



Local Government Energy Audit Report

Monsignor Lipinski Center

November 17, 2021

Prepared for:

City of Trenton

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Trenton, NJ 08638

Prepared by:

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

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

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ENERGY EFFICIENCY INCENTIVE & REBATE TRANSITION

For the purposes of your LGEA, estimated incentives and rebates are included as placeholders for planning purposes. New Jersey utilities are rolling out their own energy efficiency programs, which your project may be eligible for depending on individual measures, quantities, and size of the building.

In 2018, Governor Murphy signed into law the landmark legislation known as the [Clean Energy Act](#). The law called for a significant overhaul of New Jersey's clean energy systems by building sustainable infrastructure in order to fight climate change and reduce carbon emissions, which will in turn create well-paying local jobs, grow the state's economy, and improve public health while ensuring a cleaner environment for current and future residents.

These "next generation" energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and incentives directly to customers like you. NJCEP will still offer programs for new construction, renewable energy, the Energy Savings Improvement Program (ESIP), and large energy users.

New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the [NJCEP website](#).

The infographic features logos for Atlantic City Electric, Jersey Central Power & Light, PSEG, Rockland Electric Company, Elizabethtown Gas, South Jersey Gas, and New Jersey Natural Gas. Below the logos, it lists program areas to be served by utilities and proposed new programs and features.

Program areas to be served by the Utilities:

- Existing Buildings (residential, commercial, industrial, government)
- Efficient Products
 - HVAC
 - Appliance Rebates
 - Appliance Recycling

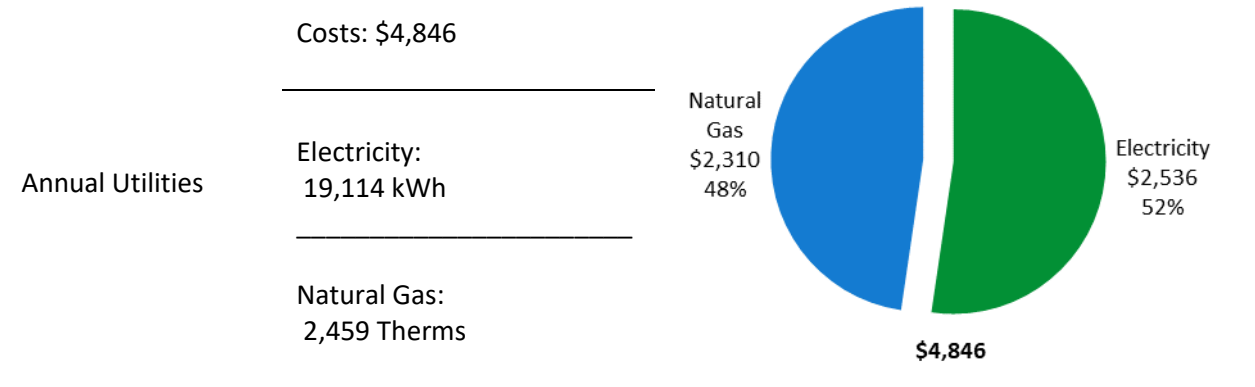
Proposed New Programs & Features:

- Dedicated multi-family program
- More financing options
- Quick home energy check-ups

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT



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

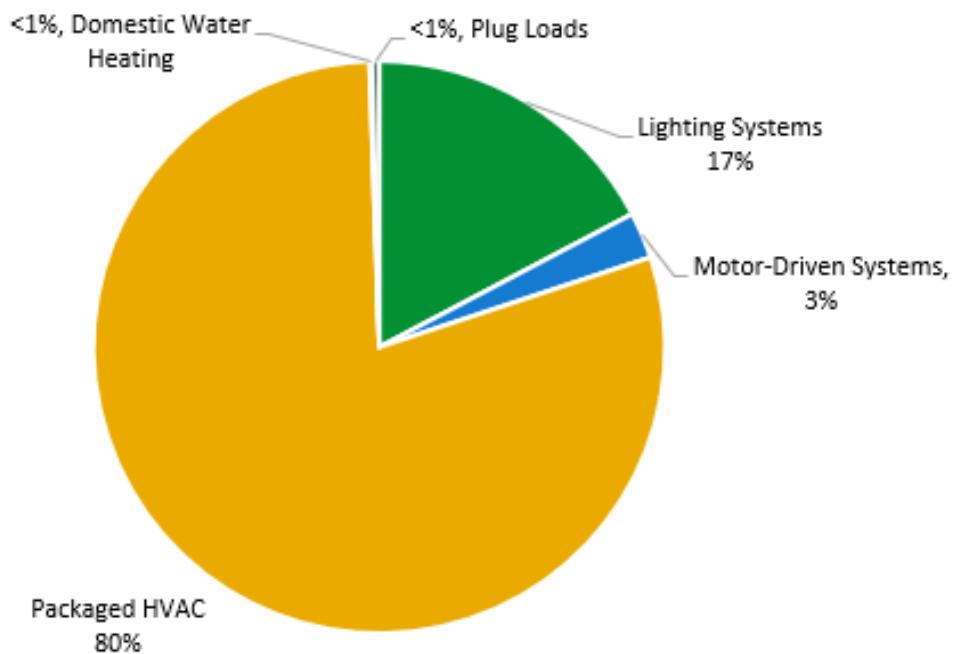


Figure 1 - Energy Use by System

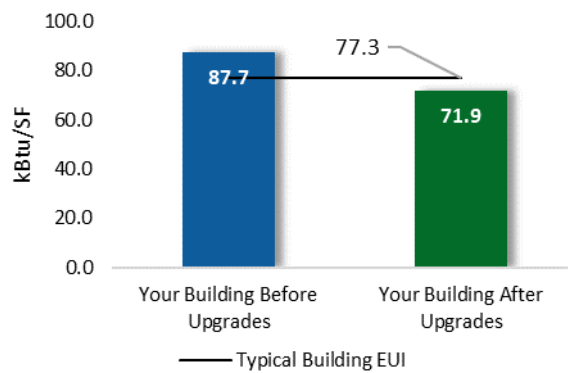
POTENTIAL IMPROVEMENTS



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

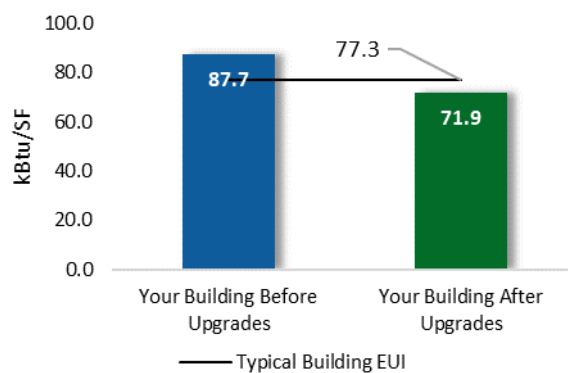
Scenario 1: Full Package (all evaluated measures)

| | |
|---|--|
| Installation Cost | \$8,314 |
| Potential Rebates & Incentives ¹ | \$1,358 |
| Annual Cost Savings | \$1,675 |
| Annual Energy Savings | Electricity: 11,440 kWh Natural Gas: 168 Therms |
| Greenhouse Gas Emission Savings | 7 Tons |
| Simple Payback | 4.2 Years |
| Site Energy Savings (all utilities) | 18% |



