Constant Volume (CV) Fans

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

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

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

Affected air handlers: all air handlers in the Administration and Maintenance Garage Buildings

Install a VFD on Chilled Water Pump

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

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

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

Installing a VFD on chilled water pump has a long payback, therefore, this measure is not recommended for implementation on the basis of energy savings alone.

Affected pump: Administration Building 2 hp Chilled water pump

Install a VFD on Heating Water Pump

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

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

Installing a VFD on hot water pump has a long payback, therefore, this measure is not recommended for implementation on the basis of energy savings alone.

Affected pumps: Maintenance Garage Building 1.5 hp heating hot water pump

4.5 Electric Chillers

#	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)
Electric Chiller Replacement		**13,248**	**12.1**	**0**	**$1,455**	**$36,519**	**$1,200**	**$35,319**	**24.3**	**13,341**
	Install High Efficiency Chillers	13,248	12.1	0	$1,455	$36,519	$1,200	$35,319	24.3	13,341

Install High Efficiency Chillers

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

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

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

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

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

4.6 HVAC

#	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)
HVAC System Improvements		**0**	**0.0**	**30**	**$487**	**$264**	**$0**	**$264**	**0.5**	**4,860**
ECM 8	Install Pipe Insulation	0	0.0	30	$487	$264	$0	$264	0.5	4,860

ECM 8: Install Pipe Insulation

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

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**1,668**	**0.0**	**0**	**$183**	**$43**	**$0**	**$43**	**0.2**	**1,680**
ECM 9	Install Low-Flow DHW Devices	1,668	0.0	0	$183	$43	$0	$43	0.2	1,680

ECM 9: 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

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. 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[4]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Lighting Maintenance

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

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

Lighting Controls

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

Motor Controls

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

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

Motor Maintenance

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

Chiller Maintenance

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

Boiler Maintenance

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

Water Heater Maintenance

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.

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[5] or download a copy of EPA's "WaterSense™ at Work: Best Management Practices for Commercial and Institutional Facilities"[6] 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.

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

[6] 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 reduction, 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 a **high** potential for installing a PV array.

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

The 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.

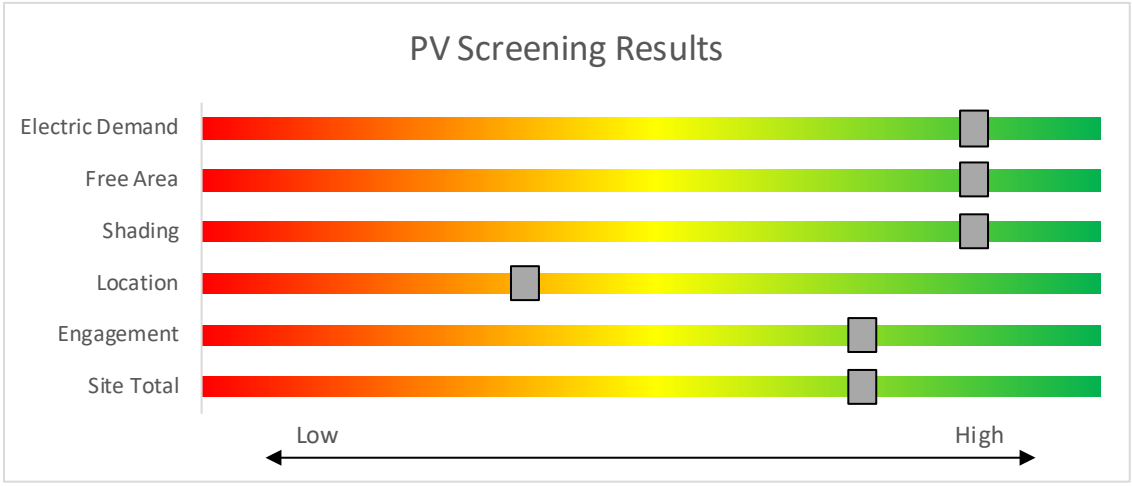


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

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:

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

6.2 Combined Heat and Power

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

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

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

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

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The 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.

