



# Local Government Energy Audit Report

Emergency Services / 911 Building

April 30, 2019

*Prepared for:*

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135 Cemetery Road  
Pilesgrove, NJ 08098

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# Disclaimer

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

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

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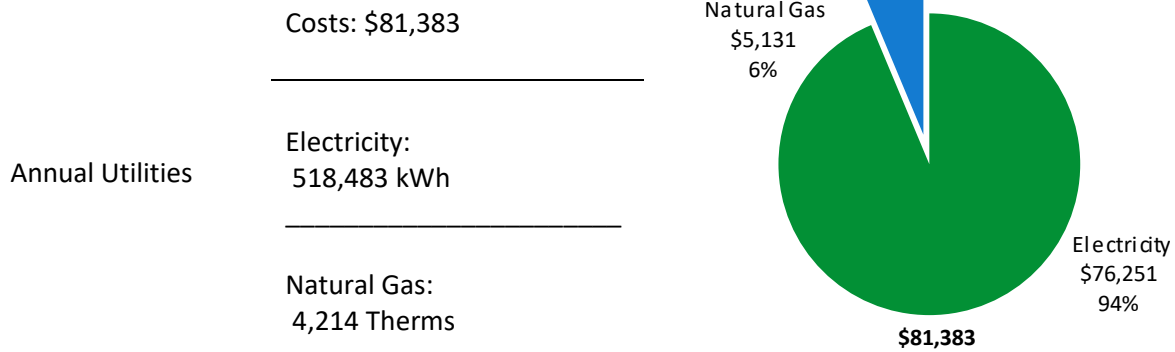
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# 1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) report for the Emergency Services/911 Building. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC 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



ENERGY STAR® Benchmarking Score      N/A (1-100 scale)

*The ENERGY STAR® Portfolio Manager® website was closed due to the ongoing federal government shutdown when this report was produced. Therefore, an SEP report and ENERGY STAR® score could not be generated for this site. Benchmarking for this site will be completed when the Portfolio Manager® website is reopened.*

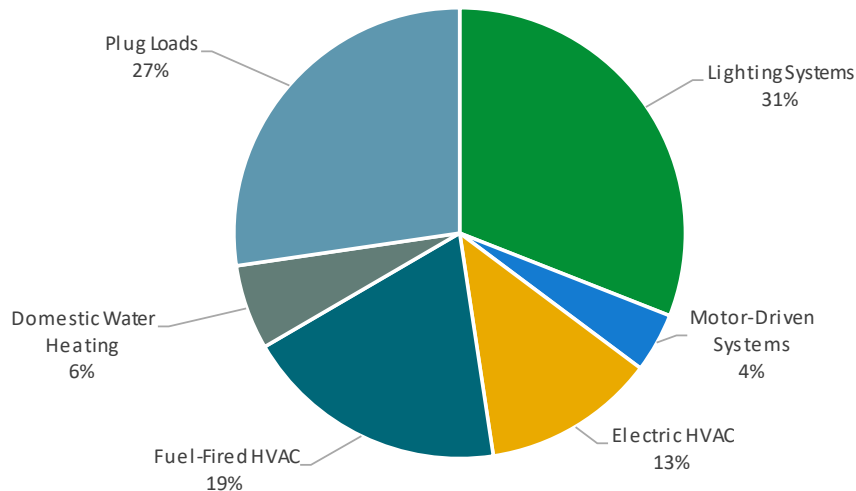


Figure 1 - Energy Use by System

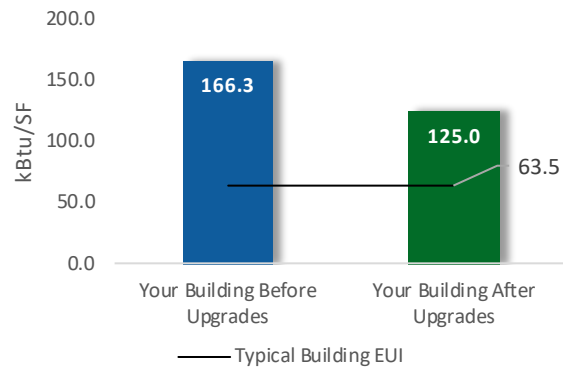
## POTENTIAL IMPROVEMENTS



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.

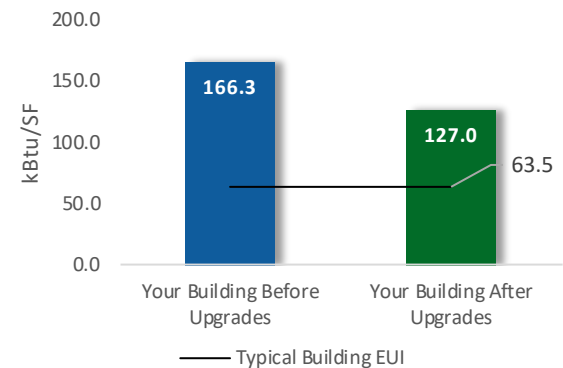
### Scenario 1: Full Package (all evaluated measures)

Installation Cost	\$47,999
Potential Rebates & Incentives <sup>1</sup>	\$8,657
Annual Cost Savings	\$23,651
Annual Energy Savings	Electricity: 161,373 kWh
Greenhouse Gas Emission Savings	81 Tons
Simple Payback	1.7 Years
Site Energy Savings (all utilities)	25%



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

Installation Cost	\$40,748
Potential Rebates & Incentives	\$7,057
Annual Cost Savings	\$23,332
Annual Energy Savings	Electricity: 161,373 kWh
Greenhouse Gas Emission Savings	79 Tons
Simple Payback	1.4 Years
Site Energy Savings (all utilities)	24%



### On-site Generation Potential

Photovoltaic	Medium
Combined Heat and Power	None

<sup>1</sup> Incentives are based on current SmartStart Prescriptive incentives. Other Program incentives may apply.

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

#	Energy Conservation Measure	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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>132,872</b>	<b>18.3</b>	<b>-28</b>	<b>\$19,201</b>	<b>\$288,009</b>	<b>\$26,471</b>	<b>\$4,657</b>	<b>\$21,814</b>	<b>1.1</b>	<b>130,528</b>
ECM 1	Install LED Fixtures	1,191	0.2	0	\$175	\$2,628	\$3,864	\$400	\$3,464	19.8	1,200
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	97,288	12.9	-21	\$14,055	\$210,832	\$15,157	\$2,481	\$12,676	0.9	95,542
ECM 3	Retrofit Fixtures with LED Lamps	34,393	5.2	-7	\$4,970	\$74,549	\$7,450	\$1,776	\$5,674	1.1	33,787
<b>Lighting Control Measures</b>		<b>23,112</b>	<b>3.1</b>	<b>-5</b>	<b>\$3,339</b>	<b>\$26,712</b>	<b>\$13,796</b>	<b>\$2,400</b>	<b>\$11,396</b>	<b>3.4</b>	<b>22,697</b>
ECM 4	Install Occupancy Sensor Lighting Controls	20,448	2.8	-4	\$2,954	\$23,633	\$11,996	\$1,490	\$10,506	3.6	20,081
ECM 5	Install High/Low Lighting Controls	2,664	0.3	-1	\$385	\$3,079	\$1,800	\$910	\$890	2.3	2,616
<b>Gas Heating (HVAC/Process) Replacement</b>		<b>0</b>	<b>0.0</b>	<b>26</b>	<b>\$319</b>	<b>\$6,384</b>	<b>\$7,250</b>	<b>\$1,600</b>	<b>\$5,650</b>	<b>17.7</b>	<b>3,069</b>
	Install High Efficiency Furnaces	0	0.0	26	\$319	\$6,384	\$7,250	\$1,600	\$5,650	17.7	3,069
<b>Domestic Water Heating Upgrade</b>		<b>3,435</b>	<b>0.0</b>	<b>0</b>	<b>\$505</b>	<b>\$5,051</b>	<b>\$22</b>	<b>\$0</b>	<b>\$22</b>	<b>0.0</b>	<b>3,459</b>
ECM 6	Install Low-Flow DHW Devices	3,435	0.0	0	\$505	\$5,051	\$22	\$0	\$22	0.0	3,459
<b>Food Service &amp; Refrigeration Measures</b>		<b>1,954</b>	<b>0.2</b>	<b>0</b>	<b>\$287</b>	<b>\$1,437</b>	<b>\$460</b>	<b>\$0</b>	<b>\$460</b>	<b>1.6</b>	<b>1,968</b>
ECM 7	Vending Machine Control	1,954	0.2	0	\$287	\$1,437	\$460	\$0	\$460	1.6	1,968
<b>TOTALS</b>		<b>161,373</b>	<b>21.6</b>	<b>-7</b>	<b>\$23,651</b>	<b>\$327,593</b>	<b>\$47,999</b>	<b>\$8,657</b>	<b>\$39,342</b>	<b>1.7</b>	<b>161,721</b>

