



# Local Government Energy Audit Report

Lakewood Fire District Station No. 2

November 5, 2024

*Prepared for:*

Lakewood Board of Fire Commissioners  
1350 Lanes Mill Road  
Lakewood, New Jersey 08701

*Prepared by:*

TRC  
317 George Street  
New Brunswick, New Jersey 08901



## Disclaimer

---

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

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

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

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

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

Copyright ©2024 TRC. All rights reserved.

Reproduction or distribution of the whole, or any part of the contents of this document without written permission of TRC is prohibited. Neither TRC nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any data, information, method, product, or process disclosed in this document, or represents that its use will not infringe upon any privately-owned rights, including but not limited to, patents, trademarks, or copyrights.

## Table of Contents

---

<b>1</b>	<b>Executive Summary .....</b>	<b>1</b>
1.1	Planning Your Project.....	4
	Pick Your Installation Approach .....	4
	Options from Your Utility Company.....	4
	Options from New Jersey's Clean Energy Program .....	5
<b>2</b>	<b>Existing Conditions .....</b>	<b>6</b>
2.1	Site Overview .....	6
2.2	Building Occupancy .....	6
2.3	Building Envelope.....	6
2.4	Lighting Systems.....	8
2.5	Air Handling Systems .....	9
	Unitary Electric HVAC Equipment .....	9
	Unitary Heating Equipment .....	10
	Infrared Heating.....	10
2.6	Domestic Hot Water .....	11
2.7	Food Service Equipment .....	12
2.8	Plug Load and Vending Machines .....	12
2.9	Water-Using Systems.....	13
<b>3</b>	<b>Energy and Water Use and Costs.....</b>	<b>14</b>
3.1	Electricity.....	16
3.2	Natural Gas .....	17
3.3	Water .....	18
3.4	Benchmarking .....	19
	Tracking your Energy Performance.....	20
3.5	Understanding Your Utility Bills .....	21
<b>4</b>	<b>Energy Conservation Measures .....</b>	<b>22</b>
4.1	Lighting Controls .....	25
	ECM 1: Install Occupancy Sensor Lighting Controls.....	25
	ECM 2: Install High/Low Lighting Controls.....	25
4.2	Motors.....	26
	ECM 3: Premium Efficiency Motors .....	26
4.3	Unitary HVAC .....	26

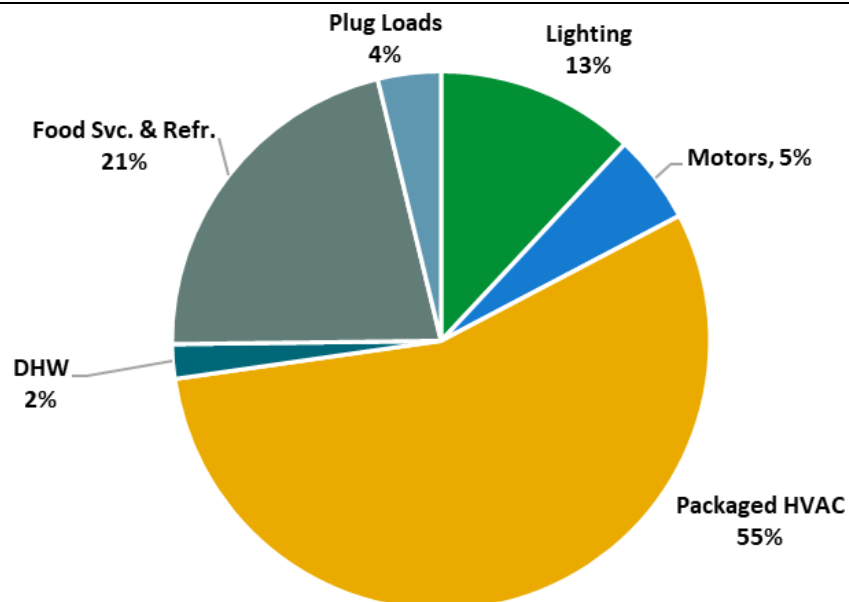
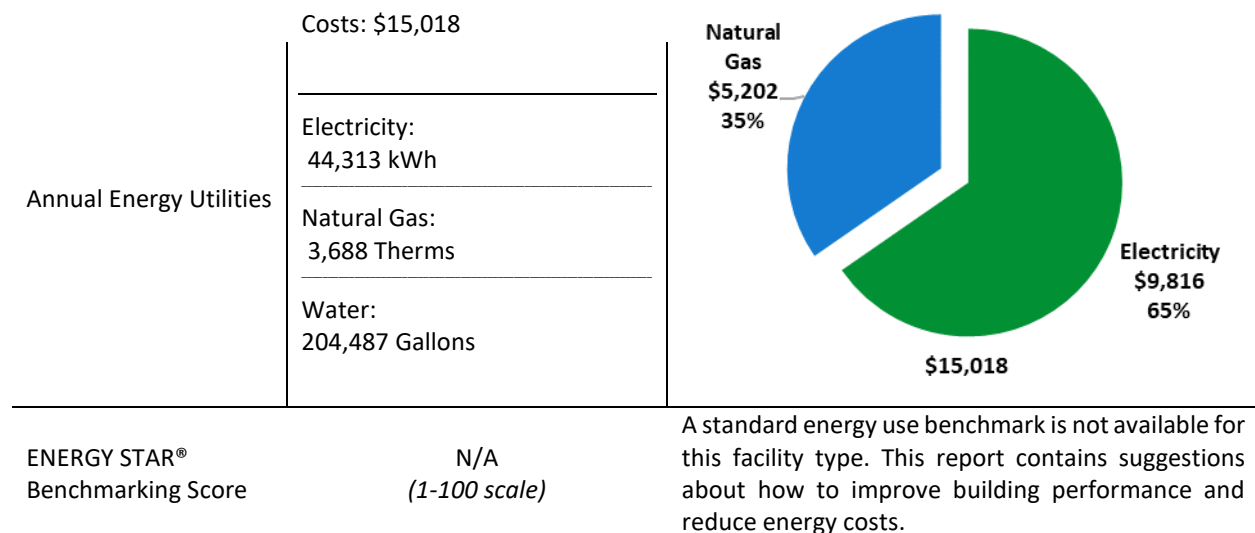
ECM 4: Install High Efficiency Air Conditioning Units .....	26
4.4 Gas-Fired Heating.....	27
ECM 5: Install Infrared Heaters.....	27
4.5 Domestic Water Heating.....	27
ECM 6: Install Tankless Water Heater.....	27
ECM 7: Install Low-Flow DHW Devices .....	27
4.6 Food Service and Refrigeration Measures .....	28
ECM 8: Replace Refrigeration Equipment.....	28
4.7 Custom Measures .....	28
ECM 9: Replace Gas Fired Water Heater with Heat Pump Water Heater .....	28
4.8 Measures for Future Consideration.....	30
Upgrade to a Heat Pump System .....	30
<b>5 Energy Efficient Best Practices.....</b>	<b>32</b>
Energy Tracking with ENERGY STAR Portfolio Manager .....	32
Doors and Windows.....	32
Window Treatments/Coverings.....	32
Lighting Maintenance .....	32
Lighting Controls .....	33
Motor Maintenance.....	33
Fans to Reduce Cooling Load .....	33
AC System Evaporator/Condenser Coil Cleaning.....	33
HVAC Filter Cleaning and Replacement.....	33
Ductwork Maintenance .....	33
Furnace Maintenance .....	34
Water Heater Maintenance .....	34
Compressed Air System Maintenance .....	34
Procurement Strategies .....	35
<b>6 Water Best Practices.....</b>	<b>36</b>
Getting Started.....	36
Leak Detection and Repair.....	36
Toilets and Urinals .....	36
Faucets and Showerheads .....	37
Vehicle Washing.....	38
Landscaping and Irrigation.....	38

<b>7</b>	<b>On-Site Generation .....</b>	<b>40</b>
7.1	Solar Photovoltaic .....	41
7.2	Combined Heat and Power .....	43
<b>8</b>	<b>Electric Vehicles .....</b>	<b>44</b>
8.1	EV Charging .....	44
<b>9</b>	<b>Project Funding and Incentives .....</b>	<b>46</b>
9.1	New Jersey's Clean Energy Program .....	47
9.2	Utility Energy Efficiency Programs .....	54
<b>10</b>	<b>Project Development .....</b>	<b>56</b>
<b>11</b>	<b>Energy Purchasing and Procurement Strategies .....</b>	<b>57</b>
11.1	Retail Electric Supply Options .....	57
11.2	Retail Natural Gas Supply Options .....	57
	<b>Appendix A: Equipment Inventory &amp; Recommendations .....</b>	<b>A-1</b>
	<b>Appendix B: ENERGY STAR Statement of Energy Performance .....</b>	<b>B-1</b>
	<b>Appendix C: Glossary .....</b>	<b>C-1</b>

# 1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) report for the Lakewood Fire District Station No. 2. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

## BUILDING PERFORMANCE REPORT



Energy Use by System

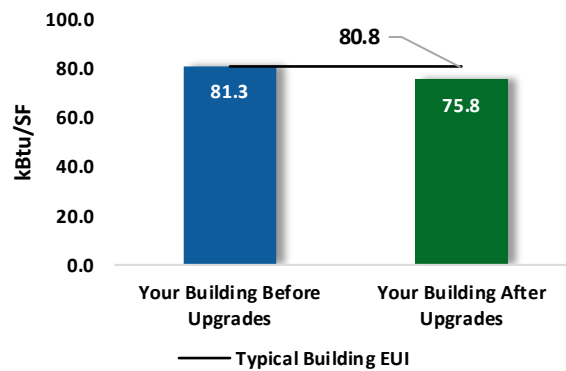
## POTENTIAL IMPROVEMENTS



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.