Scenario 2: Cost Effective Package²

| | |
|-------------------------------------|--|
| Installation Cost | \$8,314 |
| Potential Rebates & Incentives | \$1,358 |
| Annual Cost Savings | \$1,675 |
| Annual Energy Savings | Electricity: 11,440 kWh Natural Gas: 168 Therms |
| Greenhouse Gas Emission Savings | 7 Tons |
| Simple Payback | 4.2 Years |
| Site Energy Savings (all utilities) | 17% |



On-site Generation Potential

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated M&L Cost (\$) | Estimated Incentive (\$)* | Estimated Net M&L Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|---|--|-----------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------|-----------------------------|-------------------------------|---|
| Lighting Upgrades | | | 10,788 | 3.6 | -1 | \$1,422 | \$7,183 | \$890 | \$6,293 | 4.4 | 10,751 |
| ECM 1 | Install LED Fixtures | Yes | 6,303 | 0.0 | 0 | \$836 | \$3,270 | \$250 | \$3,020 | 3.6 | 6,347 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 4,415 | 3.3 | -1 | \$577 | \$3,826 | \$640 | \$3,186 | 5.5 | 4,335 |
| ECM 3 | Retrofit Fixtures with LED Lamps | Yes | 70 | 0.2 | 0 | \$9 | \$86 | \$0 | \$86 | 9.4 | 69 |
| Lighting Control Measures | | | 652 | 0.4 | 0 | \$85 | \$450 | \$450 | \$0 | 0.0 | 641 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 652 | 0.4 | 0 | \$85 | \$450 | \$450 | \$0 | 0.0 | 641 |
| HVAC System Improvements | | | 0 | 0.0 | 17 | \$157 | \$660 | \$0 | \$660 | 4.2 | 1,951 |
| ECM 5 | Install Programmable Thermostats | Yes | 0 | 0.0 | 17 | \$157 | \$660 | \$0 | \$660 | 4.2 | 1,951 |
| Domestic Water Heating Upgrade | | | 0 | 0.0 | 1 | \$12 | \$22 | \$18 | \$3 | 0.3 | 144 |
| ECM 6 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 1 | \$12 | \$22 | \$18 | \$3 | 0.3 | 144 |
| TOTALS (COST EFFECTIVE MEASURES) | | | 11,440 | 4.0 | 17 | \$1,675 | \$8,314 | \$1,358 | \$6,955 | 4.2 | 13,487 |
| TOTALS (ALL MEASURES) | | | 11,440 | 4.0 | 17 | \$1,675 | \$8,314 | \$1,358 | \$6,955 | 4.2 | 13,487 |

* - All incentives presented in this table are included as placeholders 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).

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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.

For details on these programs please visit [New Jersey's Clean Energy Program website](#) or contact your utility provider.



Options from Around the State

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

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

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

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

Ongoing Electric Savings with Demand Response

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

2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBP) has sponsored this Local Government Energy Audit (LGEA) Report for Monsignor Lipinski Center. 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 14, 2021, TRC performed an energy audit at Monsignor Lipinski Center located in Trenton, New Jersey. TRC met with facility staff to review the facility operations and help focus our investigation on specific energy-using systems.

The Monsignor Lipinski Center is a one-story, 3,549 square foot building built in 1930. Spaces include kitchen, offices, restrooms, multipurpose room, and mechanical spaces.

2.2 Building Occupancy

This facility is currently unoccupied and is being used for storage.

| Building Name | Weekday/Weekend | Operating Schedule |
|---------------------------|-----------------|--------------------|
| Monsignor Lipinski Center | Weekday | Unoccupied |
| | Weekend | Unoccupied |

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block and brick. Exterior finish is exposed block and plaster. The flat roof is built up with wood and filled with fiberglass insulation.

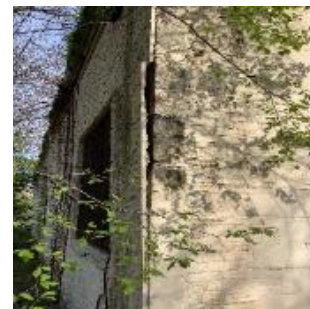
Windows are single pane with metal frames and covered with metal mesh. The glass to frame seals are in poor condition. Exterior doors have aluminum frames and are in fair condition with worn door seals. Degraded window and door seals increase drafts and outside air infiltration.



Exterior of building



Exterior of building



Exterior of building



Window in Multipurpose Room



Window in Multipurpose Room



Exterior Door



Exterior Door

2.4 Lighting Systems

The primary interior lighting system uses 40-Watt linear fluorescent T12 lamps. Additionally, there are some incandescent general-purpose lamps. Typically, T12 fluorescent lamps use magnetic ballasts.

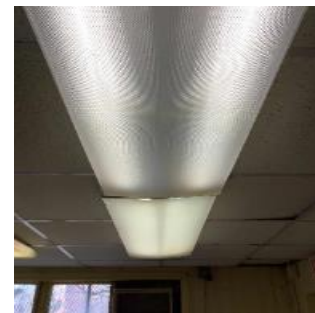
Fixture types include 2-lamp or 4-lamp, 4-foot-long troffers, and surface mounted fixtures.



2-foot x 4-foot Recessed Troffer



Surface Mount Wrap Fixtures in Office



Surface Mount Wrap Fixtures in Kitchen

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

The facility is equipped with window air conditioning (AC) units. These vary in capacity between 0.5 tons and 1-ton. They are not ENERGY STAR® labeled. The units are in poor condition and are not operated.



Window AC Units



Window AC Unit



Window AC Unit

Unitary Heating Equipment

The restrooms are heated by electric resistance heating units that are in poor condition. These units are not used.

The multipurpose room is heated by two suspended gas-fired furnaces. These units are in fair condition. They are controlled by a manual dial thermostat.