\* - 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	X	X
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X		X
ECM 3	Retrofit Fixtures with LED Lamps	X	X	X
ECM 4	Install Occupancy Sensor Lighting Controls	X	X	X
ECM 5	Install High/Low Lighting Controls	X	X	X
ECM 6	Install Low-Flow Domestic Hot Water Devices		X	X
ECM 7	Vending Machine Control		X	X

*Figure 3 – Funding Options*





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

	<b>SmartStart</b> Flexibility to install at your own pace	<b>Direct Install</b> Turnkey installation	<b>Pay for Performance</b> Whole building upgrades
<b>Who should use it?</b>	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.
<b>How does it work?</b>	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.
<b>What are the Incentives?</b>	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.
<b>How do I participate?</b>	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](http://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 (NJBP) has sponsored this Local Government Energy Audit (LGEA) Report for the Emergency Services/911 Building. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. 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 September 27, 2018, TRC performed an energy audit at the Emergency Services/911 Building located in Pilesgrove, New Jersey. TRC met with Sam Willis to review the facility operations and help focus our investigation on specific energy-using systems.

The Emergency Services/911 Building is a three-story, 13,170 square foot building built in 1983. Spaces include: offices, corridors, stairwells, restrooms, computer rooms, phone rooms, conference rooms, a small kitchen, classrooms, and various storage and mechanical spaces.

Recent improvements include: Over the last five years the facility has replaced existing T12 fluorescent fixtures with T8 fluorescent fixtures. Approximately half of the fluorescent lighting has been replaced. The site is interested in a complete LED lighting system but has been unable to fund the project.

### 2.2 Building Occupancy

The facility is occupied year-round. Typical weekday occupancy is between 15-30 staff depending on time of day.

Building Name	Weekday/Weekend	Operating Schedule
Emergency Services / 911 Building	Weekday	6:00 AM to 12:00 AM
	Weekend	6:00 AM to 12:00 AM

*Figure 4 - Building Occupancy Schedule*

### 2.3 Building Envelope

Building walls are concrete block over structural steel with a brick facade. The roof is pitched and covered with asphalt shingles and it is in good condition.

The walls are made of concrete masonry units (CMUs) with a brick veneer and gypsum drywall interior finish.

Most of the windows are double glazed with low-e glass and have aluminum frames with a thermal break. The glass-to-frame seals are in good condition. The operable window weather seals are in fair condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition. Degraded window and door seals increase drafts and outside air infiltration.



*Building Exterior*



*Building Exterior*

## 2.4 Lighting Systems

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

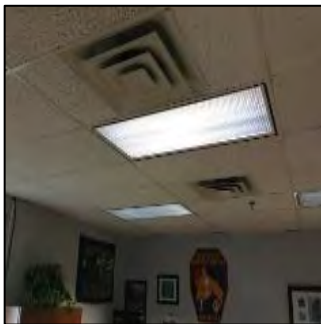
Fixture types include 2-lamp, 3-lamp or 4-lamp, 2-foot or 4-foot long, recessed or surface mounted fixtures and 2-foot fixtures with U-bend tube lamps.

Lighting fixtures throughout the building are controlled by wall switches.

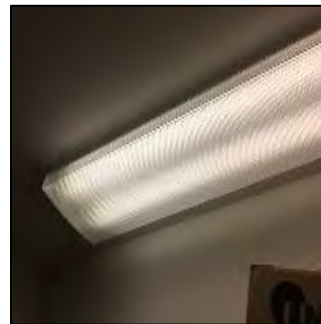
Most fixtures are in good condition, and only a few fixtures were observed to have yellowed lenses.

All exit signs are LED units. Some were older units retrofitted with LED kits, while others are newer LED units.

Interior lighting levels were generally sufficient.



*Office Lighting*



*Storage Room Lighting*

Exterior fixtures include wall packs and canopy light fixtures. Wall packs contain metal halide lamps, and canopy light fixtures contain LED and incandescent lamps.

Exterior light fixtures are controlled by a time clock.



*Front Entryway*



*Side Door*

## 2.5 Air Handling Systems

### Water-Source Heat Pumps

There are approximately 23 water-source heat pump units located in the ceilings throughout the building. There are 20 McQuay units, each with a cooling capacity of 2 tons and a heating capacity of 14 MBh. There are three ClimateMaster units with a cooling capacity of 1 ton, and a heating capacity of 15 MBh. The units are served by a hot water boiler and outdoor cooling tower. The units appear to be in good condition.

### Split-System and Mini-Split Air Conditioners

The first floor offices and 911 services area use split-system air conditioning (AC) units with outdoor condensers and indoor furnaces with cooling components. The first floor offices and second floor classrooms A & B are served by a 5 ton unit, while the 911 services area is served by a 4 ton unit. They each have an efficiency of 12 EER. They are ENERGY STAR® labeled.

The server room is cooled by a Panasonic ductless mini-split air conditioner model CS-KS36 with a cooling capacity of 34,000 Btu/hr.



*Water-Source Heat Pump*



*Water-Source Heat Pump*

## 2.6 Heating Systems

The building is heated by a combination of natural gas-fired furnaces and a hot water boiler loop.

One H.B. Smith 520 MBh hot water boiler serves some of the building heating load. The burner is non-modulating with a nominal efficiency of 86%. The boiler is configured in an automated control scheme based on an outdoor temperature sensor. The boiler is reaching the end of its useful life but is in good condition. There is a service contract in place to maintain the boiler.

The hydronic distribution system is a two-pipe heating only system.

The heating loop is configured in a constant flow primary distribution with a 3 hp constant speed hot water pump operating on an automated control scheme. The boilers provide hot water to water-source heat pumps located in the ceilings throughout the building.

Hot water is supplied at 160°F when the outside air temperature is low, and the setpoint adjusts linearly to 140°F when the outside air is above 60°F.

The majority of the building is served by four Rheem natural gas furnaces with a capacity of 80 MBH and an efficiency of 80%. The 911 Services area is served by two units, and the 1<sup>st</sup> floor offices and 2<sup>nd</sup> floor classrooms A & B are served by two units. The furnaces are relatively new, and in good condition.



*Hot Water Boiler*



*Natural-Gas Furnace*

## 2.7 Domestic Hot Water

Hot water is produced by a 40-gallon electric storage water heater and a 52-gallon gas-fired storage water heater. The electric unit has a heating capacity of 4.5 kW, and the gas-fired unit has a heating capacity of 38 MBh and an efficiency of 84%.

At the time of the site visit, the domestic water heaters were set at 120°F.