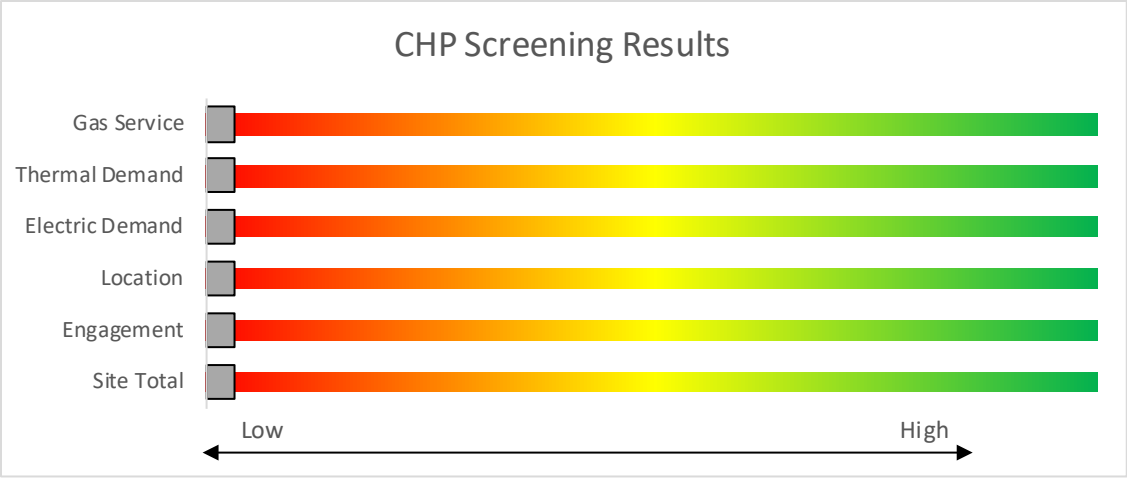


Figure 10 - Combined Heat and Power Screening

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 incentives from New Jersey's Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *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. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. 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. 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 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 description and application can be found at: www.njcleanenergy.com/ESIP.

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

7.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) 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 SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

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 SRECs. SRECs are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SRECs to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

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[7].

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[8].