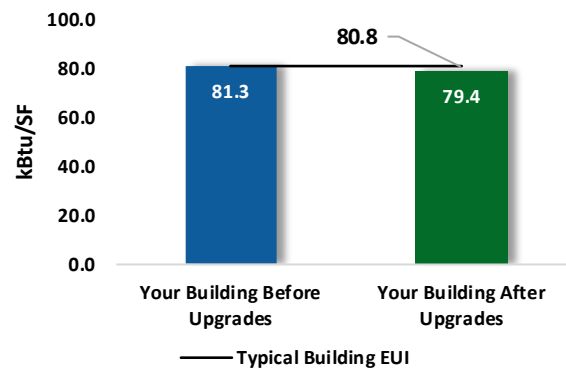
### Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	\$43,190
Potential Rebates & Incentives <sup>1</sup>	\$3,640
Annual Cost Savings	\$1,033
Annual Energy Savings	Electricity: 3,093 kWh Natural Gas: 246 Therms
Greenhouse Gas Emission Savings	3 Tons
Simple Payback	38.3 Years
Site Energy Savings (All Utilities)	7%



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

Installation Cost	\$1,890
Potential Rebates & Incentives	\$340
Annual Cost Savings	\$622
Annual Energy Savings	Electricity: 2,616 kWh Natural Gas: 30 Therms
Greenhouse Gas Emission Savings	1 Tons
Simple Payback	2.5 Years
Site Energy Savings (all utilities)	2%



### On-site Generation Potential

Photovoltaic	None
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>			<b>2,072</b>	<b>0.6</b>	<b>0</b>	<b>\$453</b>	<b>\$1,150</b>	<b>\$290</b>	<b>\$860</b>	<b>1.9</b>	<b>2,035</b>
ECM 1	Install Occupancy Sensor Lighting Controls	Yes	1,838	0.5	0	\$402	\$870	\$110	\$760	1.9	1,805
ECM 2	Install High/Low Lighting Controls	Yes	234	0.1	0	\$51	\$280	\$180	\$100	2.0	230
<b>Motor Upgrades</b>			<b>544</b>	<b>0.1</b>	<b>0</b>	<b>\$120</b>	<b>\$500</b>	<b>\$0</b>	<b>\$500</b>	<b>4.2</b>	<b>548</b>
ECM 3	Premium Efficiency Motors	Yes	544	0.1	0	\$120	\$500	\$0	\$500	4.2	548
<b>Unitary HVAC Measures</b>			<b>828</b>	<b>0.6</b>	<b>-8</b>	<b>\$69</b>	<b>\$9,500</b>	<b>\$500</b>	<b>\$9,000</b>	<b>130.3</b>	<b>-116</b>
ECM 4	Install High Efficiency Air Conditioning Units	No	828	0.6	-8	\$69	\$9,500	\$500	\$9,000	130.3	-116
<b>Gas Heating (HVAC/Process) Replacement</b>			<b>0</b>	<b>0.0</b>	<b>17</b>	<b>\$240</b>	<b>\$21,900</b>	<b>\$2,500</b>	<b>\$19,400</b>	<b>80.9</b>	<b>1,991</b>
ECM 5	Install Infrared Heaters	No	0	0.0	17	\$240	\$21,900	\$2,500	\$19,400	80.9	1,991
<b>Domestic Water Heating Upgrade</b>			<b>0</b>	<b>0.0</b>	<b>5</b>	<b>\$73</b>	<b>\$3,540</b>	<b>\$350</b>	<b>\$3,190</b>	<b>43.9</b>	<b>604</b>
ECM 6	Install Tankless Water Heater	No	0	0.0	2	\$24	\$3,300	\$300	\$3,000	125.9	198
ECM 7	Install Low-Flow DHW Devices	Yes	0	0.0	3	\$49	\$240	\$50	\$190	3.9	406
<b>Food Service &amp; Refrigeration Measures</b>			<b>653</b>	<b>0.1</b>	<b>0</b>	<b>\$145</b>	<b>\$3,200</b>	<b>\$0</b>	<b>\$3,200</b>	<b>22.1</b>	<b>658</b>
ECM 8	Replace Refrigeration Equipment	No	653	0.1	0	\$145	\$3,200	\$0	\$3,200	22.1	658
<b>Custom Measures***</b>			<b>-1,004</b>	<b>0.0</b>	<b>11</b>	<b>-\$67</b>	<b>\$3,400</b>	<b>\$0</b>	<b>\$3,400</b>	<b>-50.7</b>	<b>277</b>
ECM 9	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-1,004	0.0	11	-\$67	\$3,400	\$0	\$3,400	-50.7	277
<b>TOTALS (COST EFFECTIVE MEASURES)</b>			<b>2,616</b>	<b>0.6</b>	<b>3</b>	<b>\$622</b>	<b>\$1,890</b>	<b>\$340</b>	<b>\$1,550</b>	<b>2.5</b>	<b>2,989</b>
<b>TOTALS (ALL MEASURES)</b>			<b>3,093</b>	<b>1.3</b>	<b>25</b>	<b>\$1,033</b>	<b>\$43,190</b>	<b>\$3,640</b>	<b>\$39,550</b>	<b>38.3</b>	<b>5,996</b>

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

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

\*\*\* - Negative payback explained in section 4.7

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

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

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



## 1.1 Planning Your Project

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

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

### Pick Your Installation Approach

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

### Options from Your Utility Company

#### *Prescriptive and Custom Rebates*

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

#### *Direct Install*

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

#### *Engineered Solutions*

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

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

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

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

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

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

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

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

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

### *Ongoing Electric Savings with Demand Response*

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

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

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

For more details on these programs please visit [New Jersey's Clean Energy Program website](http://www.njcleanenergy.com).



## 2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPUB) has sponsored this Local Government Energy Audit (LGEA) report for the Lakewood Fire District Station No. 2. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

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

### 2.1 Site Overview

On April 24, 2024, TRC performed an energy audit at the Lakewood Fire District Station No. 2 located in Lakewood, New Jersey. TRC met with Steven Mulholland to review the facility operations and help focus our investigation on specific energy-using systems.

The Lakewood Fire District Station No. 2 is a one-story, 6,400 square foot building built in 2002. Spaces include conference room, garage, weight room, kitchen, mechanical room, multipurpose lounge, office, and restrooms.

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

The facility has not made any recent changes to its structure, mechanical systems, or operations.

Facility staff have noted that a large portion of their natural gas usage is derived from the old infrared heaters installed in the garage and are interested in replacing them.

### 2.2 Building Occupancy

The facility is occupied intermittently, as needed for maintenance and operations.

Building Name	Weekday/Weekend	Operating Schedule
Lakewood Fire District Station No. 2	Weekday	12:00 AM
	Weekend	12:00 AM

*Building Occupancy Schedule*

### 2.3 Building Envelope

The facility's exterior walls are constructed of concrete masonry units (CMUs) with additional metal siding and a painted CMU interior. Facility staff reported that the interior walls were noted to have spray foam insulation of an unknown thickness. Steel trusses support a pitched roof with a metal deck covered with seam metal roofing in the garage. Wood trusses support roof with a wooden deck in all other areas of the facility. The roof encloses conditioned spaces and the level of insulation in the roof is unknown.

The facility's windows are double glazed and have vinyl cladding on the exterior. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. Degraded window and door seals increase drafts and outside air infiltration.



*Typical Exterior Walls*



*Pitched Metal Roof*



*Typical Facility Windows*



*Typical Facility Exterior Doors*



*Front Entrance*

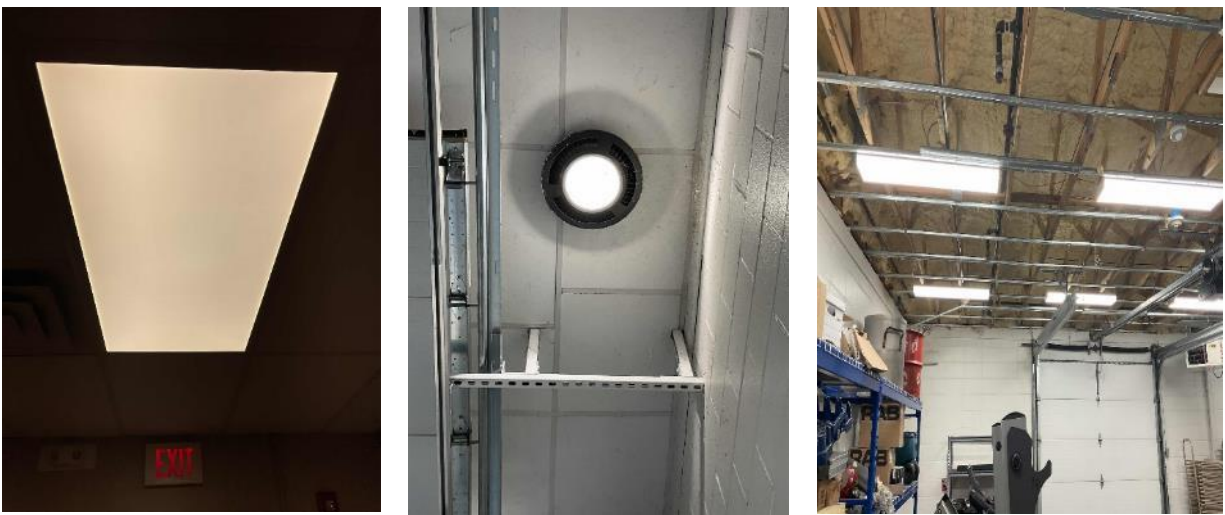


## 2.4 Lighting Systems

The primary interior lighting system uses 40-Watt 2-foot x 2-foot and 50-Watt 2-foot x 4-foot LED light panels. There are also several 18-Watt LED T8 equivalent fixtures in mechanical spaces and the garage. These LED T8 equivalent fixtures all consist of two ,4-foot lamps. All exit signs are LED. Most fixtures are in good condition. Interior lighting levels were generally sufficient. All interior lighting fixtures are controlled by wall switches.

Exterior lighting is provided by recessed 9-Watt screw-in LED lights installed around doorways and roof overhangs. LED wall pack fixtures are also present on exterior walls. These lights are controlled via wall switches and timeclocks.

The facility parking lot has pole-mounted LED fixtures illuminating the parking lot and roadways. The site lighting is fed from the main electric meter. Parking lot fixtures are controlled by a timeclock.



*Interior LED Lighting Fixtures*



*LED Pole Lights in Parking Lot*



*LED Exterior Wall Pack*

## 2.5 Air Handling Systems

### Unitary Electric HVAC Equipment

The facility is conditioned through the use of two gas-fired furnaces with attached split-system AC coils. The gas-fired furnaces are rated for heating capacities of 60 MBH and 114 MBh with an annual fuel utilization efficiency (AFUE) of 95% and 96%, respectively. The attached condensing units have a cooling capacity of 5 tons and 4 tons with seasonal energy efficiency rating (SEER) of 15.60 and 12, respectively. The units are in good to fair condition but with the larger of the two units operating beyond its useful life span. They are not ENERGY STAR labeled.