Hanging Gas-fired Furnace



Thermostat



Hanging Gas-fired Furnace,

2.6 Domestic Hot Water

Hot water is produced by a 20 gallon, 150 MBh gas-fired storage water heater with an 80% efficiency rating. The domestic hot water pipes are insulated, and the insulation is in fair condition.

2.7 Plug Load & Vending Machines

There is a residential-style refrigerator in the kitchen. Aside from that, plug loads were not noted. This report makes general suggestions for ECMs in this area as well as Energy Efficient Best Practices.

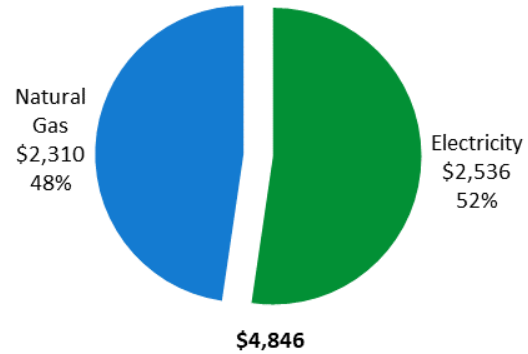
2.8 Water-Using Systems

There are restrooms with toilets and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher.

3 ENERGY USE AND COSTS

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

| Utility Summary | | |
|-----------------|--------------|----------------|
| Fuel | Usage | Cost |
| Electricity | 19,114 kWh | \$2,536 |
| Natural Gas | 2,459 Therms | \$2,310 |
| Total | | \$4,846 |



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

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

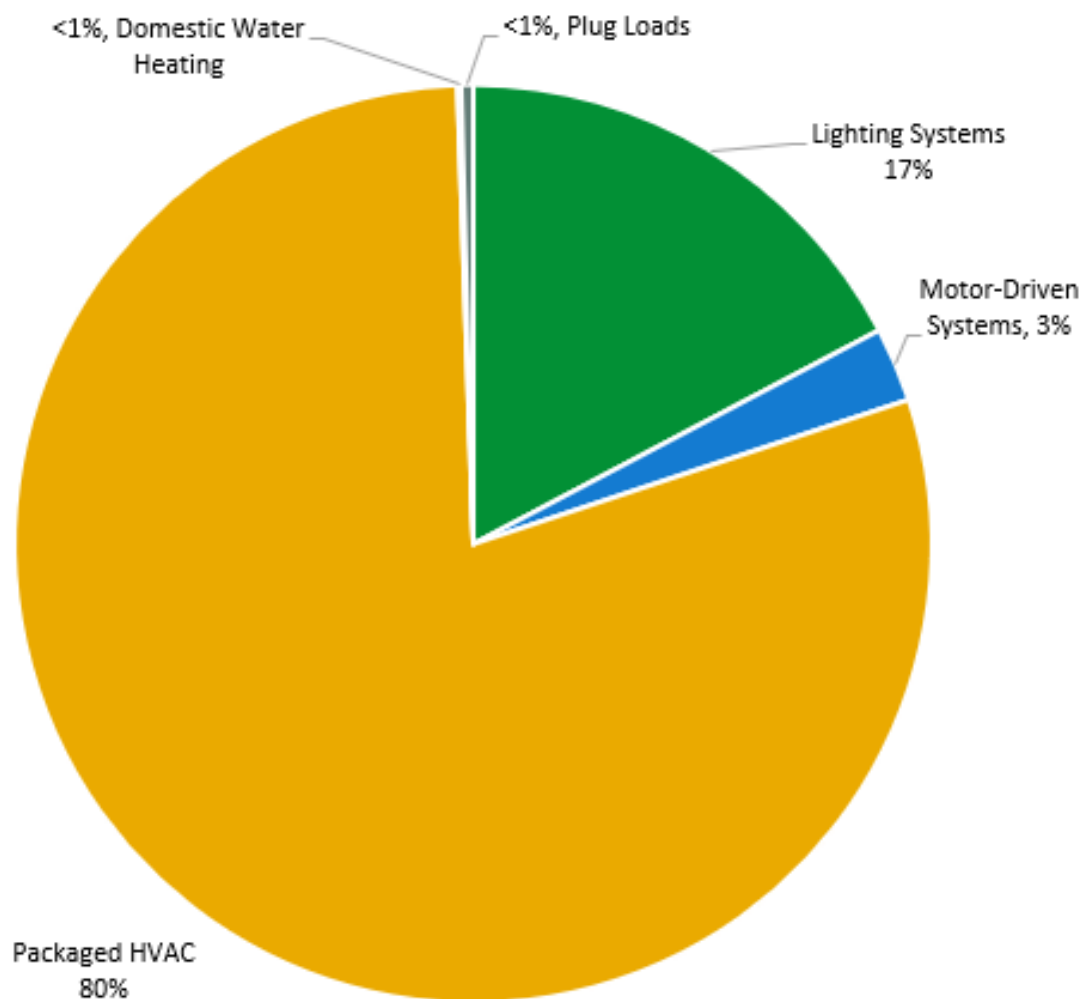
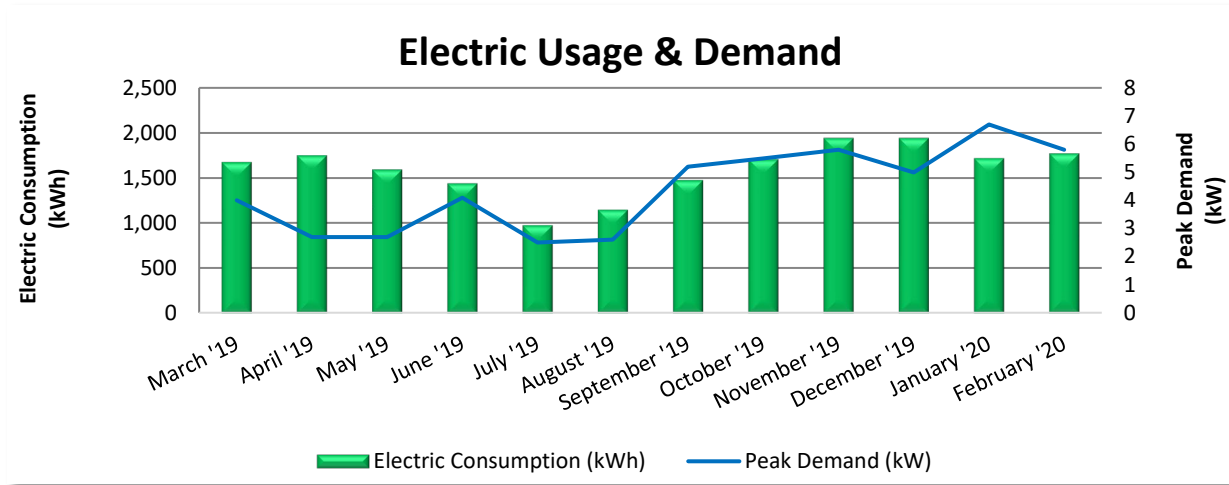


Figure 4 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class General Lighting & Power (GLP).