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

[8] 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
Boiler Room	7	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	7	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.2	2,444	-2	$243	$773	$84	2.8
Boiler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,736	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	427	0	$43	$73	$20	1.2
Boiler 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
Tank Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	1,252	-1	$125	$601	$71	4.3
Tank Room	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	213	0	$21	$37	$10	1.2
Break Room	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736	4	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	0.0	291	0	$29	$270	$0	9.3
Print Shop	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,900	4	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,691	0.0	130	0	$13	$270	$0	20.9
Main Lobby	15	Mercury Vapor: (1) 250W Lamp	Wall Switch	S	290	8,736	1	Fixture Replacement	No	15	LED - Fixtures: Downlight Recessed	Wall Switch	75	8,736	2.1	20,848	-13	$2,077	$2,276	$75	1.1
Main Lobby	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	3	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.1	1,047	-1	$104	$331	$36	2.8
Main Lobby	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
Electrical Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	3,900	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	3,900	0.0	156	0	$16	$110	$12	6.3
Closet	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	3,900	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	3,900	0.0	156	0	$16	$110	$12	6.3
Men Restroom	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	1,252	-1	$125	$601	$71	4.3
Women Restroom	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	1,252	-1	$125	$601	$71	4.3
Exibition Room	27	Mercury Vapor: (1) 250W Lamp	Wall Switch	S	290	8,736	1	Fixture Replacement	No	27	LED - Fixtures: Downlight Pendant	Wall Switch	75	8,736	3.8	37,527	-23	$3,738	$4,098	$135	1.1
Exibition Room	12	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	S	35	8,736		None	No	12	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	35	8,736	0.0	0	0	$0	$0	$0	0.0
Exibition 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
Auditorium	18	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	18	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.8	7,510	-5	$748	$2,527	$286	3.0
Auditorium	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736	4	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	0.0	291	0	$29	$270	$35	8.1
Auditorium	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
Auditorium	12	Mercury Vapor: (1) 250W Lamp	Wall Switch	S	290	1,095	1, 4	Fixture Replacement	Yes	12	LED - Fixtures: Downlight Pendant	Occupancy Sensor	75	756	1.9	2,317	-1	$231	$2,091	$95	8.7
Closet	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,095	3	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,095	0.0	26	0	$3	$65	$12	20.5
Office1	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.2	1,669	-1	$166	$711	$83	3.8
Office2	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.3	2,503	-2	$249	$932	$107	3.3
2nd Floor Main Area	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	3,900	2	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	3,900	0.1	623	0	$62	$441	$48	6.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
2nd Floor Main Area	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,900		None	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,900	0.0	0	0	$0	$0	$0	0.0
2nd Floor Main Area	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
2nd Floor Conference Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,600	2, 4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	1,794	0.3	745	0	$74	$932	$107	11.1
2nd Floor Conference Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,600		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	0	0	$0	$0	$0	0.0
Hallway	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 5	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 2' Lamps	High/Low Control	34	6,028	0.2	1,669	-1	$166	$641	$48	3.6
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
Office3	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,340		None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,340	0.0	0	0	$0	$0	$0	0.0
Office3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,340	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,340	0.0	57	0	$6	$37	$10	4.7
Office4	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,340	4	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,615	0.0	93	0	$9	$270	$0	29.0
Lab Room	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,900		None	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,900	0.0	0	0	$0	$0	$0	0.0
Back Entrance	2	Incandescent: Screw in	Wall Switch	S	150	1,095	3	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	21	1,095	0.2	209	0	$21	$34	$2	1.6
Men Restroom - 2nd Floor	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	834	-1	$83	$491	$59	5.2
Janitorial Closet	1	Incandescent: Screw in	Wall Switch	S	65	8,736	3	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	10	8,736	0.0	356	0	$35	$17	$1	0.5
Closet	1	Incandescent: Screw in	Wall Switch	S	65	3,900	3	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	10	3,900	0.0	159	0	$16	$17	$1	1.0
Women Restroom - 2nd Floor	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	834	-1	$83	$491	$59	5.2
Office	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	3,900	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,691	0.0	104	0	$10	$270	$0	26.1
Exterior Recessed	2	Incandescent: Screw in	Photocell		150	4,380	3	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Photocell	21	4,380	0.2	1,130	0	$124	$34	$2	0.3
Exterior Main Entrance	3	Incandescent: Screw in	Photocell		150	4,380	3	Relamp	No	3	LED Screw-In Lamps: LED Screw-In Lamps	Photocell	21	4,380	0.3	1,695	0	$186	$52	$3	0.3
Exterior Pole Lights	10	Metal Halide: (1) 250W Lamp	Photocell		295	4,380	1	Fixture Replacement	No	10	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	75	4,380	1.5	9,636	0	$1,058	$9,306	$1,000	7.8
Exterior Wall Pack	1	Metal Halide: (1) 250W Lamp	Photocell		295	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	75	4,380	0.1	964	0	$106	$966	$100	8.2
Mechanical Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	3	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.1	1,047	-1	$104	$331	$36	2.8
Nursery Building	16	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	16	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.6	5,585	-3	$556	$1,766	$192	2.8
Nursery Building	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Restroom	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.0	349	0	$35	$110	$12	2.8
Restroom	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	0	0	$0	$0	$0	0.0