Supplementary air conditioning and heating is provided in the office space by a Fujitsu split-system air-sourced heat pump. This system provides 1.5 tons of cooling with an efficiency of 11.10 SEER and 22 MBh of heating with an efficiency of 10.20 heating seasonal performance factor (HSPF). The unit is in good condition and operating within its expected life span. It is not ENERGY STAR rated.



*Condensing Units*



*Ruud Natural Gas Furnace*



*York Natural Gas Furnaces*



*Indoor Unit for Fujitsu Split System*



*Outdoor Unit for Fujitsu Split System*

### **Unitary Heating Equipment**

The weight room is heated by two ceiling-mounted Reznor natural gas unit heaters. These units are rated to provide 37 MBh of heating with an efficiency of 82%. The units are in good condition.



*Reznor Natural Gas Unit Heater*

### **Infrared Heating**

The main garage is heated by two Space Ray infrared heaters, each with a heating capacity of 75 MBh and efficiency rating of 83%. This equipment is operating beyond its useful life and is in fair condition. The units are controlled by a manual dial thermostat located within the space. Infrared heating is in general a recommended approach to provide heat to persons working in large open spaces.





*Space Ray Infrared Heaters Installed  
in Garage*

## 2.6 Domestic Hot Water

Hot water is produced by a 65 gallon, 65 MBh gas-fired storage water heater with an efficiency of 80%. The domestic hot water pipes are not insulated.



*Bradford White Natural Gas  
Storage Tank Water Heater*



## 2.7 Food Service Equipment

The kitchen contains a single natural gas conventional oven that is used to prepare staff meals. A non-ENERGY STAR rated undercounter dishwasher is installed in the kitchen. A reach-in refrigerated case is present in the multipurpose lounge and the garage contains a non-ENERGY STAR icemaker. The equipment is not high efficiency and is in good condition.

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



*Typical Food Service Equipment*

## 2.8 Plug Load and Vending Machines

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

There are three computer workstations in the facility. Plug loads include general cafe and office equipment.

There is a residential-style refrigerator in the building that is used to store staff meals. A reach-in refrigerated case is installed in the garage. These vary in condition and efficiency.



*Typical Plug Load Fixtures*

## 2.9 Water-Using Systems

Water is provided by a municipal water supply company. Potable water is used for drinking, cleaning, cooking, sanitary fixtures, laundry, and vehicle washing. Water leaks were not observed or reported.

EPA WaterSense® has set maximum flow rates for sanitary fixtures. They are: 1.28 gallons per flush (gpf) for toilets, 0.5 gpf for urinals, 1.5 gallons per minute (gpm) for lavatory faucets, and 2.0 gpm for showerheads. There are two restrooms with toilets and sinks. Faucet flow rates are at 2.2 gpm or higher. Toilets are rated at 1.6 gpf. There are two restrooms with a shower and the showerheads are rated at 2.5 gpm.

The site has a large capacity washer.

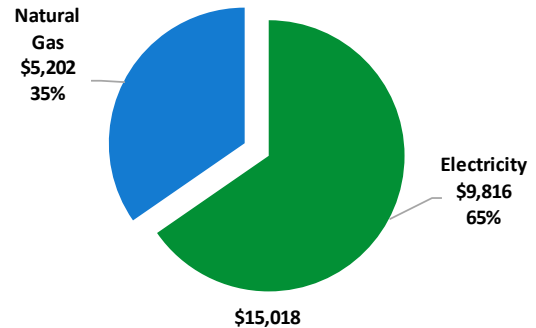


*Typical Water Using Fixtures*

### 3 ENERGY AND WATER USE AND COSTS

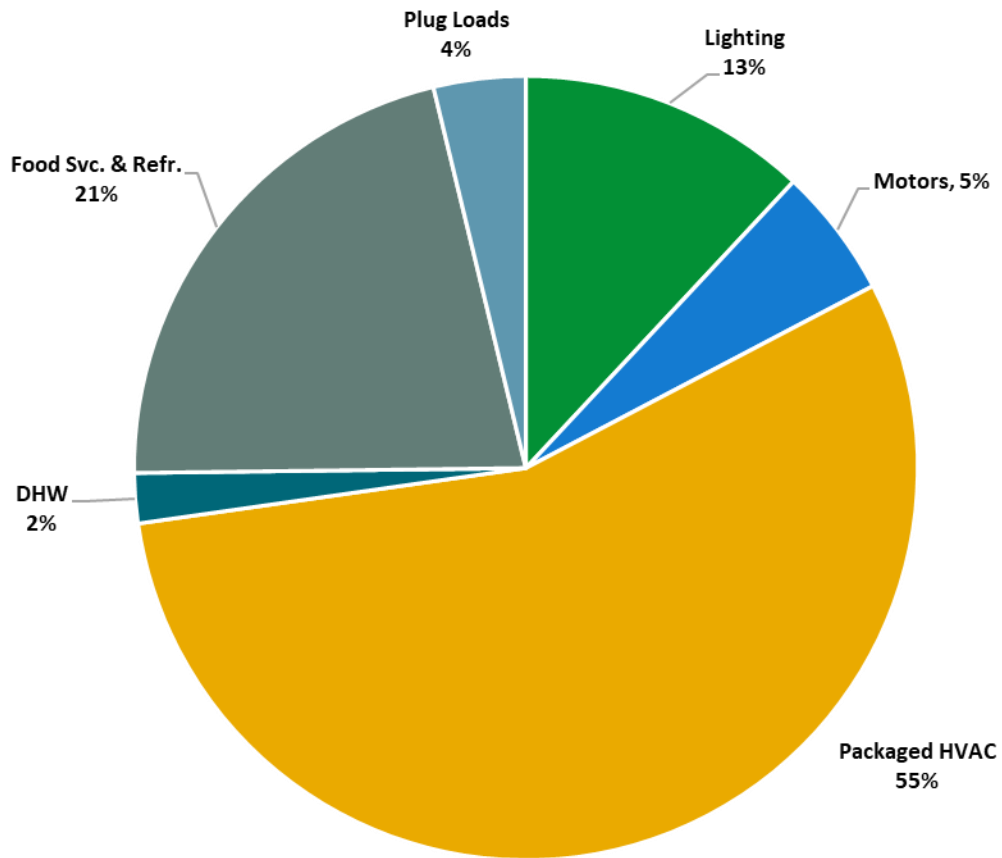
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	Usage	Cost
Electricity	44,313 kWh	\$9,816
Natural Gas	3,688 Therms	\$5,202
Total		\$15,018



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

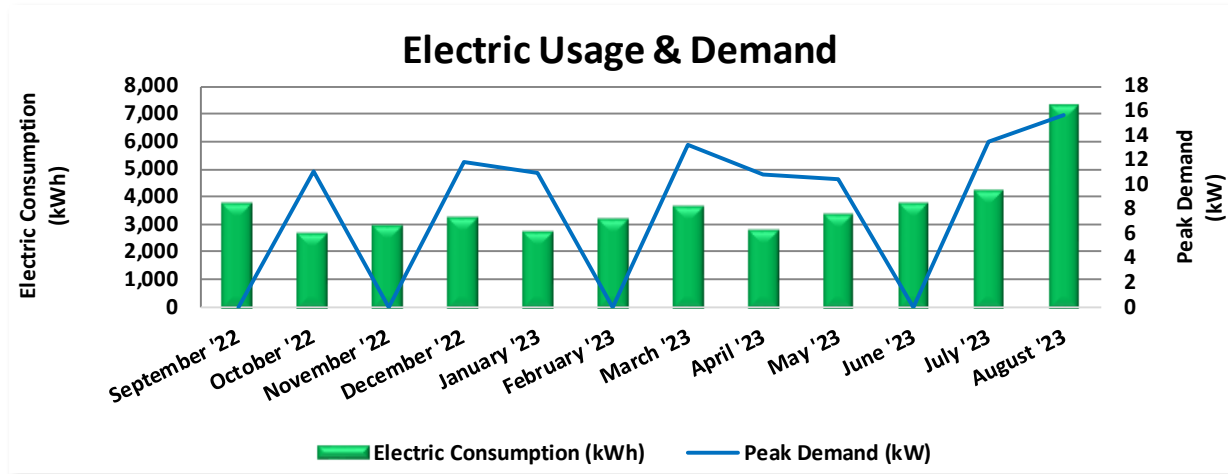
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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



*Energy Balance by System*

### 3.1 Electricity

JCP&L delivers electricity under rate class General Service Secondary 3 Phase - JC\_GS3\_01D.