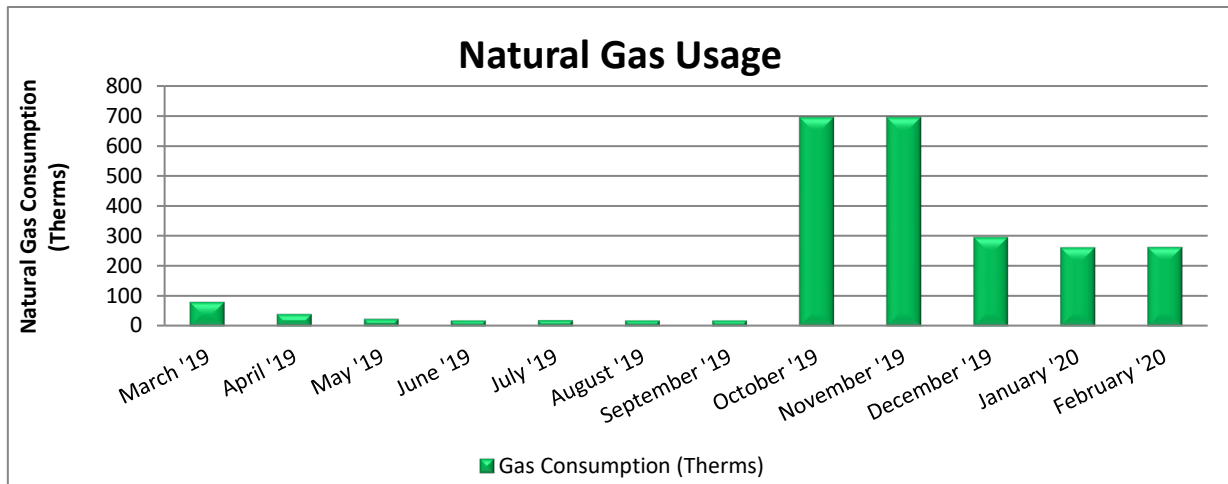
| Electric Billing Data | | | | | |
|-----------------------|----------------|----------------------|-------------|--------------|---------------------|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 4/4/19 | 31 | 1,673 | 4 | \$16 | \$208 |
| 5/6/19 | 30 | 1,748 | 3 | \$11 | \$216 |
| 6/5/19 | 30 | 1,592 | 3 | \$37 | \$220 |
| 7/5/19 | 30 | 1,438 | 4 | \$56 | \$222 |
| 8/5/19 | 31 | 976 | 3 | \$10 | \$146 |
| 9/4/19 | 30 | 1,148 | 3 | \$10 | \$167 |
| 10/3/19 | 29 | 1,474 | 5 | \$10 | \$184 |
| 11/3/19 | 31 | 1,706 | 6 | \$17 | \$204 |
| 12/4/19 | 31 | 1,938 | 6 | \$23 | \$251 |
| 1/6/20 | 33 | 1,938 | 5 | \$20 | \$251 |
| 2/4/20 | 29 | 1,715 | 7 | \$26 | \$234 |
| 3/4/20 | 30 | 1,768 | 6 | \$23 | \$232 |
| Totals | 365 | 19,114 | 7 | \$259 | \$2,536 |
| Annual | 365 | 19,114 | 7 | \$259 | \$2,536 |

Notes:

- Peak demand of 7 kW occurred in January 2020.
- Average demand over the past 12 months was 4 kW.
- The average electric cost over the past 12 months was \$0.133/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class General Service Gas Heating – GSG (HTG).



| Gas Billing Data | | | |
|------------------|----------------|----------------------------|------------------|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 4/4/19 | 31 | 82 | \$81 |
| 5/6/19 | 30 | 42 | \$45 |
| 6/5/19 | 30 | 26 | \$36 |
| 7/5/19 | 30 | 21 | \$30 |
| 8/5/19 | 31 | 22 | \$33 |
| 9/4/19 | 30 | 21 | \$30 |
| 10/3/19 | 29 | 21 | \$32 |
| 11/3/19 | 31 | 698 | \$635 |
| 12/4/19 | 31 | 698 | \$635 |
| 1/6/20 | 33 | 299 | \$280 |
| 2/4/20 | 29 | 264 | \$241 |
| 3/4/20 | 30 | 266 | \$233 |
| Totals | 365 | 2,459 | \$2,310 |
| Annual | 365 | 2,459 | \$2,310 |

Notes:

- The average gas cost for the past 12 months is \$0.940/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

| | |
|---------------------------|--------------|
| Benchmarking Score | [N/A] |
|---------------------------|--------------|

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

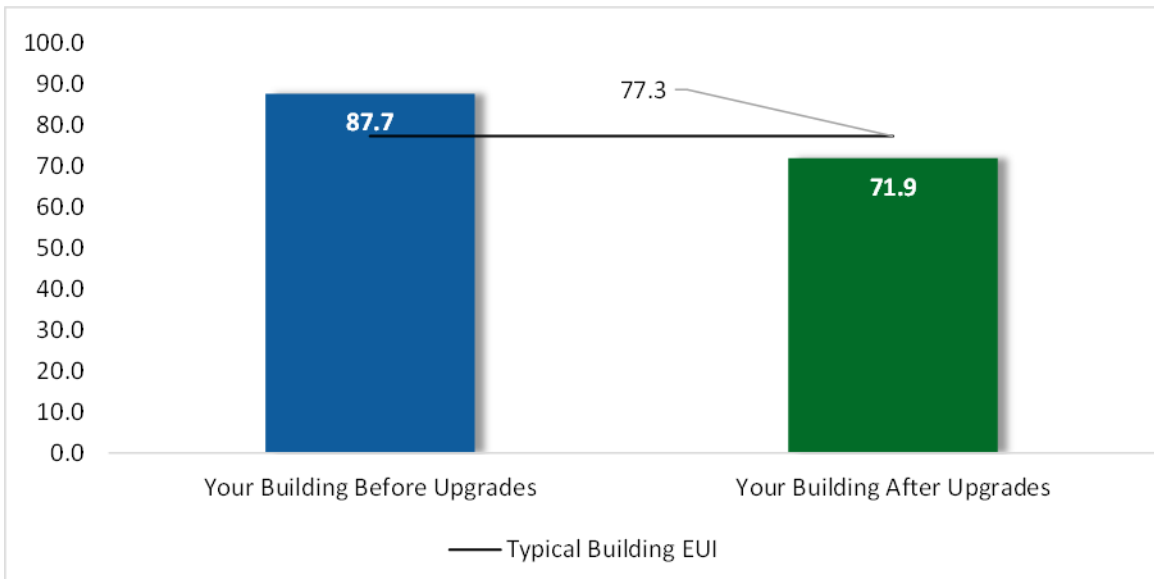


Figure 5 - Energy Use Intensity Comparison³

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

³ Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

For more information on ENERGY STAR® and Portfolio Manager®, visit their website⁴.