	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
Nursery Building Office1	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	3,900	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	2,691	0.1	373	0	$37	$491	$59	11.6
Nursery Building Office2	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	3,900	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	2,691	0.2	745	0	$74	$711	$83	8.5
Restroom	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	834	-1	$83	$491	$59	5.2
Egg Room	4	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2, 4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	6,028	0.3	2,801	-2	$279	$785	$115	2.4
Pump Room	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	0.1	556	0	$55	$129	$20	2.0
Fish Tank Area	42	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2	Relamp & Reballast	No	42	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	2.4	23,350	-15	$2,326	$5,405	$840	2.0
Fish Tank Area	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	2	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.1	698	0	$70	$221	$24	2.8
Fish Tank Area	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
Storage Room	18	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2, 4	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	6,028	1.3	12,604	-8	$1,256	$2,856	$360	2.0
Food Storage	24	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	24	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	1.0	10,013	-6	$997	$3,189	$288	2.9
Food Storage	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
Nursery Building Boiler Room	24	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	24	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.9	8,378	-5	$835	$2,649	$288	2.8
Fish Tank Area	3	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	S	10	8,736		None	No	3	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	10	8,736	0.0	0	0	$0	$0	$0	0.0
Fish Tank Area	2	Incandescent: Screw in	Wall Switch	S	65	8,736	3	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	10	8,736	0.1	711	0	$71	$34	$2	0.5
Main Entrance	4	Incandescent: Screw in	Wall Switch	S	150	1,095	3	Relamp	No	4	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	21	1,095	0.3	418	0	$42	$69	$4	1.6
Nursery Building Wall Pack	4	Halogen Incandescent: Halogen Incandescent - PAR38	Photocell		90	4,380	3	Relamp	No	4	LED Screw-In Lamps: LED Screw-In Lamps	Photocell	25	4,380	0.2	1,139	0	$125	$141	$4	1.1
Nursery Building Wall Pack	1	Metal Halide: (1) 175W Lamp	Photocell		215	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	52	4,380	0.1	714	0	$78	$966	$100	11.0
Maintenance Garage Building	1	Incandescent: Screw in	Wall Switch	S	150	8,736	3	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	21	8,736	0.1	834	-1	$83	$17	$1	0.2
Maintenance Garage Bldg Hallway	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	0	0	$0	$0	$0	0.0
Maintenance Garage Bldg Hallway	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 5	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	High/Low Control	34	6,028	0.1	834	-1	$83	$421	$24	4.8
Maintenance Garage Bldg Hallway	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
Men Restroom	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	0	0	$0	$0	$0	0.0
Men Restroom	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	834	-1	$83	$491	$59	5.2
Men Restroom	1	Incandescent: Screw in	Wall Switch	S	65	8,736	3	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	10	8,736	0.0	356	0	$35	$17	$1	0.5
Closet	2	Incandescent: Screw in	Wall Switch	S	65	3,900	3	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	10	3,900	0.1	317	0	$32	$34	$2	1.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Women Restroom	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736	4	None	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	6,028	0.0	232	0	$23	$270	$0	11.7
Break Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.3	2,503	-2	$249	$932	$107	3.3
Break Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	0	0	$0	$0	$0	0.0
Break 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
Locker Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.3	2,503	-2	$249	$932	$107	3.3
Locker Room	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	8,736		None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	8,736	0.0	0	0	$0	$0	$0	0.0
Drying Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	834	-1	$83	$491	$59	5.2
Vestibule	1	Incandescent: Screw in	Wall Switch	S	150	1,095	3	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	21	1,095	0.1	105	0	$10	$17	$1	1.6
Vestibule	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
Boiler Room - Hallway	2	Incandescent: Screw in	Wall Switch	S	150	8,736	3	Relamp	No	2	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	21	8,736	0.2	1,668	-1	$166	$34	$2	0.2
Boiler Room - 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
Boiler Room	4	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	0.2	2,224	-1	$222	$515	$80	2.0
Maintenance Garage	17	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2	Relamp & Reballast	No	17	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	1.0	9,451	-6	$941	$2,188	$340	2.0
Maintenance Garage	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
Welding Bay	3	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	8,736	0.2	1,668	-1	$166	$386	$60	2.0
Office	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	8,736	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	6,028	0.3	2,637	-2	$263	$625	$95	2.0
Wood Shop	12	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2, 4	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	6,028	0.9	8,403	-5	$837	$1,814	$275	1.8
Wood Shop	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
Storage Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	6,028	0.1	834	-1	$83	$491	$24	5.6
End Bay	9	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2, 4	Relamp & Reballast	Yes	9	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	6,028	0.6	6,302	-4	$628	$1,428	$215	1.9
End Bay	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
Tool Storage Room	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	8,736	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	6,028	0.1	1,400	-1	$140	$527	$40	3.5
Exterior Wall Pack	11	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		150	4,380		None	No	11	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	150	4,380	0.0	0	0	$0	$0	$0	0.0
Vehicle Storage Building	42	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	1,095	2	Relamp & Reballast	No	42	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,095	3.3	4,016	-2	$400	$4,971	$840	10.3
Well #2	5	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	8,736	2	Relamp & Reballast	No	5	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.4	3,814	-2	$380	$592	$100	1.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Well #4	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	8,736	2	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.3	3,051	-2	$304	$473	$80	1.3
Water Treatment Plant	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	8,736	2	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	8,736	0.3	3,051	-2	$304	$473	$80	1.3
Exterior Water Treatment Plant	2	Metal Halide: (1) 175W Lamp	Photocell		215	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	52	4,380	0.2	1,428	0	$157	$1,932	$200	11.0
Well #3	1	Incandescent: Screw in	Wall Switch	S	100	8,736	3	Relamp	No	1	LED Screw-In Lamps: LED Screw-In Lamps	Wall Switch	15	8,736	0.1	549	0	$55	$17	$1	0.3
Open Fishery Pole Lights	20	LED - Fixtures: Outdoor Pole/Arm Mounted Area/Roadway Fixture	Photocell		300	4,380		None	No	20	LED - Fixtures: Outdoor Pole/Arm Mounted Area/Roadway Fixture	Photocell	300	4,380	0.0	0	0	$0	$0	$0	0.0
Unheated Building	52	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	52	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	730	1.9	1,517	-1	$151	$5,739	$624	33.9
Well #5	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	6	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.2	2,095	-1	$209	$662	$72	2.8
Well #7	6	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	6	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.2	2,095	-1	$209	$662	$72	2.8
Well #7	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
Well #8	3	Metal Halide: (1) 175W Lamp	Photocell		215	4,380	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	52	4,380	0.3	2,142	0	$235	$2,898	$300	11.0
Well #1	5	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	5	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.2	1,745	-1	$174	$552	$60	2.8
Well #6	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	8,736	2	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	8,736	0.1	1,396	-1	$139	$441	$48	2.8