The domestic hot water pipes are insulated, and the insulation is in good condition.



*Electric Water Heater*



*Natural Gas Water Heater*

## 2.8 Plug Load & Vending Machines

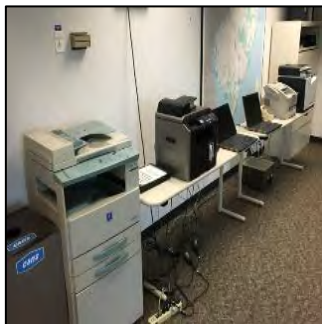
The utility bill analysis indicates that plug loads consume approximately 27% of total building energy use. This is higher than a typical building.

You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area as well as Energy Efficient Best Practices.

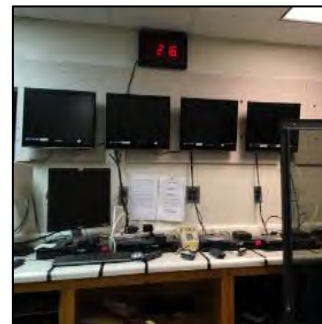
There are 74 computer work stations with desktop computers and LCD monitors throughout the facility. Plug loads throughout the building include general office equipment and some kitchen appliances. There are typical office loads such as LCD televisions, desk printers, photocopiers, paper shredders, projectors, phones, laminator, computer server, and radio equipment.

There are five residential style refrigerators throughout the building that are used to store lunches and beverages. These vary in condition and efficiency. There are also electric stoves, water coolers, coffee makers, microwave ovens, and water fountains.

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

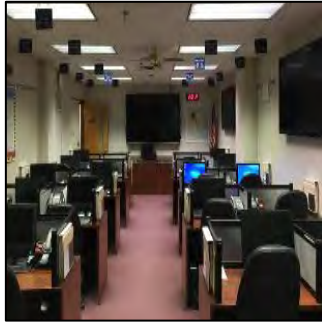


*Photocopiers and printers*



*LCD monitors*





*Desktop Computers*



*LCD monitors*

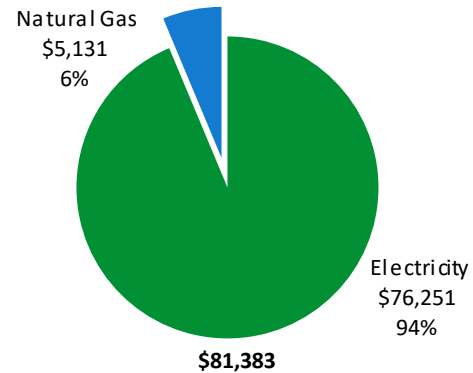
## 2.9 Water-Using Systems

There are 11 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.0 gallons per minute (gpm) or lower. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 1.7 gpf.

### 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	518,483 kWh	\$76,251
Natural Gas	4,214 Therms	\$5,131
<b>Total</b>		<b>\$81,383</b>



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

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

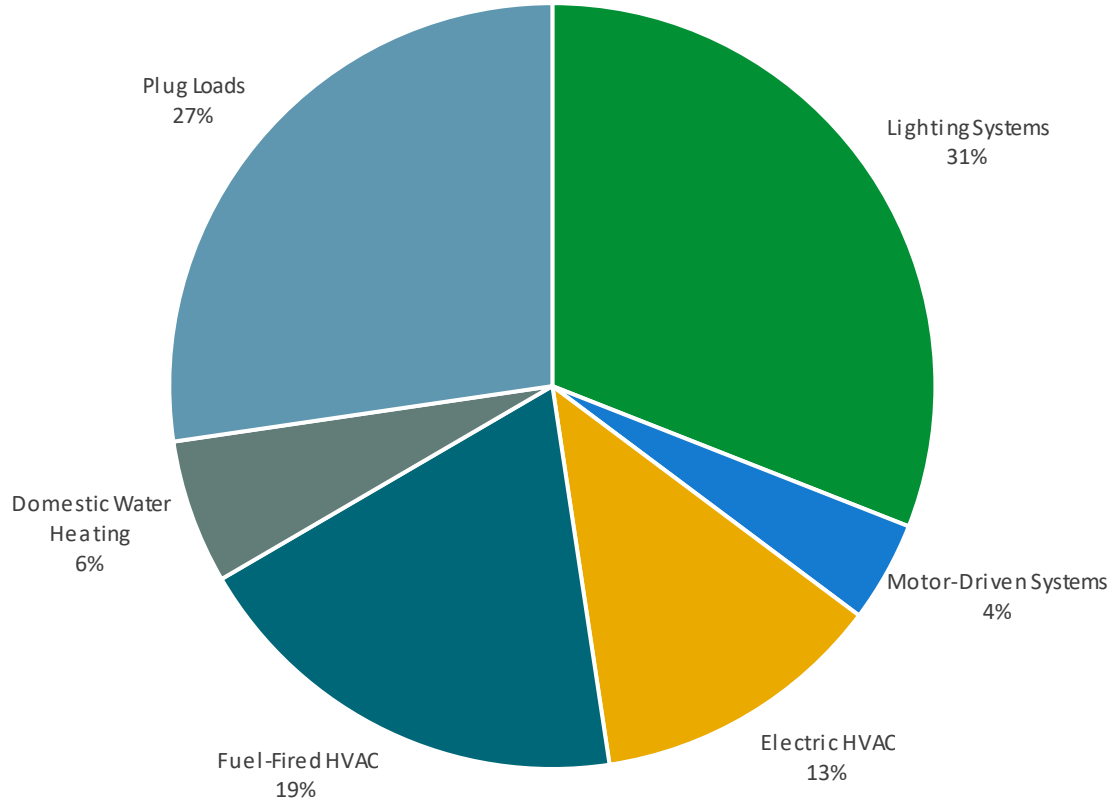
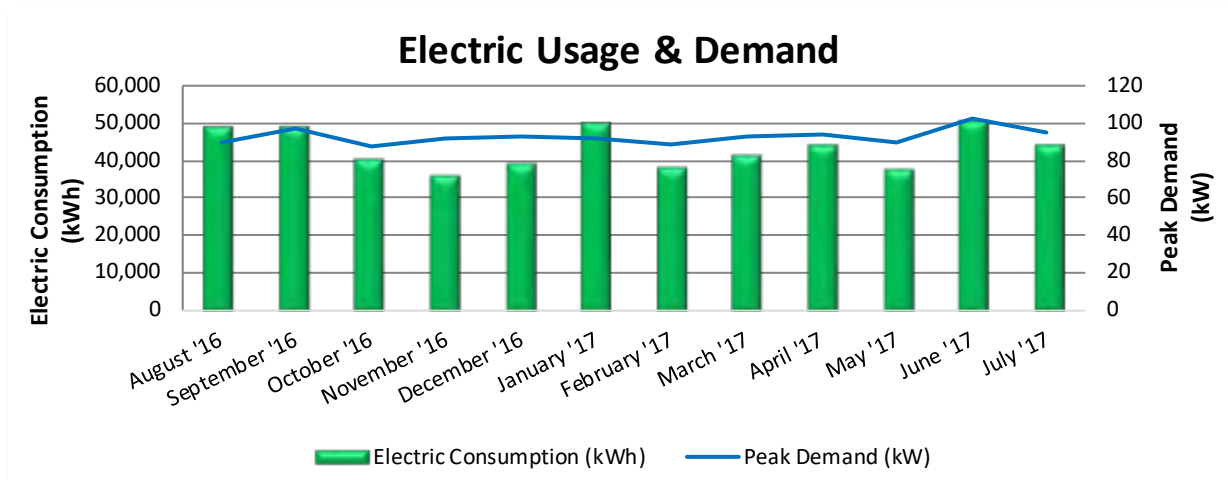


Figure 5 - Energy Balance

### 3.1 Electricity

Atlantic City Electric delivers electricity under rate class General Service, with electric production provided by NewEnergy Inc., a third-party supplier.