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

4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify and evaluate potential energy efficiency improvements 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 are based on previously run state rebate programs. New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the [NJCEP website](#). Some measures and proposed upgrades may be eligible for higher incentives than those shown below.

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 ₂ e Emissions Reduction (lbs) |
|---------------------------------------|--|-----------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------|-----------------------------|-------------------------------|---|
| Lighting Upgrades | | | 10,788 | 3.6 | -1 | \$1,422 | \$7,183 | \$890 | \$6,293 | 4.4 | 10,751 |
| ECM 1 | Install LED Fixtures | Yes | 6,303 | 0.0 | 0 | \$836 | \$3,270 | \$250 | \$3,020 | 3.6 | 6,347 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | Yes | 4,415 | 3.3 | -1 | \$577 | \$3,826 | \$640 | \$3,186 | 5.5 | 4,335 |
| ECM 3 | Retrofit Fixtures with LED Lamps | Yes | 70 | 0.2 | 0 | \$9 | \$86 | \$0 | \$86 | 9.4 | 69 |
| Lighting Control Measures | | | 652 | 0.4 | 0 | \$85 | \$450 | \$450 | \$0 | 0.0 | 641 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 652 | 0.4 | 0 | \$85 | \$450 | \$450 | \$0 | 0.0 | 641 |
| HVAC System Improvements | | | 0 | 0.0 | 17 | \$157 | \$660 | \$0 | \$660 | 4.2 | 1,951 |
| ECM 5 | Install Programmable Thermostats | Yes | 0 | 0.0 | 17 | \$157 | \$660 | \$0 | \$660 | 4.2 | 1,951 |
| Domestic Water Heating Upgrade | | | 0 | 0.0 | 1 | \$12 | \$22 | \$18 | \$3 | 0.3 | 144 |
| ECM 6 | Install Low-Flow DHW Devices | Yes | 0 | 0.0 | 1 | \$12 | \$22 | \$18 | \$3 | 0.3 | 144 |
| TOTALS | | | 11,440 | 4.0 | 17 | \$1,675 | \$8,314 | \$1,358 | \$6,955 | 4.2 | 13,487 |

* - All incentives presented in this table are included as placeholders 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).

Figure 6 & 7 – All Evaluated & Cost Effective ECMs

4.1 Lighting

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated M&L Cost (\$) | Estimated Incentive (\$)* | Estimated Net M&L Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|--------------------------|--|-------------------------------|--------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------|-----------------------------|-------------------------------|---|
| Lighting Upgrades | | 10,788 | 3.6 | -1 | \$1,422 | \$7,183 | \$890 | \$6,293 | 4.4 | 10,751 |
| ECM 1 | Install LED Fixtures | 6,303 | 0.0 | 0 | \$836 | \$3,270 | \$250 | \$3,020 | 3.6 | 6,347 |
| ECM 2 | Retrofit Fluorescent Fixtures with LED Lamps and Drivers | 4,415 | 3.3 | -1 | \$577 | \$3,826 | \$640 | \$3,186 | 5.5 | 4,335 |
| ECM 3 | Retrofit Fixtures with LED Lamps | 70 | 0.2 | 0 | \$9 | \$86 | \$0 | \$86 | 9.4 | 69 |

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

ECM 1: Install LED Fixtures

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

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

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

Affected building areas: exterior fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

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

ECM 3: Retrofit Fixtures with LED Lamps

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

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

Affected building areas: office and restrooms.

4.2 Lighting Controls

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated M&L Cost (\$) | Estimated Incentive (\$)* | Estimated Net M&L Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|----------------------------------|------------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------|-----------------------------|-------------------------------|---|
| Lighting Control Measures | | 652 | 0.4 | 0 | \$85 | \$450 | \$450 | \$0 | 0.0 | 641 |
| ECM 4 | Install High/Low Lighting Controls | 652 | 0.4 | 0 | \$85 | \$450 | \$450 | \$0 | 0.0 | 641 |

Lighting controls reduce energy use by turning off or lowering lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 4: Install High/Low Lighting Controls

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

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

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

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

Affected building areas: multipurpose room.

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

4.3 HVAC Improvements

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated M&L Cost (\$) | Estimated Incentive (\$)* | Estimated Net M&L Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|---------------------------------|----------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------|-----------------------------|-------------------------------|---|
| HVAC System Improvements | | 0 | 0.0 | 17 | \$157 | \$660 | \$0 | \$660 | 4.2 | 1,951 |
| ECM 5 | Install Programmable Thermostats | 0 | 0.0 | 17 | \$157 | \$660 | \$0 | \$660 | 4.2 | 1,951 |

ECM 5: Install Programmable Thermostats

Replace manual thermostats with programmable thermostats which provide energy savings by reducing heating and cooling energy usage when a room is unoccupied. Manual thermostats are generally adjusted to a single heating and cooling setpoint and left at that setting regardless of occupancy and they provide the same level of heating and cooling regardless of whether the space is being used. Programmable thermostats can maintain different temperature settings for different times of day and for different days of the week. By reducing heating temperature setpoints and raising cooling temperature setpoints when spaces are unoccupied, the operation of the HVAC equipment is reduced while maintaining comfortable space temperatures for building usage. Building is largely unoccupied, therefore, set back thermostats to a minimum level for general operations.

Affected building areas: unit heaters in multipurpose room

4.4 Domestic Water Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated M&L Cost (\$) | Estimated Incentive (\$)* | Estimated Net M&L Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|---------------------------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------|-----------------------------|-------------------------------|---|
| Domestic Water Heating Upgrade | | 0 | 0.0 | 1 | \$12 | \$22 | \$18 | \$3 | 0.3 | 144 |
| ECM 5 | Install Low-Flow DHW Devices | 0 | 0.0 | 1 | \$12 | \$22 | \$18 | \$3 | 0.3 | 144 |

ECM 6: Install Low-Flow DHW Devices

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

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

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

Additional cost savings may result from reduced water usage.