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	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
Boiler Room	Heating System	2	Heating Hot Water Pump	0.3	65.0%	No	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Cooling System	1	Chilled Water Pump	2.0	86.5%	No	W	2,745	6, NR	Yes	86.5%	Yes	1	0.4	1,776	0	$195	$3,261	$0	16.7
Boiler Room	Condenser Water	1	Condenser Water Pump	1.5	78.0%	No	B	2,745	6	Yes	86.5%	No		0.1	290	0	$32	$758	$0	23.8
Boiler Room	Oil Pump	2	Process Pump	0.3	65.0%	No	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Air Handler HV-1	1	Supply Fan	7.5	86.5%	No	B	3,391	6, 7	Yes	91.7%	Yes	1	2.3	9,065	0	$995	$4,761	$600	4.2
Fish Tank	Water Recirculation	1	Water Supply Pump	0.3	65.0%	No	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Elevator	1	Process Pump	15.0	82.0%	No	W	3,391		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Restrooms	Restrooms	2	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Hallway	Hallway	2	Exhaust Fan	0.5	65.0%	No	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Air Handler HV-2	1	Supply Fan	2.0	78.0%	No	B	2,745	6, 7	Yes	86.5%	Yes	1	0.7	2,317	0	$254	$3,623	$160	13.6
Mechanical Room	Air Handler HV-3	1	Supply Fan	2.0	84.0%	No	W	2,745		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Air Handler	2	Exhaust Fan	0.5	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Nursery Pump Room	Water Recirculation	2	Water Supply Pump	15.0	84.0%	No	B	6,480	6	Yes	93.0%	No		1.4	12,531	0	$1,376	$3,693	$0	2.7
Nursery Building	Motorized Doors	6	Other	1.0	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Fish Tank Area	Unit Heater	1	Supply Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Fish Tank Area	Compressed Air System	1	Air Compressor	5.0	86.0%	No	W	6,978		No	86.0%	No		0.0	0	0	$0	$0	$0	0.0
Nursery Boiler Room	Oil Pump	1	Process Pump	0.5	65.0%	No	B	2,745	6	Yes	78.2%	No		0.1	199	0	$22	$352	$0	16.1
Maintenance Bldg Boiler Room	Heating System	1	Heating Hot Water Pump	0.5	65.0%	No	W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Maintenance Bldg Boiler Room	Oil Pump	2	Process Pump	0.5	65.0%	No	B	2,745	6	Yes	78.2%	No		0.1	399	0	$44	$705	$0	16.1
Maintenance Bldg Boiler Room	Compressed Air System	1	Air Compressor	10.0	84.0%	No	W	2,190	6	Yes	91.7%	No		0.4	1,225	0	$134	$1,344	$0	10.0