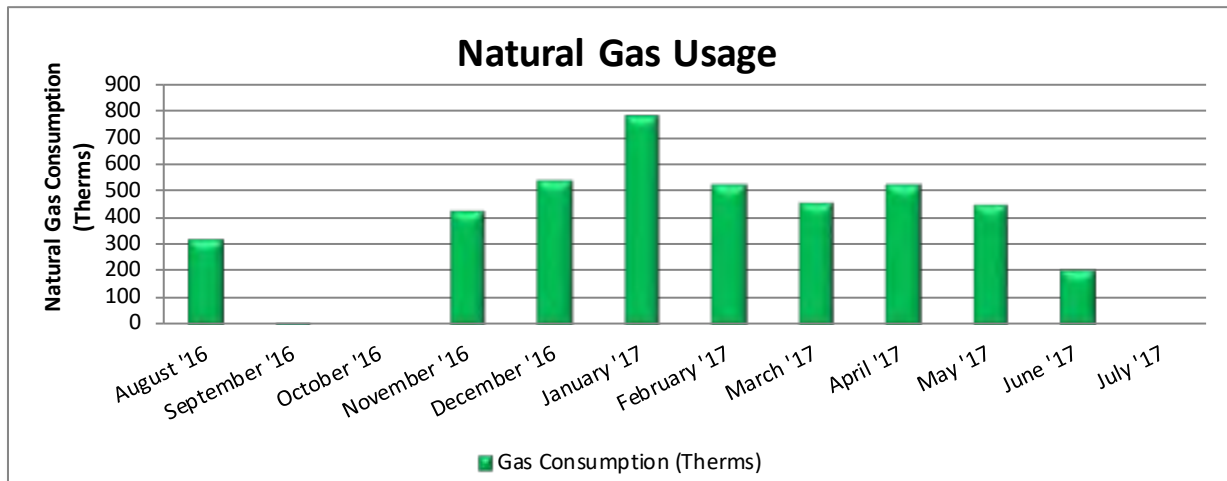
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
8/18/16	29	48,531	90	\$615	\$6,956
9/19/16	32	48,597	97	\$742	\$7,037
10/19/16	30	40,047	88	\$638	\$5,919
11/15/16	27	35,805	92	\$577	\$5,350
12/14/16	29	38,779	93	\$622	\$5,793
1/18/17	35	49,432	92	\$747	\$7,247
2/15/17	28	38,049	89	\$593	\$5,659
3/17/17	30	41,356	93	\$642	\$6,161
4/19/17	33	43,954	94	\$708	\$6,544
5/17/17	28	37,243	90	\$595	\$5,550
6/20/17	34	50,138	102	\$850	\$7,188
7/18/17	28	43,711	95	\$695	\$6,429
<b>Totals</b>	<b>363</b>	<b>515,642</b>	<b>102</b>	<b>\$8,025</b>	<b>\$75,834</b>
<b>Annual</b>	<b>365</b>	<b>518,483</b>	<b>102</b>	<b>\$8,069</b>	<b>\$76,251</b>

Notes:

- Peak demand of 102 kW occurred in June 2017.
- The average electric cost over the past 12 months was \$0.147/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

### 3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service, with natural gas supply provided by Woodruff Energy, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
8/18/16	30	321	\$385
9/19/16	32	1	\$32
10/19/16	30	0	\$29
11/15/16	27	425	\$538
12/14/16	29	537	\$680
1/18/17	35	780	\$904
2/15/17	28	518	\$603
3/17/17	30	450	\$528
4/19/17	33	518	\$607
5/17/17	28	444	\$517
6/20/17	34	209	\$265
7/18/17	28	0	\$27
<b>Totals</b>	<b>364</b>	<b>4,202</b>	<b>\$5,117</b>
<b>Annual</b>	<b>365</b>	<b>4,214</b>	<b>\$5,131</b>

Notes:

- The average gas cost for the past 12 months is \$1.218/therm, 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.

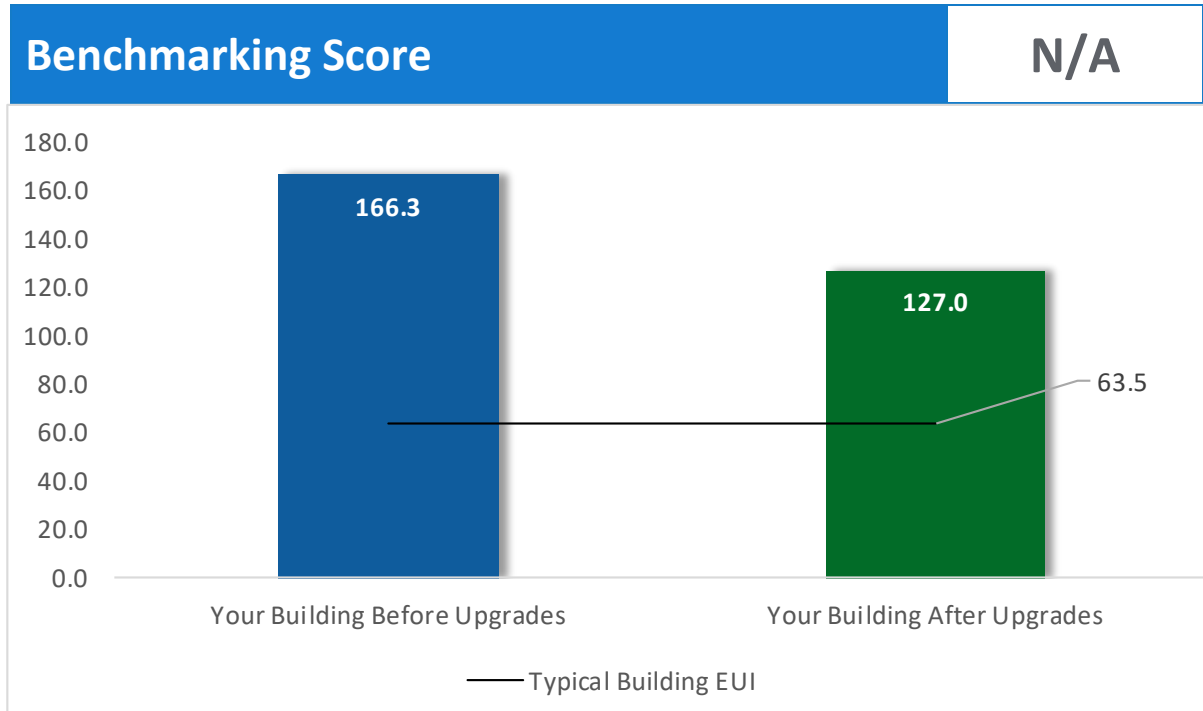


Figure 6 - Energy Use Intensity Comparison

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<sup>3</sup>.