5 ENERGY EFFICIENT BEST PRACTICES

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

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

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

Energy Tracking with ENERGY STAR® Portfolio Manager®



You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions⁵. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

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.

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

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.

Water Conservation



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

For more information regarding water conservation go to the EPA's WaterSense® website⁶ or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"⁷ to get ideas for creating a water management plan and best practices for a wide range of water using systems.

⁶ <https://www.epa.gov/watersense>.

⁷ <https://www.epa.gov/watersense/watersense-work-0>.

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

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

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

Procurement Strategies

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

6 ON-SITE GENERATION

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

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

6.1 Solar Photovoltaic

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

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

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

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

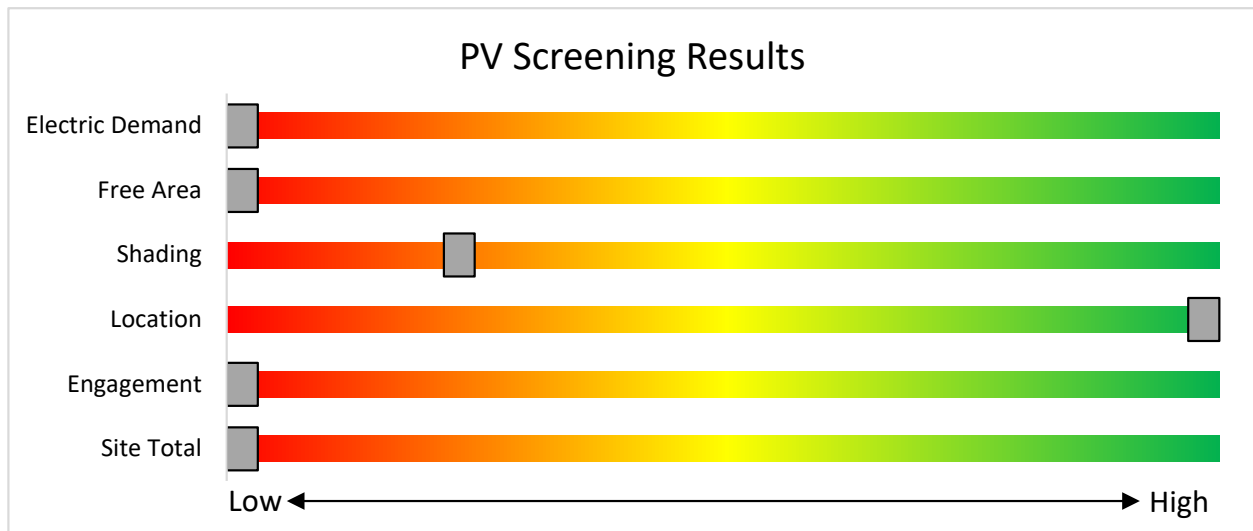


Figure 8 - Photovoltaic Screening

Transition Incentive (TI) Program

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

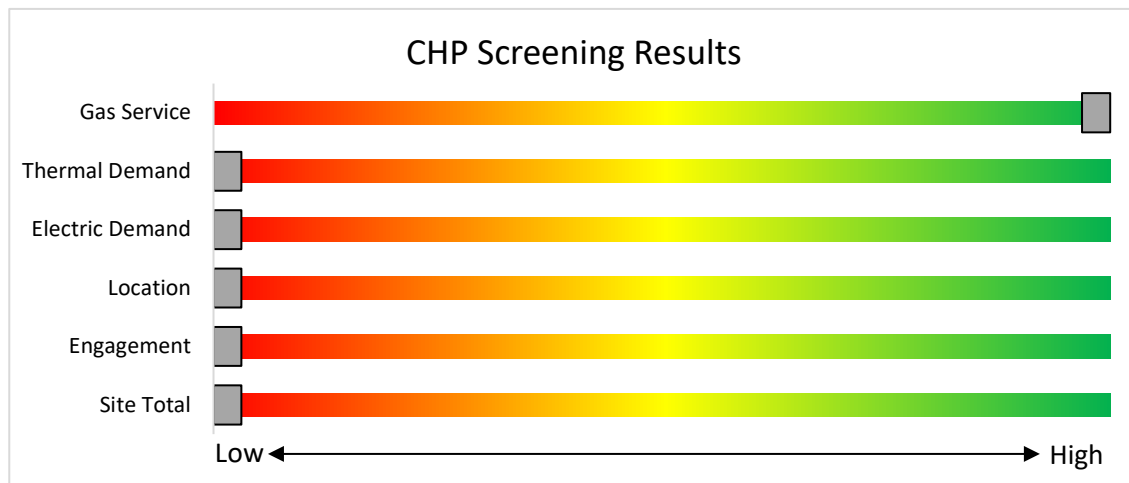


Figure 9 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? Your utility provider may be able to help.

7.1 Utility Energy Efficiency Programs

The infographic features logos for Atlantic City Electric, Jersey Central Power & Light, PSEG, Rockland Electric Company, Elizabethtown Gas, South Jersey Gas, and New Jersey Natural Gas. Below the logos, it lists program areas to be served by utilities and proposed new programs and features.

Program areas to be served by the Utilities:

- Existing Buildings (residential, commercial, industrial, government)
- Efficient Products
 - HVAC
 - Appliance Rebates
 - Appliance Recycling

Proposed New Programs & Features:

- Dedicated multi-family program
- More financing options
- Quick home energy check-ups

New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the [NJCEP website](#).

8 NEW JERSEY'S CLEAN ENERGY PROGRAMS

New Jersey's Clean Energy Program will continue to offer some energy efficiency programs.



Program areas staying with NJCEP:

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

8.1 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

8.2 Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

8.3 Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project’s eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installations. NJBPU calculates the value of a Transition Renewable Energy Certificate (TREC) by multiplying the base compensation rate (\$152/MWh) by the project’s assigned factor (i.e. $\$152 \times 0.85 = \$129.20/\text{MWh}$). The TREC factors are defined based on the chart below:

| Project Type | Factor |
|--|--------|
| Subsection (t): landfill, brownfield, areas of historic fill | 1.00 |
| Grid supply (Subsection (r)) rooftop | 1.00 |
| Net metered non-residential rooftop and carport | 1.00 |
| Community solar | 0.85 |
| Grid supply (Subsection (r)) ground mount | 0.60 |
| Net metered residential ground mount | 0.60 |
| Net metered residential rooftop and carport | 0.60 |
| Net metered non-residential ground mount | 0.60 |

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

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

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

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

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state’s Energy Master Plan. The Transition Incentive Program online portal is now open to new applications effective May 1, 2020. There are instructions on “How and When to Transfer my SRP Registration to the Transition Incentive Program”. If you are considering installing solar photovoltaics on your building, visit the following link for more information:

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

9 PROJECT DEVELOPMENT

Energy conservation measures (ECMs) have been identified for your site and their energy and economic analyses are provided within this LGEA report. 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 includes the review of multiple bids for project work, incorporate potential operational & maintenance (O&M) cost savings and maximize your incentive potential.