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	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
Maintenance Bldg Boiler Room	Heating System	1	Heating Hot Water Pump	1.5	84.0%	No	W	2,745	6, NR	Yes	86.5%	Yes	1	0.2	1,443	0	$158	$3,391	$0	21.4
Maintenance Bldg	Garage Lift	1	Process Pump	2.0	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Maintenance Bldg	Motorized Doors	6	Other	1.0	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Maintenance Bldg Boiler Room	Air Handler HV-1	1	Supply Fan	3.0	86.5%	No	B	2,745	6, 7	Yes	89.5%	Yes	1	0.9	2,824	0	$310	$3,884	$240	11.8
Well #2	Well #2	1	Water Supply Pump	40.0	94.1%	Yes	W	5,760		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Well #2	Well #2	1	Exhaust Fan	1.5	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Well #4	Well #4	1	Water Supply Pump	40.0	94.1%	Yes	W	5,760		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Well #4	Well #4	1	Exhaust Fan	1.5	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Treatment Plant	Treatment Plant	2	Process Pump	2.0	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Treatment Plant	Compressed Air System	1	Air Compressor	5.0	84.0%	No	W	2,190		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Well #3	Well #3	1	Water Supply Pump	50.0	94.5%	Yes	W	7,200		No	94.5%	No		0.0	0	0	$0	$0	$0	0.0
Well #5	Well #5	1	Water Supply Pump	150.0	95.8%	Yes	W	4,320		No	95.8%	No		0.0	0	0	$0	$0	$0	0.0
Well #5	Well #5	2	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Well #7	Well #7	1	Water Supply Pump	200.0	93.0%	Yes	W	4,320		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Well #7	Well #7	1	Exhaust Fan	1.5	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Well #1	Well #1	1	Water Supply Pump	50.0	94.5%	Yes	W	5,760		No	94.5%	No		0.0	0	0	$0	$0	$0	0.0
Well #1	Well #1	1	Exhaust Fan	1.5	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Well #6	Well #6	1	Water Supply Pump	30.0	86.0%	No	B	5,760	6	Yes	94.1%	No		1.2	9,677	0	$1,063	$3,103	$0	2.9
Well #6	Well #6	1	Exhaust Fan	1.5	82.0%	No	W	2,745		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Air Handler HV-1	1	Return Fan	2.0	84.0%	No	W	2,745	6, 7	Yes	86.5%	Yes	1	0.6	1,923	0	$211	$3,623	$160	16.4