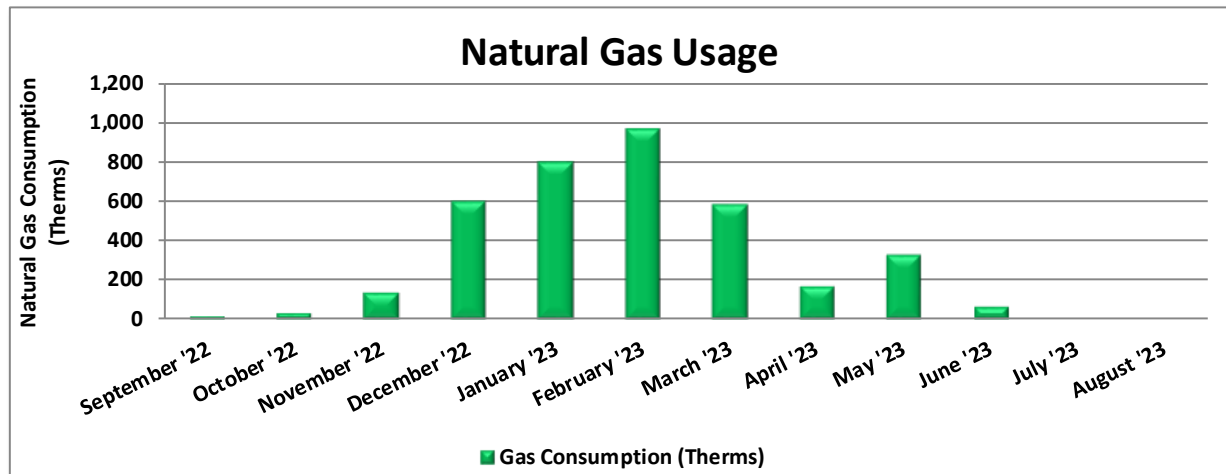
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/20/22	29	3,798	0	\$0	\$719
10/20/22	30	2,708	11	\$19	\$583
11/20/22	31	3,019	0	\$0	\$650
12/20/22	30	3,330	12	\$19	\$750
1/21/23	32	2,801	11	\$19	\$711
2/19/23	29	3,253	0	\$0	\$826
3/22/23	31	3,705	13	\$24	\$881
4/20/23	29	2,857	11	\$19	\$664
5/22/23	32	3,406	10	\$19	\$792
6/21/23	30	3,830	0	\$0	\$890
7/21/23	30	4,253	14	\$28	\$876
8/22/23	32	7,354	16	\$44	\$1,476
<b>Totals</b>	<b>365</b>	<b>44,313</b>	<b>16</b>	<b>\$191</b>	<b>\$9,816</b>
<b>Annual</b>	<b>365</b>	<b>44,313</b>	<b>16</b>	<b>\$191</b>	<b>\$9,816</b>

Notes:

- Peak demand of 16 kW occurred in August '23.
- Average demand over the past 12 months was 12 kW.
- The average electric cost over the past 12 months was \$0.222/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

## 3.2 Natural Gas

NJ Natural Gas delivers natural gas under rate class Monthly 006



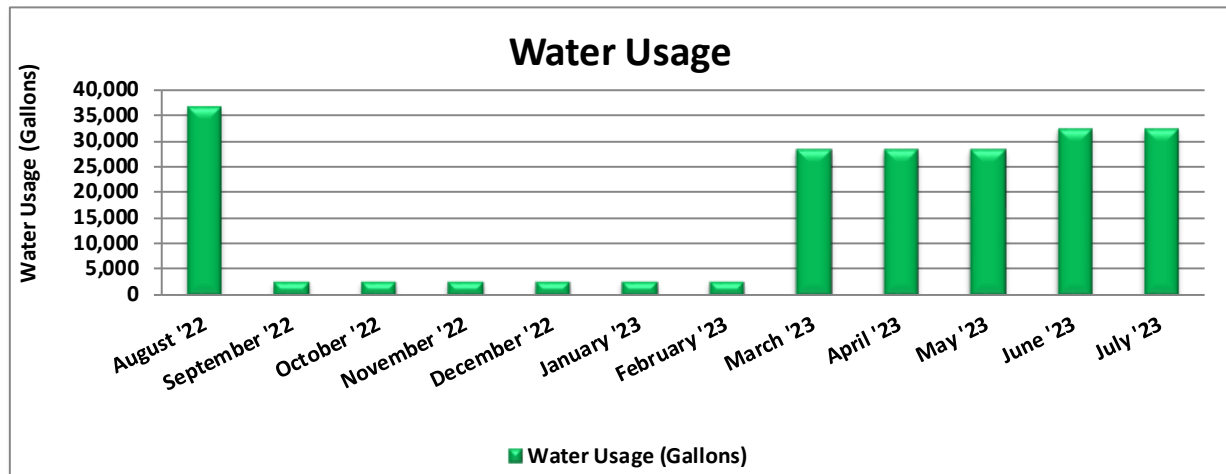
Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
9/22/22	25	18	\$63
10/21/22	29	29	\$79
11/21/22	31	137	\$228
12/22/22	31	598	\$851
1/24/23	33	798	\$1,122
2/23/23	30	967	\$1,351
3/29/23	34	580	\$562
4/27/23	29	169	\$260
5/30/23	33	330	\$470
6/26/23	27	62	\$123
7/31/23	35	0	\$50
8/28/23	28	0	\$42
<b>Totals</b>	<b>365</b>	<b>3,688</b>	<b>\$5,202</b>
<b>Annual</b>	<b>365</b>	<b>3,688</b>	<b>\$5,202</b>

Notes:

- The average gas cost for the past 12 months is \$1.410/therm, which is the blended rate used throughout the analysis.

### 3.3 Water

Lakewood Township MUA delivers water to the project site.



Water Billing Data			
	Days in Period	Water Usage (gallons)	Water Cost
9/1/22	31	36,852	\$247
10/1/22	30	2,731	\$202
11/1/22	31	2,731	\$202
12/1/22	30	2,731	\$202
1/1/23	31	2,813	\$208
2/1/23	31	2,813	\$208
3/1/23	28	2,813	\$208
4/1/23	31	28,610	\$210
5/1/23	30	28,610	\$210
6/1/23	31	28,610	\$210
7/1/23	30	32,587	\$232
8/1/23	31	32,587	\$232
<b>Totals</b>	<b>365</b>	<b>204,487</b>	<b>\$2,570</b>
<b>Annual</b>	<b>365</b>	<b>204,487</b>	<b>\$2,570</b>

Notes:

- The average cost of water for the past 12 months is \$0.0126/gal.
- Irrigation is performed during the summer months, leading to increased water usage during that time period.

### 3.4 Benchmarking

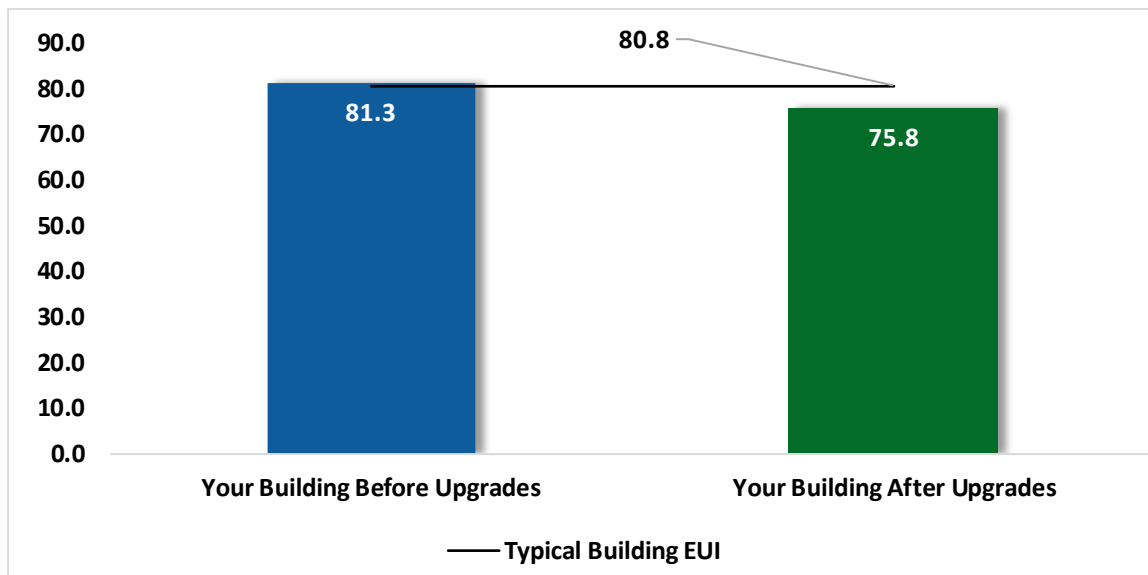
Your building was benchmarked using the United States Environmental Protection Agency's (EPA) Portfolio Manager® software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy, and operating hours. Some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

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

#### Benchmarking Score

N/A

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



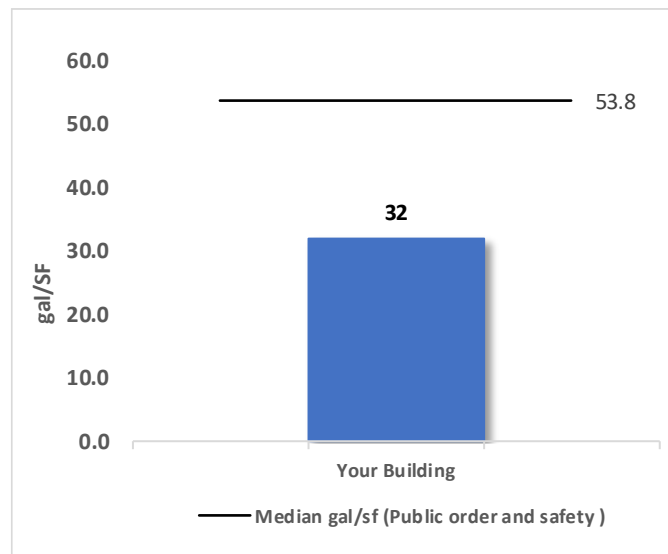
*Energy Use Intensity Comparison<sup>4</sup>*

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

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



## Water Benchmarking



A benchmark is provided for your building's water use based on the annual water use in gallons per square foot of building area (gal/sf-yr). Your building is compared to other similar buildings based on average water usage as available from the 2012 Commercial Buildings Energy Consumption Survey (CBECS) and from the EPA ENERGY STAR DataTrends Water Use Tracking database.

Water use varies considerably depending mainly on the extent of outdoor water use and whether process water is used, such as for vehicle washing and for laboratory sterilizers. Cooling towers and steam boilers are also significant water users. Kitchens and sanitary fixtures may use varying amounts of water.