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<sup>3</sup> <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>

## 4 ENERGY CONSERVATION MEASURES

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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**

The 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 (\$)	Lifetime Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>132,872</b>	<b>18.3</b>	<b>-28</b>	<b>\$19,201</b>	<b>\$288,009</b>	<b>\$26,471</b>	<b>\$4,657</b>	<b>\$21,814</b>	<b>1.1</b>	<b>130,528</b>
ECM 1	Install LED Fixtures	1,191	0.2	0	\$175	\$2,628	\$3,864	\$400	\$3,464	19.8	1,200
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	97,288	12.9	-21	\$14,055	\$210,832	\$15,157	\$2,481	\$12,676	0.9	95,542
ECM 3	Retrofit Fixtures with LED Lamps	34,393	5.2	-7	\$4,970	\$74,549	\$7,450	\$1,776	\$5,674	1.1	33,787
<b>Lighting Control Measures</b>		<b>23,112</b>	<b>3.1</b>	<b>-5</b>	<b>\$3,339</b>	<b>\$26,712</b>	<b>\$13,796</b>	<b>\$2,400</b>	<b>\$11,396</b>	<b>3.4</b>	<b>22,697</b>
ECM 4	Install Occupancy Sensor Lighting Controls	20,448	2.8	-4	\$2,954	\$23,633	\$11,996	\$1,490	\$10,506	3.6	20,081
ECM 5	Install High/Low Lighting Controls	2,664	0.3	-1	\$385	\$3,079	\$1,800	\$910	\$890	2.3	2,616
<b>Gas Heating (HVAC/Process) Replacement</b>		<b>0</b>	<b>0.0</b>	<b>26</b>	<b>\$319</b>	<b>\$6,384</b>	<b>\$7,250</b>	<b>\$1,600</b>	<b>\$5,650</b>	<b>17.7</b>	<b>3,069</b>
	Install High Efficiency Furnaces	0	0.0	26	\$319	\$6,384	\$7,250	\$1,600	\$5,650	17.7	3,069
<b>Domestic Water Heating Upgrade</b>		<b>3,435</b>	<b>0.0</b>	<b>0</b>	<b>\$505</b>	<b>\$5,051</b>	<b>\$22</b>	<b>\$0</b>	<b>\$22</b>	<b>0.0</b>	<b>3,459</b>
ECM 6	Install Low-Flow DHW Devices	3,435	0.0	0	\$505	\$5,051	\$22	\$0	\$22	0.0	3,459
<b>Food Service &amp; Refrigeration Measures</b>		<b>1,954</b>	<b>0.2</b>	<b>0</b>	<b>\$287</b>	<b>\$1,437</b>	<b>\$460</b>	<b>\$0</b>	<b>\$460</b>	<b>1.6</b>	<b>1,968</b>
ECM 7	Vending Machine Control	1,954	0.2	0	\$287	\$1,437	\$460	\$0	\$460	1.6	1,968
<b>TOTALS</b>		<b>161,373</b>	<b>21.6</b>	<b>-7</b>	<b>\$23,651</b>	<b>\$327,593</b>	<b>\$47,999</b>	<b>\$8,657</b>	<b>\$39,342</b>	<b>1.7</b>	<b>161,721</b>

\* - 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 (\$)	Lifetime Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>132,872</b>	<b>18.3</b>	<b>-28</b>	<b>\$19,201</b>	<b>\$288,009</b>	<b>\$26,471</b>	<b>\$4,657</b>	<b>\$21,814</b>	<b>1.1</b>	<b>130,528</b>
ECM 1	Install LED Fixtures	1,191	0.2	0	\$175	\$2,628	\$3,864	\$400	\$3,464	19.8	1,200
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	97,288	12.9	-21	\$14,055	\$210,832	\$15,157	\$2,481	\$12,676	0.9	95,542
ECM 3	Retrofit Fixtures with LED Lamps	34,393	5.2	-7	\$4,970	\$74,549	\$7,450	\$1,776	\$5,674	1.1	33,787
<b>Lighting Control Measures</b>		<b>23,112</b>	<b>3.1</b>	<b>-5</b>	<b>\$3,339</b>	<b>\$26,712</b>	<b>\$13,796</b>	<b>\$2,400</b>	<b>\$11,396</b>	<b>3.4</b>	<b>22,697</b>
ECM 4	Install Occupancy Sensor Lighting Controls	20,448	2.8	-4	\$2,954	\$23,633	\$11,996	\$1,490	\$10,506	3.6	20,081
ECM 5	Install High/Low Lighting Controls	2,664	0.3	-1	\$385	\$3,079	\$1,800	\$910	\$890	2.3	2,616
<b>Domestic Water Heating Upgrade</b>		<b>3,435</b>	<b>0.0</b>	<b>0</b>	<b>\$505</b>	<b>\$5,051</b>	<b>\$22</b>	<b>\$0</b>	<b>\$22</b>	<b>0.0</b>	<b>3,459</b>
ECM 6	Install Low-Flow DHW Devices	3,435	0.0	0	\$505	\$5,051	\$22	\$0	\$22	0.0	3,459
<b>Food Service &amp; Refrigeration Measures</b>		<b>1,954</b>	<b>0.2</b>	<b>0</b>	<b>\$287</b>	<b>\$1,437</b>	<b>\$460</b>	<b>\$0</b>	<b>\$460</b>	<b>1.6</b>	<b>1,968</b>
ECM 7	Vending Machine Control	1,954	0.2	0	\$287	\$1,437	\$460	\$0	\$460	1.6	1,968
<b>TOTALS</b>		<b>161,373</b>	<b>21.6</b>	<b>-7</b>	<b>\$23,651</b>	<b>\$327,593</b>	<b>\$47,999</b>	<b>\$8,657</b>	<b>\$39,342</b>	<b>1.7</b>	<b>161,721</b>

\* - 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>132,872</b>	<b>18.3</b>	<b>-28</b>	<b>\$19,201</b>	<b>\$26,471</b>	<b>\$4,657</b>	<b>\$21,814</b>	<b>1.1</b>	<b>130,528</b>
ECM 1	Install LED Fixtures	1,191	0.2	0	\$175	\$3,864	\$400	\$3,464	19.8	1,200
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	97,288	12.9	-21	\$14,055	\$15,157	\$2,481	\$12,676	0.9	95,542
ECM 3	Retrofit Fixtures with LED Lamps	34,393	5.2	-7	\$4,970	\$7,450	\$1,776	\$5,674	1.1	33,787

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

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

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

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

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

**Affected building areas:** exterior fixtures

### **ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers**

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

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

**Affected building areas:** all areas with fluorescent fixtures with T12 tubes

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

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

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

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

## 4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>		<b>23,112</b>	<b>3.1</b>	<b>-5</b>	<b>\$3,339</b>	<b>\$13,796</b>	<b>\$2,400</b>	<b>\$11,396</b>	<b>3.4</b>	<b>22,697</b>
ECM 4	Install Occupancy Sensor Lighting Controls	20,448	2.8	-4	\$2,954	\$11,996	\$1,490	\$10,506	3.6	20,081
ECM 5	Install High/Low Lighting Controls	2,664	0.3	-1	\$385	\$1,800	\$910	\$890	2.3	2,616

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 rooms, restrooms, 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 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Reduction (lbs)
	<b>Gas Heating (HVAC/Process) Replacement</b>	<b>0</b>	<b>0.0</b>	<b>26</b>	<b>\$319</b>	<b>\$7,250</b>	<b>\$1,600</b>	<b>\$5,650</b>	<b>17.7</b>	<b>3,069</b>
	Install High Efficiency Furnaces	0	0.0	26	\$319	\$7,250	\$1,600	\$5,650	17.7	3,069

### **Install High Efficiency Furnaces**

We evaluated replacement of the standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases which can significantly improve furnace efficiency. Savings result from improved system efficiency. Note: these units produce acidic condensate that requires proper drainage.

The measure is not projected to pay for itself in energy savings within the expected useful life of the replacement equipment, however, condensing furnaces should be considered when the units are replaced.

## 4.4 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>		<b>3,435</b>	<b>0.0</b>	<b>0</b>	<b>\$505</b>	<b>\$22</b>	<b>\$0</b>	<b>\$22</b>	<b>0.0</b>	<b>3,459</b>
ECM 6	Install Low-Flow DHW Devices	3,435	0.0	0	\$505	\$22	\$0	\$22	0.0	3,459

### **ECM 6: Install Low-Flow DHW Devices**

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

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

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. [Pre-rinse spray valves (PRSVs)—often used in commercial and institutional kitchens—remove food waste from dishes prior to dishwashing.]