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
Nursery Building Office	Nursery Building Office	1	Window AC	0.67		W		No							0.0	0	0	$0	$0	$0	0.0
Maintenance Bld-Break Room	Maintenance Bld-Break Room	1	Window AC	0.67		W		No							0.0	0	0	$0	$0	$0	0.0
Well #2	Well #2	1	Electric Resistance Heat		17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Well #4	Well #4	1	Electric Resistance Heat		17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Well #5	Well #5	1	Electric Resistance Heat		17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Well #7	Well #7	1	Electric Resistance Heat		17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Well #1	Well #1	1	Electric Resistance Heat		17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Well #6	Well #6	1	Electric Resistance Heat		17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Fish Tank Area	1	Electric Resistance Heat		26.00	W		No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Main Office Building	1	Water-Cooled Reciprocating Chiller	30.00	B	NR	Yes	1	Water-Cooled Scroll Chiller	Variable	30.00	0.78	0.49	12.1	13,248	0	$1,455	$36,519	$1,200	24.3

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
Boiler Room	Main Office Building	3	Non-Condensing Hot Water Boiler	326.00	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Nursery Building	2	Non-Condensing Hot Water Boiler	326.00	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Maintenance Building	5	Non-Condensing Hot Water Boiler	331.00	W		No						0.0	0	0	$0	$0	$0	0.0

Pipe Insulation Recommendations

Location	Area(s)/System(s) Affected	Recommendation Inputs			Energy Impact & Financial Analysis						
		ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler	Maintenance Building - Heating Hot Water	8	20	2.50	0.0	0	20	$325	$176	$0	0.5
Boiler	Nursery Building - Heating Hot Water	8	10	2.50	0.0	0	10	$162	$88	$0	0.5

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
		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
Boiler Room	Main Office Building	1	Storage Tank Water Heater (≤ 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
2nd Floor Closet	Main Office Building	1	Storage Tank Water Heater (≤ 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Main Office Building	1	Storage Tank Water Heater (≤ 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Nursery Building	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Maintenance Building	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Treatment Plant	Treatment Plant	1	Storage Tank Water Heater (≤ 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