### **Tracking your Energy Performance**

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

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

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

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

### 3.5 Understanding Your Utility Bills

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

Sample bills, with annotation, may be viewed at:

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

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

#### **Why Utility Bills Vary**

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

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

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

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

## 4 ENERGY CONSERVATION MEASURES

---

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>			<b>2,072</b>	<b>0.6</b>	<b>0</b>	<b>\$453</b>	<b>\$1,150</b>	<b>\$290</b>	<b>\$860</b>	<b>1.9</b>	<b>2,035</b>
ECM 1	Install Occupancy Sensor Lighting Controls	Yes	1,838	0.5	0	\$402	\$870	\$110	\$760	1.9	1,805
ECM 2	Install High/Low Lighting Controls	Yes	234	0.1	0	\$51	\$280	\$180	\$100	2.0	230
<b>Motor Upgrades</b>			<b>544</b>	<b>0.1</b>	<b>0</b>	<b>\$120</b>	<b>\$500</b>	<b>\$0</b>	<b>\$500</b>	<b>4.2</b>	<b>548</b>
ECM 3	Premium Efficiency Motors	Yes	544	0.1	0	\$120	\$500	\$0	\$500	4.2	548
<b>Unitary HVAC Measures</b>			<b>828</b>	<b>0.6</b>	<b>-8</b>	<b>\$69</b>	<b>\$9,500</b>	<b>\$500</b>	<b>\$9,000</b>	<b>130.3</b>	<b>-116</b>
ECM 4	Install High Efficiency Air Conditioning Units	No	828	0.6	-8	\$69	\$9,500	\$500	\$9,000	130.3	-116
<b>Gas Heating (HVAC/Process) Replacement</b>			<b>0</b>	<b>0.0</b>	<b>17</b>	<b>\$240</b>	<b>\$21,900</b>	<b>\$2,500</b>	<b>\$19,400</b>	<b>80.9</b>	<b>1,991</b>
ECM 5	Install Infrared Heaters	No	0	0.0	17	\$240	\$21,900	\$2,500	\$19,400	80.9	1,991
<b>Domestic Water Heating Upgrade</b>			<b>0</b>	<b>0.0</b>	<b>5</b>	<b>\$73</b>	<b>\$3,540</b>	<b>\$350</b>	<b>\$3,190</b>	<b>43.9</b>	<b>604</b>
ECM 6	Install Tankless Water Heater	No	0	0.0	2	\$24	\$3,300	\$300	\$3,000	125.9	198
ECM 7	Install Low-Flow DHW Devices	Yes	0	0.0	3	\$49	\$240	\$50	\$190	3.9	406
<b>Food Service &amp; Refrigeration Measures</b>			<b>653</b>	<b>0.1</b>	<b>0</b>	<b>\$145</b>	<b>\$3,200</b>	<b>\$0</b>	<b>\$3,200</b>	<b>22.1</b>	<b>658</b>
ECM 8	Replace Refrigeration Equipment	No	653	0.1	0	\$145	\$3,200	\$0	\$3,200	22.1	658
<b>Custom Measures***</b>			<b>-1,004</b>	<b>0.0</b>	<b>11</b>	<b>-\$67</b>	<b>\$3,400</b>	<b>\$0</b>	<b>\$3,400</b>	<b>-50.7</b>	<b>277</b>
ECM 9	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-1,004	0.0	11	-\$67	\$3,400	\$0	\$3,400	-50.7	277
<b>TOTALS</b>			<b>3,093</b>	<b>1.3</b>	<b>25</b>	<b>\$1,033</b>	<b>\$43,190</b>	<b>\$3,640</b>	<b>\$39,550</b>	<b>38.3</b>	<b>5,996</b>

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

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

\*\*\* - Negative payback explained in section 4.7

*All Evaluated ECMs*

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
Lighting Control Measures		2,072	0.6	0	\$453	\$1,150	\$290	\$860	1.9	2,035
ECM 1	Install Occupancy Sensor Lighting Controls	1,838	0.5	0	\$402	\$870	\$110	\$760	1.9	1,805
ECM 2	Install High/Low Lighting Controls	234	0.1	0	\$51	\$280	\$180	\$100	2.0	230
Motor Upgrades		544	0.1	0	\$120	\$500	\$0	\$500	4.2	548
ECM 3	Premium Efficiency Motors	544	0.1	0	\$120	\$500	\$0	\$500	4.2	548
Domestic Water Heating Upgrade		0	0.0	3	\$49	\$240	\$50	\$190	3.9	406
ECM 7	Install Low-Flow DHW Devices	0	0.0	3	\$49	\$240	\$50	\$190	3.9	406
TOTALS		2,616	0.6	3	\$622	\$1,890	\$340	\$1,550	2.5	2,989

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

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

Cost Effective ECMs

## 4.1 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>		<b>2,072</b>	<b>0.6</b>	<b>0</b>	<b>\$453</b>	<b>\$1,150</b>	<b>\$290</b>	<b>\$860</b>	<b>1.9</b>	<b>2,035</b>
ECM 1	Install Occupancy Sensor Lighting Controls	1,838	0.5	0	\$402	\$870	\$110	\$760	1.9	1,805
ECM 2	Install High/Low Lighting Controls	234	0.1	0	\$51	\$280	\$180	\$100	2.0	230

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 1: Install Occupancy Sensor Lighting Controls**

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend that lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

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

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

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

**Affected Building Areas:** kitchen

### **ECM 2: Install High/Low Lighting Controls**

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

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

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

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

**Affected Building Areas:** corridor

## 4.2 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Motor Upgrades</b>		<b>544</b>	<b>0.1</b>	<b>0</b>	<b>\$120</b>	<b>\$500</b>	<b>\$0</b>	<b>\$500</b>	<b>4.2</b>	<b>548</b>
ECM 3	Premium Efficiency Motors	544	0.1	0	\$120	\$500	\$0	\$500	4.2	548

### ECM 3: Premium Efficiency Motors

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

The potential savings from installing new fan coils with electronically commutated (EC) motors was evaluated. EC motors are generally more efficient than other fractional hp motors and have the capability of operating at variable speeds. In general, replacing the fan coils should be considered a capital improvement measure that has the potential to provide energy savings and improve occupant comfort.

#### Affected Motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Exterior	Kitchen Exhaust Hood	1	Kitchen Hood Exhaust Fan	0.5	Kitchen Exhaust Hood Motor

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

## 4.3 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Unitary HVAC Measures</b>		<b>828</b>	<b>0.6</b>	<b>-8</b>	<b>\$69</b>	<b>\$9,500</b>	<b>\$500</b>	<b>\$9,000</b>	<b>130.3</b>	<b>-116</b>
ECM 4	Install High Efficiency Air Conditioning Units	828	0.6	-8	\$69	\$9,500	\$500	\$9,000	130.3	-116

We evaluated replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the equipment is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

### ECM 4: Install High Efficiency Air Conditioning Units

We evaluated replacing the standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The replacement unit will incorporate an efficient gas furnace. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus

the new high efficiency unit, the average cooling and heating load, and the estimated annual operating hours.

**Affected Units:** York furnace and condensing unit

## 4.4 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
	<b>Gas Heating (HVAC/Process) Replacement</b>	<b>0</b>	<b>0.0</b>	<b>17</b>	<b>\$240</b>	<b>\$21,900</b>	<b>\$2,500</b>	<b>\$19,400</b>	<b>80.9</b>	<b>1,991</b>
ECM 5	Install Infrared Heaters	0	0.0	17	\$240	\$21,900	\$2,500	\$19,400	80.9	1,991

### ECM 5: Install Infrared Heaters

We evaluated replacing the forced air heating equipment with low-intensity infrared heating units with an enclosed flame, rather than an open flame on a ceramic or metal surface.

Forced air furnaces heat all of the air in the space served, which is inefficient for large volume spaces with relatively few occupants, areas with high ceilings, or areas with high outside air infiltration. Infrared heaters heat objects and surfaces directly, including the occupants of the space, rather than heating large volumes of air. Infrared heaters also heat the floor, which then re-radiates the heat. As a result, infrared heaters are more effective and efficient at maintaining occupant comfort at significantly lower cost for certain space types.

**Affected Building Areas:** garage

## 4.5 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
	<b>Domestic Water Heating Upgrade</b>	<b>0</b>	<b>0.0</b>	<b>5</b>	<b>\$73</b>	<b>\$3,540</b>	<b>\$350</b>	<b>\$3,190</b>	<b>43.9</b>	<b>604</b>
ECM 6	Install Tankless Water Heater	0	0.0	2	\$24	\$3,300	\$300	\$3,000	125.9	198
ECM 7	Install Low-Flow DHW Devices	0	0.0	3	\$49	\$240	\$50	\$190	3.9	406

### ECM 6: Install Tankless Water Heater

We evaluated replacing the existing tank water heater with a high efficiency condensing tankless water heating system. Tankless water heaters (i.e., on-demand water heaters) only heat water when hot water is needed. Water is heated as it flows through the pipe to the hot water tap. Energy savings from a tankless water heater are based on eliminating heat losses associated with maintaining unnecessary standby hot water capacity.

### ECM 7: Install Low-Flow DHW Devices

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



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

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

## 4.6 Food Service and Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Food Service &amp; Refrigeration Measures</b>		<b>653</b>	<b>0.1</b>	<b>0</b>	<b>\$145</b>	<b>\$3,200</b>	<b>\$0</b>	<b>\$3,200</b>	<b>22.1</b>	<b>658</b>
ECM 8	Replace Refrigeration Equipment	653	0.1	0	\$145	\$3,200	\$0	\$3,200	22.1	658

### ECM 8: Replace Refrigeration Equipment

We evaluated replacing the existing ice maker with a new ENERGY STAR rated unit. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

## 4.7 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated M&L Cost (\$)	Estimated Incentive (\$)*	Estimated Net M&L Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Custom Measures</b>		<b>-1,004</b>	<b>0.0</b>	<b>11</b>	<b>-\$67</b>	<b>\$3,400</b>	<b>\$0</b>	<b>\$3,400</b>	<b>-50.7</b>	<b>277</b>
ECM 9	Replace Gas Fired Water Heater with Heat Pump Water Heater***	-1,004	0.0	11	-\$67	\$3,400	\$0	\$3,400	-50.7	277

### ECM 9: Replace Gas Fired Water Heater with Heat Pump Water Heater

We evaluated replacing existing the gas water heater with a heat pump water heater (HPWH).

A gas fired water heater uses a burner to heat water. Air source heat pump water heaters use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. Water heater efficiency is rated by the uniform energy factor (UEF). For a relative comparison of water heater UEFs, the criteria for certifying a water heater in the ENERGY STAR program are provided below. These values indicate that HPWH heaters are significantly more efficient than gas fired water heaters.

There are two types of HPWH: those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The measure considers an integrated HPWH.