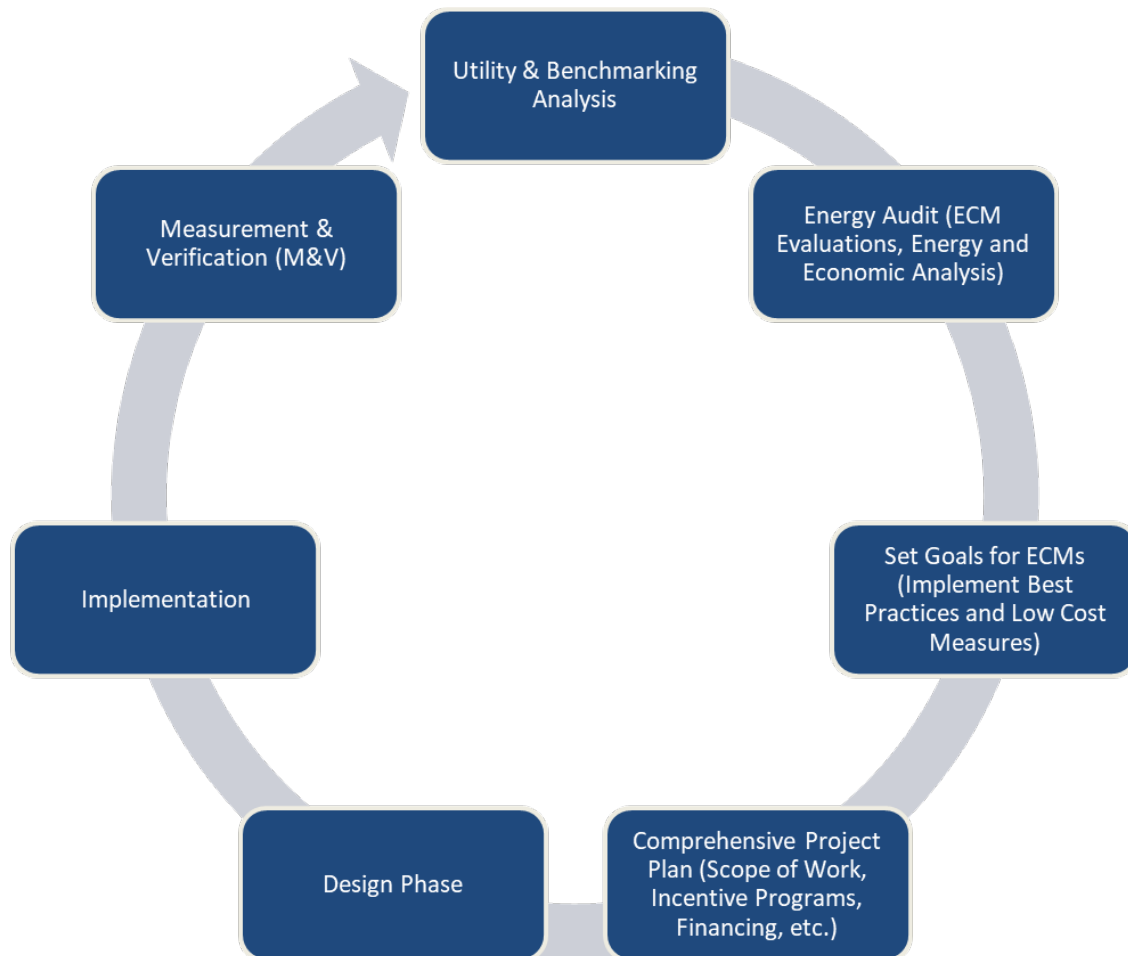


Figure 3 – Project Development Cycle

10 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

10.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website⁸.

10.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website⁹.

⁸ www.state.nj.us/bpu/commercial/shopping.html.

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

| Location | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---------------------|---------------------|---|----------------|-------------|-------------------|------------------------|---------------------|------------------------|---------------|------------------|---|------------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost (\$) | Total Incentives | Simple Payback w/ Incentives in Years |
| Exterior 1 | 2 | High-Pressure Sodium: (1) 310W Lamp | Timeclock | | 365 | 4,368 | 1 | Fixture Replacement | No | 2 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | 116 | 4,368 | 0.0 | 2,175 | 0 | \$289 | \$1,104 | \$100 | 3.5 |
| Kitchen 1 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Kitchen 1 | 4 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | S | 88 | 260 | 2 | Relamp & Reballast | No | 4 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 260 | 0.2 | 66 | 0 | \$9 | \$275 | \$40 | 27.2 |
| Multipurpose 1 | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Multipurpose 1 | 28 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | Wall Switch | S | 176 | 1,200 | 2, 4 | Relamp & Reballast | Yes | 28 | LED - Linear Tubes: (4) 4' Lamps | High/Low Control | 58 | 828 | 3.4 | 4,934 | -1 | \$645 | \$3,764 | \$1,010 | 4.3 |
| Office - Enclosed 1 | 1 | Incandescent: 60W - A Lamp | Wall Switch | S | 60 | 260 | 3 | Relamp | No | 1 | LED Lamps: A-Lamp | Wall Switch | 10 | 260 | 0.0 | 14 | 0 | \$2 | \$17 | \$0 | 9.4 |
| Office - Enclosed 1 | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | Wall Switch | S | 176 | 260 | 2 | Relamp & Reballast | No | 2 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 260 | 0.2 | 66 | 0 | \$9 | \$237 | \$40 | 22.7 |
| Restroom - Female 1 | 2 | Incandescent: 60W - A Lamp | Wall Switch | S | 60 | 260 | 3 | Relamp | No | 2 | LED Lamps: A-Lamp | Wall Switch | 10 | 260 | 0.1 | 28 | 0 | \$4 | \$34 | \$0 | 9.4 |
| Restroom - Male 1 | 1 | Incandescent: 60W - A Lamp | Wall Switch | S | 60 | 260 | 3 | Relamp | No | 1 | LED Lamps: A-Lamp | Wall Switch | 10 | 260 | 0.0 | 14 | 0 | \$2 | \$17 | \$0 | 9.4 |
| Storage 1 | 1 | Incandescent: 60W - A Lamp | Wall Switch | S | 60 | 260 | 3 | Relamp | No | 1 | LED Lamps: A-Lamp | Wall Switch | 10 | 260 | 0.0 | 14 | 0 | \$2 | \$17 | \$0 | 9.4 |
| Exterior 1 | 3 | High-Pressure Sodium: (1) 400W Lamp | Timeclock | | 465 | 4,368 | 1 | Fixture Replacement | No | 3 | LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture | Timeclock | 150 | 4,368 | 0.0 | 4,128 | 0 | \$548 | \$2,166 | \$150 | 3.7 |