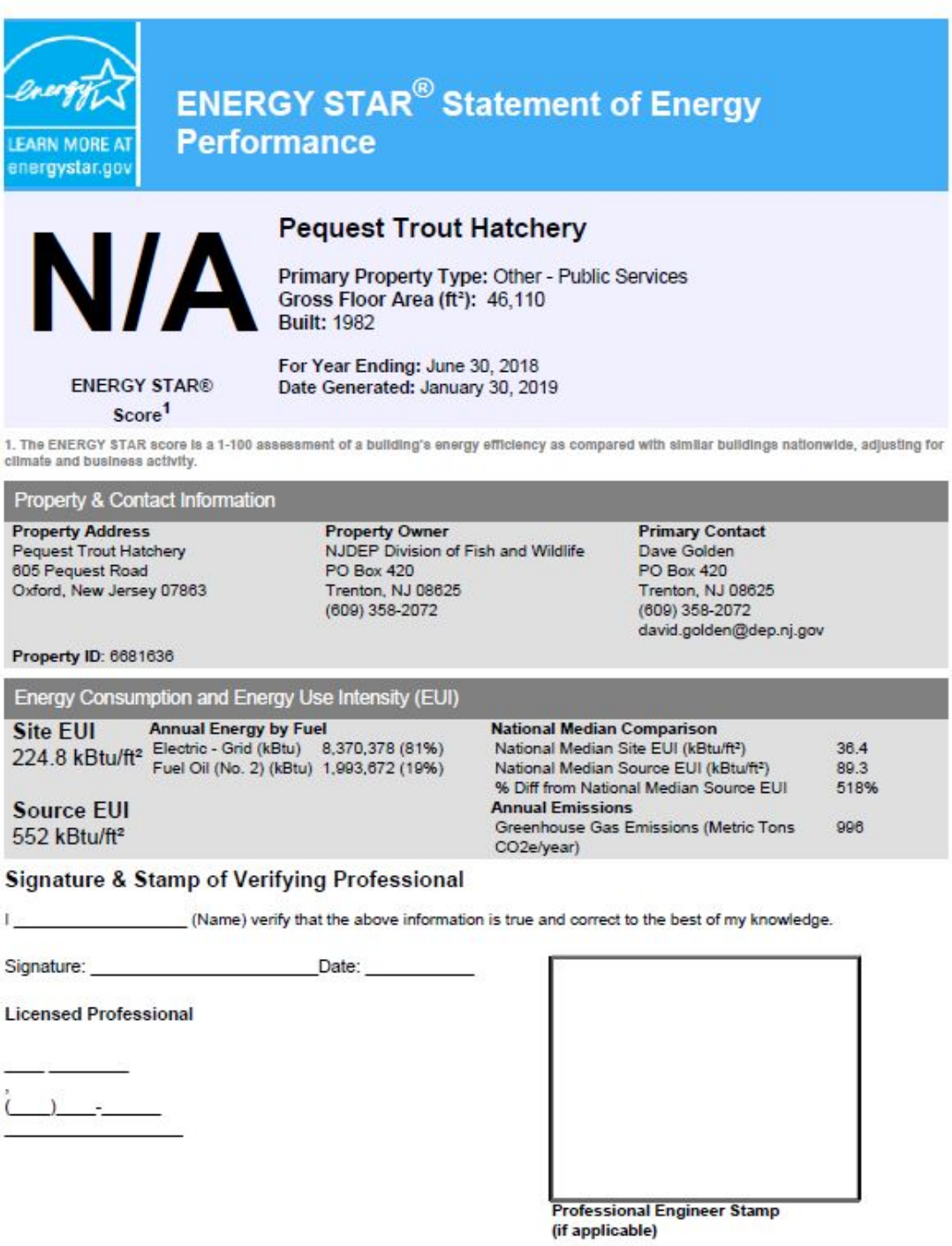
Location	Recommendation Inputs					Energy Impact & Financial Analysis						
	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Facility	9	6	Faucet Aerator (Lavatory)	2.20	0.50	0.0	1,668	0	$183	$43	$0	0.2

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Pequest Facility	2	Microwave	1,000.0	No
Pequest Facility	1	Toaster	800.0	No
Pequest Facility	2	Coffee Machine	800.0	No
Pequest Facility	5	Refrigerator	224.0	No
Pequest Facility	3	Copy Machine	600.0	Yes
Pequest Facility	14	Desktop Computer	120.0	Yes
Pequest Facility	3	Water Cooler	120.0	Yes
Pequest Facility	6	Printer	55.0	Yes
Pequest Facility	1	Electric Range	1,200.0	No
Pequest Facility	1	Small Refrigerator	75.0	Yes
Pequest Facility	3	Lab Equipment	250.0	No
Pequest Facility	1	Ice Machine	250.0	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]

Pequest Trout Hatchery

Primary Property Type: Other - Public Services
Gross Floor Area (ft²): 46,110
Built: 1982

For Year Ending: June 30, 2018
Date Generated: January 30, 2019

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
Pequest Trout Hatchery 605 Pequest Road Oxford, New Jersey 07863	NJDEP Division of Fish and Wildlife PO Box 420 Trenton, NJ 08625 (609) 358-2072	Dave Golden PO Box 420 Trenton, NJ 08625 (609) 358-2072 david.golden@dep.nj.gov

Property ID: 6681636

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
224.8 kBtu/ft²

Source EUI
552 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	8,370,378 (81%)
Fuel Oil (No. 2) (kBtu)	1,993,672 (19%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	36.4
National Median Source EUI (kBtu/ft²)	89.3
% Diff from National Median Source EUI	518%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	996

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

___ _____
,
(___)___-_____
_____

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