**ENERGY STAR Uniform Energy Factor (UEF) Criteria for Certified Water Heaters \***

Water Heater Type	Minimum UEF	Other
Integrated HPWH	3.3	
Integrated HPWH	2.2	120 Volt, 15 Amp circuit
Split System HPWH	2.2	
Gas Fired Storage	0.64	≤ 55-gal, Medium Draw Pattern
Gas Fired Storage	0.68	≤ 55-gal, High Draw Pattern
Gas Fired Storage	0.78	> 55-gal, Medium Draw Pattern
Gas Fired Storage	0.80	> 55-gal, High Draw Pattern
Gas Fired Storage	0.80	Residential Duty
Gas Fired Instantaneous	0.87	

\* Note: Uniform Energy Factor (UEF): The newest measure of water heater overall efficiency. The higher the UEF value is, the more efficient the water heater. UEF is determined by the Department of Energy's test method outlined in 10 CFR Part 430, Subpart B, Appendix E.<sup>5</sup>

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation<sup>6</sup>. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room. The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

Most HPWH operate effectively down to an air temperature of 40 °F. Below that temperature, an electric resistance booster heater is typically required to achieve full heating capacity. It is critical that the HPWH controls are set up so that the electric resistance heat only engages when the air temperature is too cold for the HPWH to extract heat from it. HPWHs have a slow recovery. During periods of high demand, the electric resistance heating element, if enabled, may be energized to maintain set point, thus reducing the overall efficiency of the unit. It is recommended that a careful analysis of the hot water demand be conducted to determine if the application makes economic sense, and the HPWH heating capacity and storage are properly sized.

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank to maintain stratification within the storage tank. Water should be drawn from the bottom of the tank to be heated. If there is a DHW recirculation pump, it should only be operated during high hot water demand periods.

Switching from a gas fired water heater to a HPWH has the potential to reduce the sites overall greenhouse gas emissions. If the electricity for the HPWH is provided by an on-site photovoltaic (PV) system then there are essentially no greenhouse gas (GHG) emissions. A 2016 study conducted at Cornell<sup>7</sup>

<sup>5</sup> [https://www.energy.gov/sites/prod/files/2014/06/f17/rwh\\_tp\\_final\\_rule.pdf](https://www.energy.gov/sites/prod/files/2014/06/f17/rwh_tp_final_rule.pdf)

<sup>6</sup> <https://basc.pnnl.gov/code-compliance/heat-pump-water-heaters-code-compliance-brief#:~:text=HPWH%20must%20have%20unrestricted%20airflow,depending%20on%20size%20of%20system>

<sup>7</sup> [Greenhouse gas emissions from domestic hot water: Heat pumps compared to most commonly used systems. Bongghi Hong, Robert W. Howarth. Department of Ecology and Evolutionary Biology, Cornell University. Energy Science and Engineering 2016.](#)

calculated the kg of methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>) produced per GJ of water heated. The study compared HPWH to gas and electric fired, storage and tankless water heaters. The study also considered electricity produced from natural gas and coal fired electric plants. In all cases the study found that HPWHs produced less methane than all of the other water heaters. The study also found that HPWH produced less carbon dioxide than electric resistance water heaters but more carbon dioxide than tankless gas water heaters and about the same amount of carbon dioxide as storage gas water heaters. The summary tables provide the reduction in CO<sub>2</sub> equivalent emissions based on the typical New Jersey electric utility.

This measure has a negative simple payback due to the relative cost of electricity to natural gas. At this site the cost per Btu for natural gas is significantly lower than for electricity. Therefore, even though this measure will result in a net energy savings in terms of Btu, at this site it will increase the overall cost for providing domestic hot water.

**Affected Units:** Bradford White water heater

## 4.8 Measures for Future Consideration

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

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

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

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

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

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

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

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

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

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

## 5 ENERGY EFFICIENT BEST PRACTICES

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

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

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

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



You've heard it before—you cannot manage what you do not measure. ENERGY STAR Portfolio Manager is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions<sup>8</sup>. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

### **Doors and Windows**

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

### **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.

---

<sup>8</sup> <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

## **Lighting Controls**

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

## **Motor 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.

## **Ductwork Maintenance**

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

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

Duct leakage in commercial buildings can account for 5%–25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building wasting conditioned air. Check ductwork for leakage. Eliminating duct leaks can improve ventilation system performance and reduce heating and cooling system operation.

Distribution system losses are dependent on air system temperature, the size of the distribution system, and the level of insulation of the ductwork. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is missing or worn, the system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

### **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**

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

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

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

### **Compressed Air System Maintenance**

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

- Inspection, cleaning, and replacement of inlet filter cartridges.
- Cleaning of drain traps.
- Daily inspection of lubricant levels to reduce unwanted friction.
- Inspection of belt condition and tension.
- Check for leaks and adjust loose connections.
- Overall system cleaning.
- Reduce pressure setting to minimum needed for air operated equipment.
- Turn off compressor if not routinely needed.
- Use low pressure blower air rather than high pressure compressed air.



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

### **Procurement Strategies**

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



## 6 WATER BEST PRACTICES

### **Getting Started**



The commercial and institutional sector is the second largest consumer of publicly supplied water in the United States, accounting for 17% of the withdrawals from public water supplies<sup>9</sup>. In New Jersey, excluding water used for power generation, approximately 80% of total water use was attributed to potable supply during the period of 2009 to 2018. Water withdrawals for potable supply have not changed noticeably during the period from 1990 to 2018<sup>10</sup>.

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

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

For more information regarding water conservation or additional details regarding the practices shown below go to the EPA's WaterSense website<sup>11</sup> or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"<sup>12</sup> to get ideas for creating a water management plan and best practices for a wide range of water using systems.

### **Leak Detection and Repair**

Identifying and repairing leaks and other water use anomalies within a facility's water distribution system or from processes or equipment can keep a facility from wasting significant quantities of water. Examples of common leaks include leaking toilets and faucets, drip irrigation malfunctions, stuck float valves, and broken distribution lines. Reading meters, installing failure abatement technologies, and conducting visual and auditory inspections are important best practices to detect leaks. Train building occupants, employees, and visitors to report any leaks that they detect. To reduce unnecessary water loss, detected leaks should be repaired quickly. Repairing leaks in water distribution that is pressurized by on-site pumps or in heated or chilled water piping will also reduce energy use.

### **Toilets and Urinals**

Toilets and urinals are considered sanitary fixtures and are found in most facilities. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously flushing, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment

---

<sup>9</sup> Estimated from analyzing data in: [Solley, Wayne B., et al, "Estimated Use of Water in the United States in 1995", U.S Geological Survey Circular 1200, \(1998\)](#)

<sup>10</sup> <https://dep.nj.gov/wp-content/uploads/dsr/trends-water-supply.pdf>

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

<sup>12</sup> <https://www.epa.gov/watersense/watersense-work-0>

and the frequency of use, it may be cost effective to replace older inefficient fixtures with current generation WaterSense labeled equipment.

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

Most urinals use water to flush liquid. These standard single-user fixtures are present in most facilities. Non-water urinals use a specially designed trap that allows liquid waste to drain out of the fixture through a trap seal, and into the drainage system. Flushing urinals should be inspected at least annually for proper valve and sensor operation. For non-water urinals, follow maintenance practices as directed by the manufacturer to ensure products perform as expected. Non-water urinals can be considered during urinal replacement, however, review the condition and design of the existing plumbing system and the expected usage patterns to ensure that these products will provide the anticipated performance.

### **Faucets and Showerheads**

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

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

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

## **Vehicle Washing**

Vehicle service facilities employ three types of vehicle-washing technologies: conveyor, in-bay, and self-service. Vehicle washing involves multiple water using steps including pre-soaking, washing, and one or more rinses. Water is typically applied under high pressure whether through an automated nozzle or hand-held sprayer.

Many commercial vehicle wash facilities have adopted water reclamation technology, which treats wash and rinse water from previous wash cycles for use during the next vehicle wash to reduce overall water use. Water reclamation is well suited to conveyor systems and can be applied to in-bay vehicle wash facilities where contaminated water can be separated from cleaner water.

For optimal vehicle wash system efficiency, consider the following:

- Conduct routine inspections for leaks and train personnel to identify and report leaks.
- Ensure that the main shut-off valve is in proper working order.
- If possible, use a friction washing component in all cycles, especially if water is not reused.
- Sweep all driveways and impervious surfaces instead of washing.
- Minimize pump head pressures based on manufacturer recommendations.
- Make sure conveyors are properly calibrated by timing spray nozzles to activate only as the vehicle reaches the spray arch.
- For all automated systems, align spray nozzles properly; they should be oriented parallel to the spray arch.

## **Landscaping and Irrigation**

Most facilities that own or maintain surrounding landscape will have outdoor water use. The amount of outdoor water use is dictated by the size and design of the landscape and the need for supplemental irrigation. Studies show that average landscape water use in the institutional sector can range from 7% of total water use for hospitals, 22% for office buildings, and up to 30% for schools.

Proper landscape design can help minimize outdoor water use. Regionally appropriate plant choices, healthy soils with appropriate grading, the use of mulches, and limiting the use of high water-using plants such as turfgrass can significantly reduce the need for supplemental irrigation. In addition, proper design, installation, and maintenance of irrigation equipment can have a dramatic impact on outdoor water use.

- Retain a landscape professional certified in water-efficient landscaping.
- Maintain soil quality by applying mulch, soil amendments, and good topsoil.
- Maintain existing plants by manually pulling weeds, raising the blade on mowers, and including shaded areas in the overall landscape design.
- Minimize water used for hardscape cleaning and use recycled or reclaimed water where applicable, especially in water features.

Irrigation system optimization combines efficient irrigation practices with efficient technologies and can be complex. Irrigation professionals who are properly educated on water-efficient practices can help ensure that existing irrigation systems are efficiently operated and properly maintained. In general, plan for or adjust irrigation systems to prevent over (or under) watering.

- Improve distribution uniformity so water is evenly applied over the landscape.
- Irrigation schedules should be updated based on changing weather conditions.
- In general, apply water in larger amounts, but less frequently, resulting in deep watering.
- If a dedicated landscape water meter is installed, incorporate an outdoor water budget.

- Routinely look for leaks, overwatering, or overspray.
- Require a full irrigation system audit every 3 years by a qualified irrigation auditor.
- Consider drip irrigation systems for plant beds as they can reduce irrigation water use by 20% to 50% as compared to traditional sprinklers.
- More efficient sprinkler heads can reduce irrigation water use by 30%.
- Smart irrigation controllers can schedule irrigation based on weather data or on-site conditions, reducing irrigation water use by 15% compared to manual or clock timer irrigation systems.