Additional cost savings may result from reduced water usage.

## 4.5 Food Service & Refrigeration Measures

#	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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Food Service &amp; Refrigeration Measures</b>		<b>1,954</b>	<b>0.2</b>	<b>0</b>	<b>\$287</b>	<b>\$460</b>	<b>\$0</b>	<b>\$460</b>	<b>1.6</b>	<b>1,968</b>
ECM 7	Vending Machine Control	1,954	0.2	0	\$287	\$460	\$0	\$460	1.6	1,968

### **ECM 7: Vending Machine Control**

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and, they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

## 5 ENERGY EFFICIENT BEST PRACTICES

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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<sup>4</sup>. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

### **Weatherization**

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment.

### **Doors and Windows**

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

### **Window Treatments/Coverings**

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

### **Lighting Maintenance**



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

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

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<sup>4</sup> <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.

## **Fans to Reduce Cooling Load**

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

## **AC System Evaporator/Condenser Coil Cleaning**

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

## **HVAC Filter Cleaning and Replacement**

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

## **Boiler Maintenance**

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. 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.

## **Furnace Maintenance**

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas/carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

## **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.

### **Plug Load Controls**



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips<sup>5</sup>. Your local utility may offer incentives or rebates for this equipment.

### **Computer Monitor Replacement**

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

### **Computer Power Management Software**

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

### **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 gpf and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

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<sup>5</sup> For additional information refer to “Assessing and Reducing Plug and Process Loads in Office Buildings” <http://www.nrel.gov/docs/fy13osti/54175.pdf>, or “Plug Load Best Practices Guide” <http://www.advancedbuildings.net/plug-load-best-practices-guide-offices>

For more information regarding water conservation go to the EPA's WaterSense™ website<sup>6</sup> or download a copy of EPA's "WaterSense™ at Work: Best Management Practices for Commercial and Institutional Facilities"<sup>7</sup> to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

### **Procurement Strategies**

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

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<sup>6</sup> <https://www.epa.gov/watersense>

<sup>7</sup> <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 **medium** potential for installing a PV array.

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

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

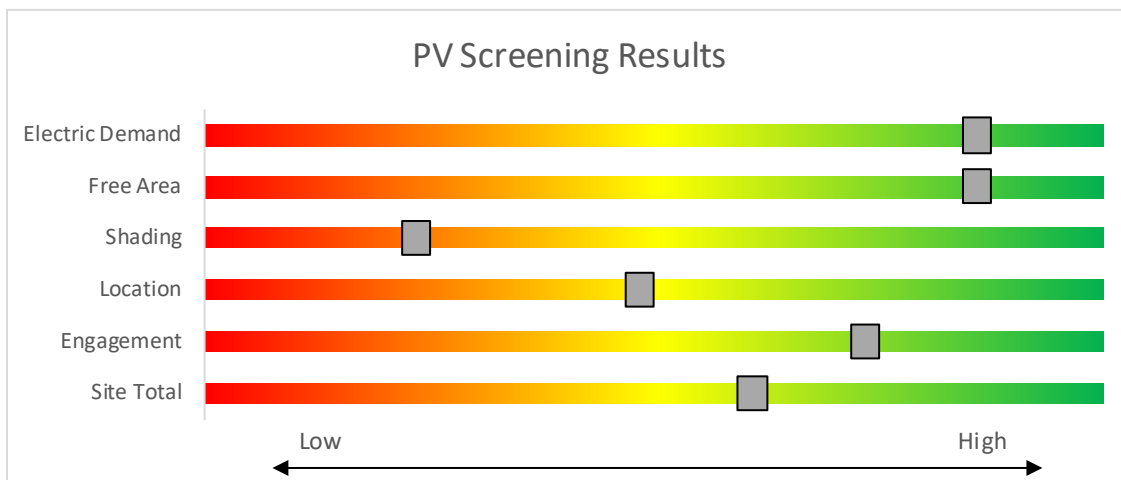


Figure 9 - Photovoltaic Screening

## 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](http://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](http://www.njcleanenergy.com/whysolar)
- **NJ Solar Market FAQs:** [www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs](http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs)
- **Approved Solar Installers in the NJ Market:** [www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved\\_vendorsearch/?id=60&start=1](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1)

## 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.

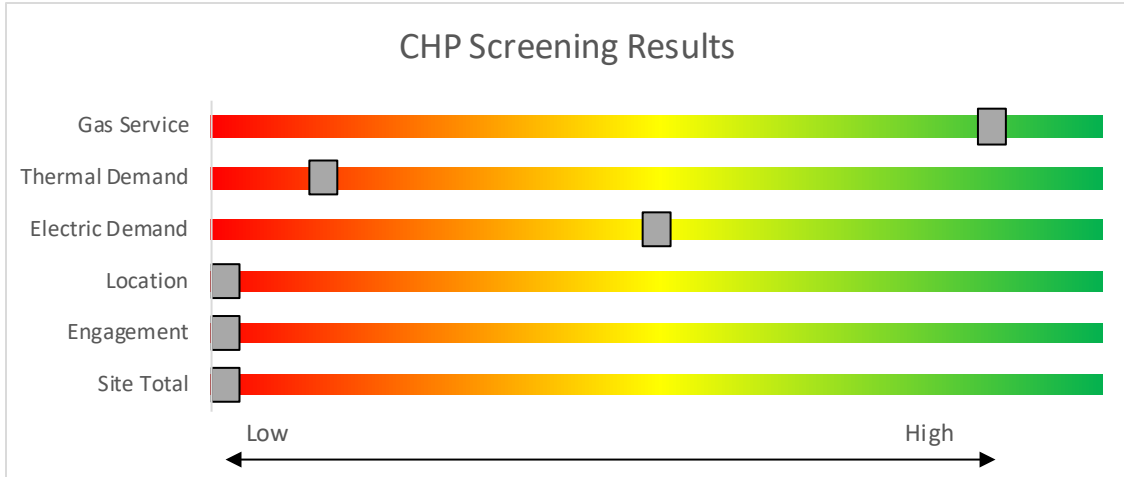
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be 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/](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 in New Jersey’s Clean Energy Programs.

	<b>SmartStart</b> <i>Flexibility to install at your own pace</i>	<b>Direct Install</b> <i>Turnkey installation</i>	<b>Pay for Performance</b> <i>Whole building upgrades</i>
<b>Who should use it?</b>	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.
<b>How does it work?</b>	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.
<b>What are the Incentives?</b>	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.
<b>How do I participate?</b>	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 <a href="http://www.njcleanenergy.com">www.njcleanenergy.com</a> 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](http://www.njcleanenergy.com/SSB) for a detailed program description, instructions for applying, and applications.

## 7.2 Direct Install



Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for

installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

### Incentives

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

### How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program, which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Detailed program descriptions and applications can be found at: [www.njcleanenergy.com/DI](http://www.njcleanenergy.com/DI).



## 7.3 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](http://www.njcleanenergy.com/ESIP).

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

## 7.4 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](http://www.njcleanenergy.com/srec).

## 8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

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### 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<sup>8</sup>.

### 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<sup>9</sup>.

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<sup>8</sup> [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).