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 |
| Multipurpose room 1 | Multipurpose room 1 | 2 | Exhaust Fan | 0.3 | 65.0% | No | Unknown | Unknown | W | 2,745 | | No | 65.0% | No | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Multipurpose room 1 | Multipurpose room 1 | 2 | Supply Fan | 0.3 | 65.0% | No | Unknown | Unknown | W | 2,745 | | No | 65.0% | 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 |
| Multipurpose Room 1 | Multipurpose Room 1 | 1 | Unit Heater | | 160.00 | | 0.8 AFUE | Unknown | Unknown | W | | No | | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Multipurpose Room 1 | Multipurpose Room 1 | 1 | Unit Heater | | 120.00 | | 0.8 AFUE | Brut | Unknown | W | | No | | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Multipurpose Room 1 | Multipurpose Room 1 | 4 | Window AC | 1.00 | | 10.00 | | Friedrich | Unknown | B | | No | | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Kitchen | Kitchen | 1 | Window AC | 0.50 | | 10.00 | | Unknown | Unknown | B | | No | | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Womens room | Womens room | 1 | Electric Resistance Heat | | 1.71 | | 1 COP | Unknown | Unknown | B | | No | | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |
| Mens room | Mens room | 1 | Electric Resistance Heat | | 1.71 | | 1 COP | Unknown | Unknown | B | | No | | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |

Programmable Thermostat Recommendations

| | | Recommendation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | | |
|---------------------|----------------------------|-----------------------|---------------------|--|--|--|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|--|
| Location | Area(s)/System(s) Affected | ECM # | Thermostat Quantity | Cooling Capacity of Controlled System (Tons) | Electric Heating Capacity of Controlled System (kBtu/hr) | Output Heating Capacity of Controlled System (MBh) | 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 Room 1 | Multipurpose Room 1 | 5 | 1.00 | 0.00 | 0.00 | 160.00 | 0.0 | 0 | 10 | \$89 | \$330 | \$0 | 3.7 | |
| Multipurpose Room 1 | Multipurpose Room 1 | 5 | 1.00 | 0.00 | 0.00 | 120.00 | 0.0 | 0 | 7 | \$67 | \$330 | \$0 | 4.9 | |

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 |
| Closet | Monsignor Lipinski Center | 1 | Storage Tank Water Heater (≤ 50 Gal) | Unknown | Unknown | W | | No | | | | | | 0.0 | 0 | 0 | \$0 | \$0 | \$0 | 0.0 |

Low-Flow Device Recommendations

| Location | Recommendation Inputs | | | | Energy Impact & Financial Analysis | | | | | | | |
|----------|-----------------------|-----------------|---------------------------|--------------------------|------------------------------------|-----------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | ECM # | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Estimated M&L Cost (\$) | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 6 | 1 | Faucet Aerator (Kitchen) | 2.50 | 1.50 | 0.0 | 0 | 0 | \$3 | \$7 | \$4 | 1.2 |
| Restroom | 6 | 2 | Faucet Aerator (Lavatory) | 2.20 | 0.50 | 0.0 | 0 | 1 | \$9 | \$14 | \$14 | 0.0 |

Plug Load Inventory

| Location | Existing Conditions | | | | | |
|----------|---------------------|-----------------------|-----------------|-------------------------|--------------|---------|
| | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified ? | Manufacturer | Model |
| Kitchen | 1 | Refrigerator | 126 | No | Unknown | Unknown |

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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

ENERGY STAR® Statement of Energy Performance

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

N/A

**ENERGY STAR®
Score¹**

Monsignor Lipinski Center

Primary Property Type: Social/Meeting Hall
Gross Floor Area (ft²): 3,549
Built: 1930

For Year Ending: February 29, 2020
Date Generated: June 22, 2021

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

| Property & Contact Information | | |
|---|--|--|
| Property Address Monsignor Lipinski Center 19 Heil Avenue Trenton, New Jersey 08638 | Property Owner City of Trenton 319 East State Street Trenton, NJ 08618 (609) 989-3615 | Primary Contact Hoggarth Stephen 319 East State Street Trenton, NJ 08618 (609) 989-3615 hstephen@trentonnj.org |
| Property ID: 15545418 | | |

| Energy Consumption and Energy Use Intensity (EUI) | | | |
|---|------------------------------|--|---|
| Site EUI 87.7 kBtu/ft² | Annual Energy by Fuel | | National Median Comparison |
| | Electric - Grid (kBtu) | 65,274 (21%) | National Median Site EUI (kBtu/ft²) 77.3 |
| | Natural Gas (kBtu) | 245,980 (79%) | National Median Source EUI (kBtu/ft²) 109.6 |
| Source EUI 124.3 kBtu/ft² | | | % Diff from National Median Source EUI 13% |
| | | Annual Emissions | |
| | | Greenhouse Gas Emissions (Metric Tons CO2e/year) | 19 |

Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

Licensed Professional

() - _____



Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

| TERM | DEFINITION |
|--------------------------|--|
| Blended Rate | Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is \$22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour. |
| Btu | <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. |
| CHP | <i>Combined heat and power</i> . Also referred to as cogeneration. |
| COP | <i>Coefficient of performance</i> : a measure of efficiency in terms of useful energy delivered divided by total energy input. |
| Demand Response | Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives. |
| DCV | <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. |
| US DOE | <i>United States Department of Energy</i> |
| EC Motor | <i>Electronically commutated motor</i> |
| ECM | <i>Energy conservation measure</i> |
| EER | <i>Energy efficiency ratio</i> : a measure of efficiency in terms of cooling energy provided divided by electric input. |
| EUI | <i>Energy Use Intensity</i> : measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance. |
| Energy Efficiency | Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing the operation of energy use systems. Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service. |
| ENERGY STAR® | ENERGY STAR® is the government-backed symbol for energy efficiency. The ENERGY STAR® program is managed by the EPA. |
| EPA | <i>United States Environmental Protection Agency</i> |
| Generation | The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil). |
| GHG | <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. |
| gpf | <i>Gallons per flush</i> |

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

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