## 7 ON-SITE GENERATION

---

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

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

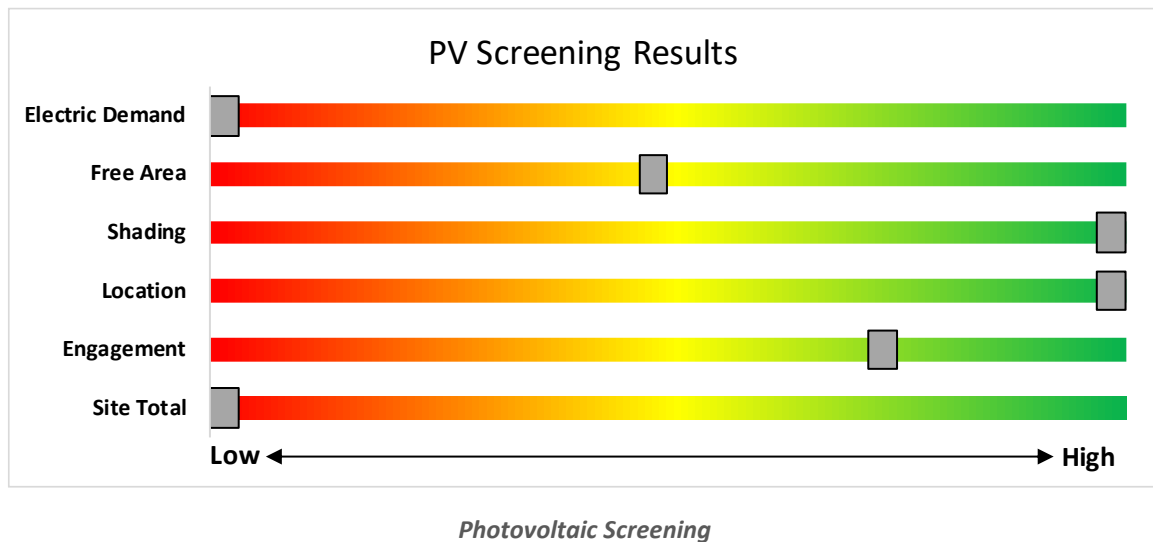
## 7.1 Solar Photovoltaic

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

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

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

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



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

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

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

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

## 7.2 Combined Heat and Power

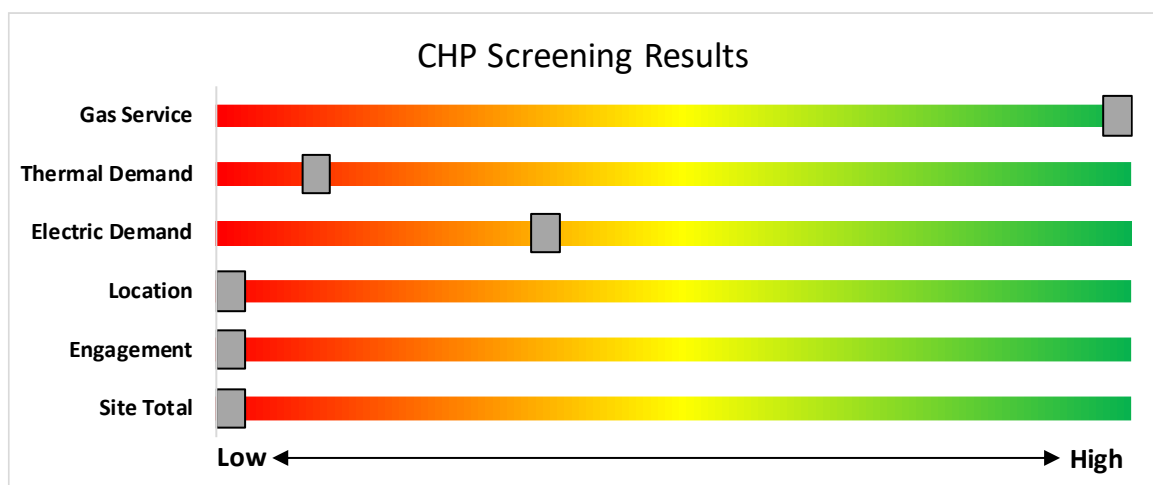
Combined heat and power (CHP) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

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

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

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has no potential for installing a cost-effective CHP system. The low or infrequent thermal load, especially in the summer, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

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



*Combined Heat and Power Screening*

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



## 8 ELECTRIC VEHICLES

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

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

### 8.1 EV Charging

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

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

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

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

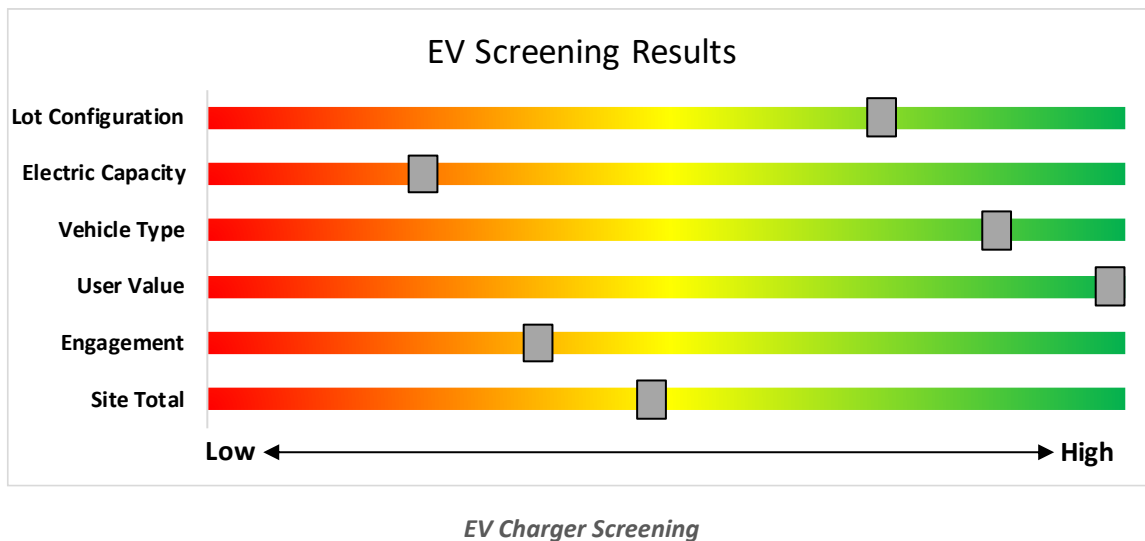
The type and size of the parking area impact the costs and feasibility of adding EV charging. Parking structure installations can be less costly than surface lot installations as power may be readily available, and equipment and wiring can be surface mounted. Parking lot installations often require trenching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

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

Other factors to consider when planning for EV charging at a facility include who the intended users are, how long they park vehicles at the site, and whether they will need to pay for the electricity they use. Adding EV charging may have a negative financial impact due to increased electric demand charges.



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



### Electric Vehicle Programs Available

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

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

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

## 9 PROJECT FUNDING AND INCENTIVES

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

### NJBPU and NJCEP Administered Programs



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

\*State facilities are also eligible for utility programs

### Utility Administered Programs



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

## 9.1 New Jersey's Clean Energy Program

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

### Large Energy Users

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

#### **Incentives**

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

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

#### **How to Participate**

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

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

## Combined Heat and Power

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

### Incentives<sup>13</sup>

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

<sup>13</sup>

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

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

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

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

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



### **How to Participate**

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



## Successor Solar Incentive Program (SuSI)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## Energy Savings Improvement Program

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

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

### **How to Participate**

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

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

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

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

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

## **Demand Response (DR) Energy Aggregator**

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

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

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

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

The first step toward participation in a DR program is to contact a curtailment service provider. A list of these providers is available on the website of the independent system operator, PJM, and it includes contact information for each company, as well as the states where they have active business<sup>14</sup>. PJM also posts training materials for program members interested in specific rules and requirements regarding DR activity along with a variety of other DR program information<sup>15</sup>.

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

---

<sup>14</sup> <http://www.pjm.com/markets-and-operations/demand-response.aspx>.

<sup>15</sup> <http://www.pjm.com/training/training-events.aspx>.