<sup>9</sup> [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html)

# APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

## Lighting Inventory & Recommendations

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Basement Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.0	234	0	\$34	\$37	\$10	0.8
Lobby	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	6,552	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	6,552	0.0	350	0	\$51	\$55	\$15	0.8
Boiler Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	6,552	2	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.2	1,252	0	\$181	\$206	\$30	1.0
Electrical Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	6,552	2	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.1	835	0	\$121	\$138	\$20	1.0
Phone Center	16	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	1.9	15,395	-3	\$2,224	\$2,434	\$390	0.9
Monitor Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.2	1,924	0	\$278	\$507	\$75	1.6
Executive Offices	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.7	5,773	-1	\$834	\$980	\$155	1.0
Message Center Offices	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.5	3,849	-1	\$556	\$743	\$115	1.1
Kitchen	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.2	1,924	0	\$278	\$507	\$75	1.6
NJDOH Office	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.2	1,924	0	\$278	\$507	\$75	1.6
Records Room	1	Compact Fluorescent: Screw-In: (13W) - 1L	Wall Switch	S	13	6,552	3	Relamp	No	1	LED Screw-In Lamps: Screw-In LED (9W) - 1L	Wall Switch	9	6,552	0.0	28	0	\$4	\$17	\$1	4.0
Radio Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.4	2,887	-1	\$417	\$625	\$95	1.3
Server Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	6,552	2,4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,521	0.1	962	0	\$139	\$408	\$55	2.5
Storage Room	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.2	1,924	0	\$278	\$507	\$40	1.7
Restroom	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	730	0.1	93	0	\$13	\$118	\$20	7.3
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.0	234	0	\$34	\$37	\$10	0.8
Storage Room	1	Compact Fluorescent: Screw-In: (18W) - 1L	Wall Switch	S	18	6,552	3	Relamp	No	1	LED Screw-In Lamps: Screw-In LED (9W) - 1L	Wall Switch	9	6,552	0.0	64	0	\$9	\$17	\$1	1.8
Men's RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.0	26	0	\$4	\$37	\$10	7.1
Water Heater Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	S	60	6,552	3	Relamp	No	1	LED Screw-In Lamps: Screw-In LED (9W) - 1L	Wall Switch	9	6,552	0.0	361	0	\$52	\$17	\$1	0.3
Women's RR	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2,4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	504	0.1	107	0	\$15	\$408	\$55	22.8
Basement Corridor	7	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,5	Relamp & Reballast	Yes	7	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	4,521	0.8	6,736	-1	\$973	\$1,229	\$385	0.9
Basement Corridor	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Stairwell 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	6,552	3	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	6,552	0.0	371	0	\$54	\$55	\$15	0.7
Stairwell 1	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	6,552	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.1	417	0	\$60	\$69	\$10	1.0
Stairwell 1	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0

		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
Stairwell 2	2	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	S	46	6,552	2	Relamp & Reballast	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	6,552	0.1	446	0	\$64	\$101	\$10	1.4
1st Floor Main Entrance	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	6,552	0.1	835	0	\$121	\$118	\$20	0.8
1st Floor Main Entrance	3	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	S	9	6,552		None	No	3	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	6,552	0.0	0	0	\$0	\$0	\$0	0.0
1st Floor Main Entrance	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Elevator Lobby	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	6,552	0.1	410	0	\$59	\$145	\$20	2.1
Elevator Lobby	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
Men's/Women's RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.0	26	0	\$4	\$37	\$10	7.1
Front Desk	5	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 4	Relamp & Reballast	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.6	4,811	-1	\$695	\$862	\$135	1.0
Fire Marshall Office	5	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 4	Relamp & Reballast	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.6	4,811	-1	\$695	\$862	\$135	1.0
Admin Assistant Office	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.4	2,887	-1	\$417	\$625	\$95	1.3
Copy Room	3	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.4	2,887	-1	\$417	\$625	\$95	1.3
Confernece Room	6	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 4	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.7	5,773	-1	\$834	\$980	\$155	1.0
Emergency Management Office	5	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 4	Relamp & Reballast	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.6	4,811	-1	\$695	\$862	\$135	1.0
Emergency Management Corridor	3	Linear Fluorescent - T12: 4' T12 (40W) - 3L	Wall Switch	S	127	6,552	2, 5	Relamp & Reballast	Yes	3	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	4,521	0.3	2,059	0	\$297	\$493	\$150	1.2
Emergency Management Corridor	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
911 Center	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.8	6,282	-1	\$908	\$1,416	\$310	1.2
911 Center	5	Incandescent: Screw-In: (76W) - 1L	Wall Switch	S	75	6,552	3, 4	Relamp	Yes	5	LED Screw-In Lamps: Screw-In LED (9W) - 1L	Occupancy Sensor	9	4,521	0.3	2,434	-1	\$352	\$356	\$40	0.9
911 Center	3	LED Screw-In Lamps: Screw-In: (20W) - 1L	Wall Switch	S	20	6,552	4	None	Yes	3	LED Screw-In Lamps: Screw-In: (20W) - 1L	Occupancy Sensor	20	4,521	0.0	132	0	\$19	\$0	\$0	0.0
911 Center	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
911 Center	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,521	0.1	555	0	\$80	\$415	\$55	4.5
911 Center	1	Compact Fluorescent: Plug-In: (26W) - 1L	Wall Switch	S	26	6,552	3	Relamp	No	1	LED Screw-In Lamps: Plug-In LED (9W) - 1L	Wall Switch	9	6,552	0.0	120	0	\$17	\$25	\$0	1.5
Restroom Corridor	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 5	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	4,521	0.2	1,924	0	\$278	\$437	\$110	1.2
Closet	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	S	9	6,552		None	No	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	6,552	0.0	0	0	\$0	\$0	\$0	0.0
Men's RR	1	Linear Fluorescent - T12: 2' T12 (20W) - 2L	Wall Switch	S	50	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	730	0.0	26	0	\$4	\$65	\$6	15.6
Men's RR	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	730	0.0	23	0	\$3	\$72	\$10	18.9

		Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis							
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Men's RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	730	0.1	93	0	\$13	\$118	\$20	7.3
Women's RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	730	0.1	93	0	\$13	\$118	\$20	7.3
Women's RR	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	730	0.0	23	0	\$3	\$72	\$10	18.9
Women's RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.1	47	0	\$7	\$69	\$10	8.7
Back RR Corridor	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
911 Center 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,521	0.1	1,189	0	\$172	\$416	\$75	2.0
911 Center 2	12	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	6,552	2, 4	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,521	0.7	5,773	-1	\$834	\$1,365	\$190	1.4
911 Center 2	3	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	S	72	6,552	2, 4	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,521	0.1	1,045	0	\$151	\$584	\$65	3.4
911 Center 2	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Chief Communications Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,521	0.1	594	0	\$86	\$189	\$40	1.7
Mechanical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.1	467	0	\$67	\$73	\$20	0.8
Emergency Services Corridor 2	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	4,521	0.3	2,221	0	\$321	\$980	\$360	1.9
Emergency Services Corridor 2	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
Communications Chief Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	6,552	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,521	0.3	2,674	-1	\$386	\$599	\$125	1.2
Office 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	6,552	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,521	0.2	1,337	0	\$193	\$434	\$80	1.8
Fire Academy Director Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	6,552	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	4,521	0.3	2,674	-1	\$386	\$599	\$125	1.2
Emergency Services Computer Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,521	0.1	891	0	\$129	\$380	\$65	2.4
Mechanical Room/Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	4,521	0.1	891	0	\$129	\$380	\$30	2.7
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	6,552	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	6,552	0.0	234	0	\$34	\$37	\$10	0.8
2nd Floor Small Hallway	2	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2, 5	Relamp & Reballast	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	4,521	0.2	1,924	0	\$278	\$437	\$110	1.2
Elevator Hallway	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,552	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	4,521	0.1	555	0	\$80	\$345	\$90	3.2
Elevator 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
Men's/Women's RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.0	26	0	\$4	\$37	\$10	7.1
PSEG Room A&B	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	624	3, 4	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	431	1.0	764	0	\$110	\$1,796	\$375	12.9
NRC Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.2	1,570	0	\$227	\$489	\$95	1.7