## 9.2 Utility Energy Efficiency Programs

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

### **Prescriptive and Custom**

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

#### **Equipment Examples**

*Lighting*

*Lighting Controls*

*HVAC Equipment*

*Refrigeration*

*Gas Heating*

*Gas Cooling*

*Commercial Kitchen Equipment*

*Food Service Equipment*

*Variable Frequency Drives*

*Electronically Commutate Motors*

*Variable Frequency Drives*

*Plug Loads Controls*

*Washers and Dryers*

*Agricultural*

*Water Heating*

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

### **Direct Install**

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

#### **Incentives**

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

#### **How to Participate**

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

## **Engineered Solutions**

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

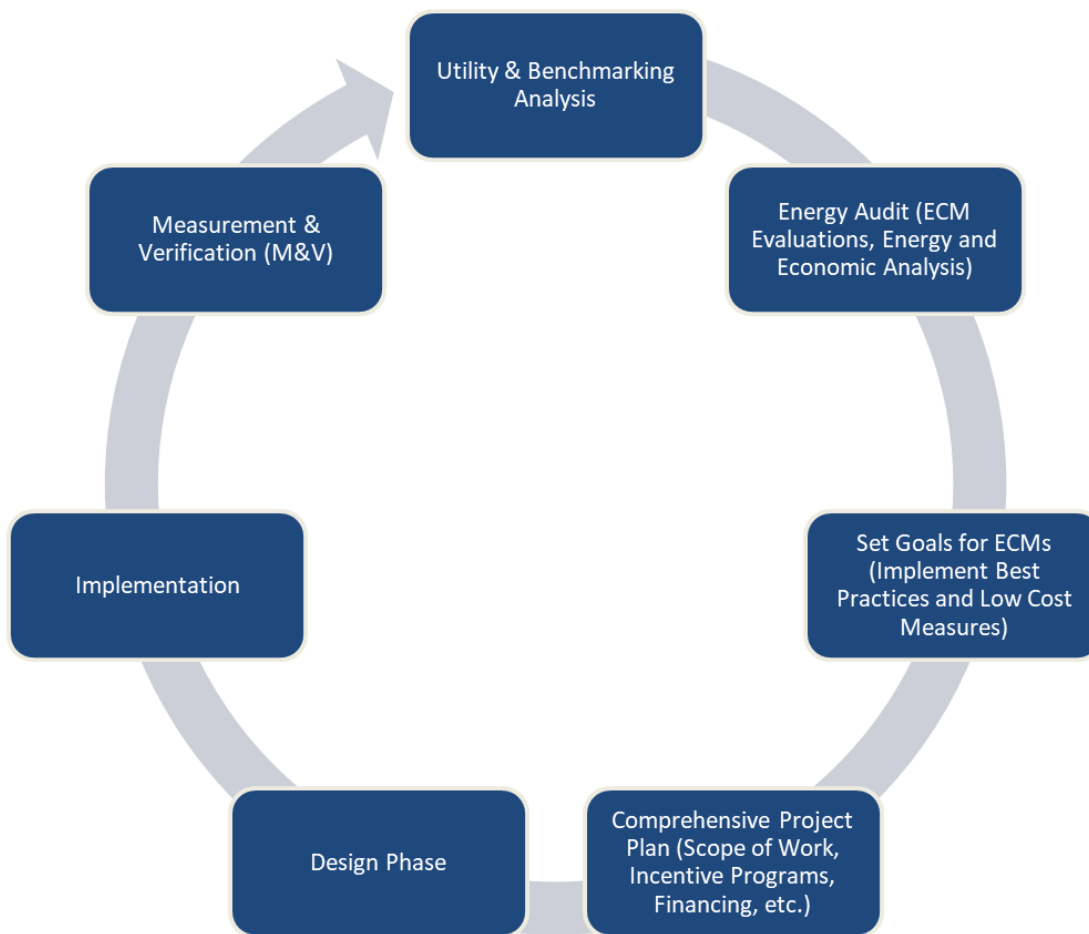
---

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



## 10 PROJECT DEVELOPMENT

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



*Project Development Cycle*

## 11 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

---

### 11.1 Retail Electric Supply Options

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

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

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

### 11.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website<sup>17</sup>.

---

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

<sup>17</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

Existing Conditions																					
Proposed Conditions																					
Energy Impact & Financial Analysis																					
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Conference - Meeting Room	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor		40	3,000		None	No	9	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	3,000	0.0	0	0	\$0	\$0	\$0	0.0
Corridor	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Corridor	5	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch		40	3,500	2	None	Yes	5	LED - Fixtures: Ambient 2x2 Fixture	High/Low Control	40	2,415	0.1	234	0	\$51	\$280	\$180	2.0
Exterior	8	LED - Fixtures: Downlight Surface Mount	Wall Switch		9	1,500		None	No	8	LED - Fixtures: Downlight Surface Mount	Wall Switch	9	1,500	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	3	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		80	4,380		None	No	3	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	80	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	8	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		80	4,380		None	No	8	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	80	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		80	4,380		None	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	80	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Exterior	3	LED - Fixtures: Wall Pack	Timeclock		50	4,380		None	No	3	LED - Fixtures: Wall Pack	Timeclock	50	4,380	0.0	0	0	\$0	\$0	\$0	0.0
Garage - Engine Bay	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Garage - Engine Bay	21	LED - Fixtures: Ceiling Mount	Wall Switch		80	3,000	1	None	Yes	21	LED - Fixtures: Ceiling Mount	Occupancy Sensor	80	2,070	0.5	1,687	0	\$369	\$540	\$70	1.3
Garage - Engine Bay	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch		18	3,000		None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	18	3,000	0.0	0	0	\$0	\$0	\$0	0.0
Gymnasium - Weight Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0
Gymnasium - Weight Room	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor		18	3,000		None	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	18	3,000	0.0	0	0	\$0	\$0	\$0	0.0
Kitchen	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
Kitchen	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch		50	3,000	1	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	50	2,070	0.0	151	0	\$33	\$330	\$40	8.8
Mechanical - Utility Room	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch		18	1,000		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	18	1,000	0.0	0	0	\$0	\$0	\$0	0.0
Multipurpose - Lounge	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
Multipurpose - Lounge	17	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor		40	3,500		None	No	17	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	3,500	0.0	0	0	\$0	\$0	\$0	0.0
Office - Enclosed	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor		50	3,000		None	No	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	50	3,000	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Female	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor		40	2,000		None	No	3	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	2,000	0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor		40	2,000		None	No	4	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	2,000	0.0	0	0	\$0	\$0	\$0	0.0



Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior	Kitchen Exhaust Hood	1	Kitchen Hood Exhaust Fan	0.50	63.0%	No			W	5,250	3	Yes	78.2%	No		0.1	544	0	\$120	\$500	\$0	4.2
Garage - Engine Bay	Garage Roll-Up Doors	4	Other	0.50	63.0%	No			W	2,745		No	63.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Weight Room	Weight Room	2	Supply Fan	0.17	60.0%	No	Reznor		W	350		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mechanical - Utility Room	Interior Spaces	1	Supply Fan	0.75	78.0%	No	Trane		W	300		No	78.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Restroom - Male	Interior Spaces	1	Supply Fan	0.75	78.0%	No	Rheem/Ruud		W	350		No	78.0%	No		0.0	0	0	\$0	\$0	\$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical - Utility Room	Interior Spaces	1	Split-System	4.50	114.00	12.00	0.96 Et	York	YM9M120D20MP 11A	B	4	Yes	1	Split-System	4.50	114.00	16.00	0.82 AFUE	0.6	828	-8	\$69	\$9,500	\$500	130.3
Restroom - Male	Interior Spaces	1	Split-System	5.00	60.00	15.60	0.95 AFUE	Ruud	RA1348AC1NB	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Garage - Engine Bay	Engine Bay	5	Infrared Heater		75.00		0.83 Et			B	5	Yes	5	Infrared Heater		75.00		0.93 Et	0.0	0	17	\$240	\$21,900	\$2,500	80.9
Office - Enclosed	Office Spaces	1	Split-System Air-Source HP	1.50	22.00	11.10	10.2 HSPF	Fujitsu	AOU18RLX	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Gymnasium - Weight Room	Weight Room	2	Unit Heater		37.00		0.82 Et	Reznor	UDBS-45	B		No							0.0	0	0	\$0	\$0	\$0	0.0

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical - Utility Room	Interior Spaces	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	PDX65S65FB3N	B	6	Yes	1	Tankless Water Heater	Natural Gas	95.00%	Et	0.0	0	2	\$24	\$3,300	\$300	125.9

Low-Flow Device Recommendations

		Recommendation Inputs				Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Restrooms	7	4	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	2	\$27	\$30	\$20	0.4
Restrooms	7	2	Showerhead	2.50	1.50	0.0	0	2	\$22	\$210	\$30	8.1



Reach-In Cooler/Freezer Inventory & Recommendations

Existing Conditions					Proposed Conditions						Energy Impact & Financial Analysis						
Location	Cooler/Freezer Quantity	Case Type/Temperature	Manufacturer	Model	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Energy Efficient Doors?	Install Door Heater Control?	Install Aluminum Night Covers?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Multipurpose - Lounge	1	Cooler (35F to 55F)	Fagor	FBC-50		No	No	No	No	No	0.0	0	0	\$0	\$0	\$0	0.0

Commercial Ice Maker Inventory & Recommendations

Existing Conditions						Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Garage - Engine Bay	1	Self-Contained Unit (<175 lbs/day), Batch			No	8	Yes	0.1	653	0	\$145	\$3,200	\$0	22.1

Cooking Equipment Inventory & Recommendations


	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost (\$)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Griddle (≤2 Feet Width)			No		No	0.0	0	0	\$0	\$0	\$0	0.0
Kitchen	1	Gas Rack Oven (Single)			No		No	0.0	0	0	\$0	\$0	\$0	0.0

Plug Load Inventory

Existing Conditions						
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Garage - Engine Bay	1	Clothes Dryer	6,000	No		
Garage - Engine Bay	1	Clothes Washer	1,200	No		
Interior Spaces	3	Desktop	150	No		
Kitchen	1	Dishwasher (Undercounter)	1,400	No		
Interior Spaces	7	Fan (Ceiling)	50	No		
Kitchen	1	Microwave	1,000	No		
Gymnasium - Weight Room	1	Other	600	No		
Interior Spaces	3	Printer (Medium/Small)	240	No		
Kitchen	1	Refrigerator (Residential)	572	No		
Interior Spaces	3	Television	130	No		

## APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

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



# ENERGY STAR® Statement of Energy Performance

## N/A

ENERGY STAR®  
Score<sup>1</sup>

### Lakewood Fire Department, Station 2

Primary Property Type: Fire Station  
Gross Floor Area (ft²): 6,400  
Built: 2002

For Year Ending: July 31, 2023  
Date Generated: June 12, 2024

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

Property & Contact Information			
<b>Property Address</b>	<b>Property Owner</b>	<b>Primary Contact</b>	
Lakewood Fire Department, Station 2 1350 Lanes Mill Road Lakewood, New Jersey 08701	Lakewood Board of Fire Commissioners 733 Cedar Bridge Ave. Lakewood, NJ 08701 (732) 364-5151	Yehuda Beer 733 Cedar Bridge Avenue Lakewood, NJ 08701 (732) 364-5151 x6102 ybeer@lakewoodfd.org	
<b>Property ID:</b> 32919831			

Energy Consumption and Energy Use Intensity (EUI)			
<b>Site EUI</b>	<b>Annual Energy by Fuel</b>	<b>National Median Comparison</b>	
80.8 kBtu/ft²	Electric - Grid (kBtu) 146,193 (28%)	National Median Site EUI (kBtu/ft²)	80.8
	Natural Gas (kBtu) 371,131 (72%)	National Median Source EUI (kBtu/ft²)	124.9
		% Diff from National Median Source EUI	0%
<b>Source EUI</b>		<b>Annual Emissions</b>	
124.8 kBtu/ft²		Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	33

### Signature & Stamp of Verifying Professional

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

LP Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Licensed Professional**

\_\_\_\_\_  
( ) - \_\_\_\_\_

Professional Engineer or Registered Architect Stamp  
(if applicable)



## APPENDIX C: GLOSSARY

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

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

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