Location	Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
PSEG Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3,4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.8	6,282	-1	\$908	\$1,416	\$310	1.2
PSEG Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,552	3,4	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,521	0.1	833	0	\$120	\$487	\$65	3.5
PSEG Office	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
PSEG Conference Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3,4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.4	3,141	-1	\$454	\$708	\$155	1.2
PSEG Conference Room	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	6,552	3,4	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	4,521	0.1	833	0	\$120	\$487	\$65	3.5
PSEG Men's/Women's RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.0	26	0	\$4	\$37	\$10	7.1
Hallway RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	730	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.0	26	0	\$4	\$37	\$10	7.1
A/V Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3,4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.3	2,094	0	\$303	\$562	\$115	1.5
Meeting Room	22	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	22	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	2.6	21,169	-5	\$3,058	\$3,414	\$545	0.9
Meeting 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
Meeting Room Side Room	4	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	6,552	2,4	Relamp & Reballast	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	4,521	0.5	3,849	-1	\$556	\$743	\$115	1.1
Meeting Room Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	6,552	0.0	396	0	\$57	\$73	\$20	0.9
RR Corridor	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
RR Corridor	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	6,552	3,5	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	4,521	0.1	1,047	0	\$151	\$346	\$110	1.6
Meeting Room Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	S	60	6,552	3	Relamp	No	1	LED Screw-In Lamps: Screw-In LED (9W) - 1L	Wall Switch	9	6,552	0.0	361	0	\$52	\$17	\$1	0.3
Men's RR	1	Linear Fluorescent - T12: 3' T12 (30W) - 2L	Wall Switch	S	79	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 3' Lamps	Wall Switch	21	730	0.1	46	0	\$7	\$69	\$10	8.9
Men's RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	730	0.1	93	0	\$13	\$118	\$20	7.3
Women's RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	S	176	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	730	0.1	93	0	\$13	\$118	\$20	7.3
Women's RR	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	730	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.1	47	0	\$7	\$69	\$10	8.7
Main Entry	2	LED Screw-In Lamps: Screw-In: (20W) - 1L	Timeclock		20	4,380		None	No	2	LED Screw-In Lamps: Screw-In: (20W) - 1L	Timeclock	20	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Building Lights (Wall Packs)	4	Metal Halide: (1) 100W Lamp	Timeclock		128	4,380	1	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	60	4,380	0.2	1,191	0	\$175	\$3,864	\$400	19.8
Side Entry	2	Incandescent: Screw-In: (60W) - 1L	Timeclock		60	4,380	3	Relamp	No	2	LED Screw-In Lamps: Screw-In LED (9W) - 1L	Timeclock	9	4,380	0.1	447	0	\$66	\$34	\$2	0.5

### Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
		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 Supply	1	Heating Hot Water Pump	3.0	89.5%	No	W	2,745		No	89.5%	No		0.0	0	0	\$0	\$0	\$0	0.0
Exterior Cooling Tower	Cooling Tower Fans	1	Cooling Tower Fan	1.5	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	\$0	\$0	\$0	0.0
Ceiling Units	Whole building supply	23	Supply Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Cooling tower condensor pump	Cooling supply	1	Condenser Water Pump	1.5	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler Room	Sprinkler System	2	Process Pump	0.8	81.1%	No	W	20		No	81.1%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler Room	Heating Supply	1	Heating Hot Water Pump	0.3	69.5%	No	W	2,745		No	69.5%	No		0.0	0	0	\$0	\$0	\$0	0.0
Furnace Room	Furnace Heating Supply	4	Process Blower	0.8	81.1%	No	W	2,745		No	81.1%	No		0.0	0	0	\$0	\$0	\$0	0.0
Elevator Machine Room	Elevator	1	Process Pump	20.0	72.0%	No	W	60		No	72.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler Room	Boiler	1	Combustion Air Fan	0.3	65.0%	No	W	1,245		No	65.0%	No		0.0	0	0	\$0	\$0	\$0	0.0

### Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis					
		System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	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
Room Ceilings	Whole Building	3	Water Source HP	1.00	15.00	N		No						0.0	0	0	\$0	\$0	\$0	0.0
Room Ceilings	Whole Building	20	Water Source HP	2.00	14.00	W		No						0.0	0	0	\$0	\$0	\$0	0.0
Server Room	Server Room	1	Ductless Mini-Split AC	2.83		W		No						0.0	0	0	\$0	\$0	\$0	0.0
Exterior	1st Floor Offices / 2nd Floor Classrooms A&B	2	Split-System AC	5.00		W		No						0.0	0	0	\$0	\$0	\$0	0.0
Exterior	911 Services Area	2	Split-System AC	4.00		W		No						0.0	0	0	\$0	\$0	\$0	0.0



### Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
		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	Whole Building Supplemental Heat	1	Non-Condensing Hot Water Boiler	520.00	W		No						0.0	0	0	\$0	\$0	\$0	0.0
Furnace Room	911 Services Area	2	Furnace	80.00	W	NR	Yes	2	Furnace	80.00	95.00%	AFUE	0.0	0	13	\$160	\$3,625	\$800	17.7
Furnace Room	1st Floor Offices	1	Furnace	80.00	W	NR	Yes	1	Furnace	80.00	95.00%	AFUE	0.0	0	7	\$80	\$1,813	\$400	17.7
Furnace Room	2nd Floor Classroom A & B	1	Furnace	80.00	W	NR	Yes	1	Furnace	80.00	95.00%	AFUE	0.0	0	7	\$80	\$1,813	\$400	17.7

### 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
Water Heater Closet	(Whole Building)	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	\$0	\$0	\$0	0.0
Water Heater Closet	Emergency Services	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
Men's RR	6	1	Faucet Aerator (Lavatory)	2.50	0.50	0.0	981	0	\$144	\$7	\$0	0.0
Men's RR	6	2	Faucet Aerator (Lavatory)	3.00	0.50	0.0	2,453	0	\$361	\$14	\$0	0.0

### Plug Load Inventory

Existing Conditions				
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified ?
Whole Building	74	Desktop Computers	150.0	Yes
Whole Building	30	LCD TVs	119.0	Yes
Whole Building	8	Laptops	45.0	Yes
Whole Building	11	Desk Printers	25.0	Yes
Whole Building	5	Photocopier	600.0	Yes
Whole Building	2	Electric stove/oven	1,500.0	No
Whole Building	5	Refrigerator	172.0	Yes
Whole Building	1	Electric Dryer	2,500.0	No
Whole Building	2	Paper Shredder	150.0	No
Whole Building	3	Microwave	1,000.0	No
Whole Building	6	Coffee Maker	900.0	No
Whole Building	2	Water Cooler	500.0	No
Whole Building	2	Water Fountain	150.0	No
Whole Building	3	Projector	200.0	Yes
Whole Building	85	Phones	30.0	No
Whole Building	4	Uninterrupted Power Service equipment	2,000.0	Yes
Data Center	1	Computer Servers	1,000.0	Yes
Whole Building	1	Laminator	400.0	Yes
Whole Building	1	Radio Equipment	250.0	Yes

### Vending Machine Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
	Quantity	Vending Machine Type	ECM #	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Main Entrance	1	Non-Refrigerated	7	Yes	0.0	343	0	\$50	\$230	\$0	4.6
2nd Floor Hallway	1	Refrigerated	7	Yes	0.2	1,612	0	\$237	\$230	\$0	1.0

## APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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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.

We were unable to generate an SEP for this site since this location includes a data center. Detailed IT meter data and additional information is needed to create an accurate score. The property is benchmarked in Portfolio Manager® for utility bill tracking purposes only.

## APPENDIX C: GLOSSARY

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

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

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