
# Local Government Energy Audit Report

Dane Barse Elementary School

January 3, 2020

*Prepared for:*
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# Disclaimer

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

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. Cost estimates include material and labor pricing associated with installation of primary recommended equipment only. Cost estimates do not include demolition or removal of hazardous waste. We encourage the owner of the facility to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

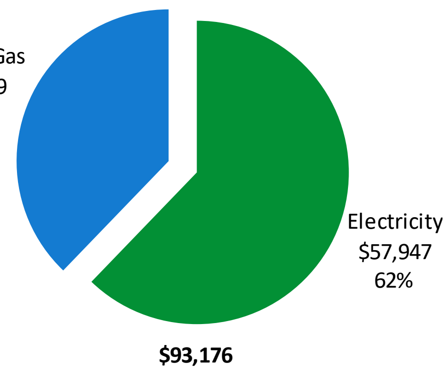
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

# Table of Contents

# 1 Executive Summary

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

## BUILDING PERFORMANCE REPORT

| | | |
|---|---|---|
| Annual Utilities | Costs: $93,176<br>Electricity: 355,785 kWh<br>Natural Gas: 23,509 Therms |  |
| ENERGY STAR® Benchmarking Score | 15<br>*(1-100 scale)* | This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs. |

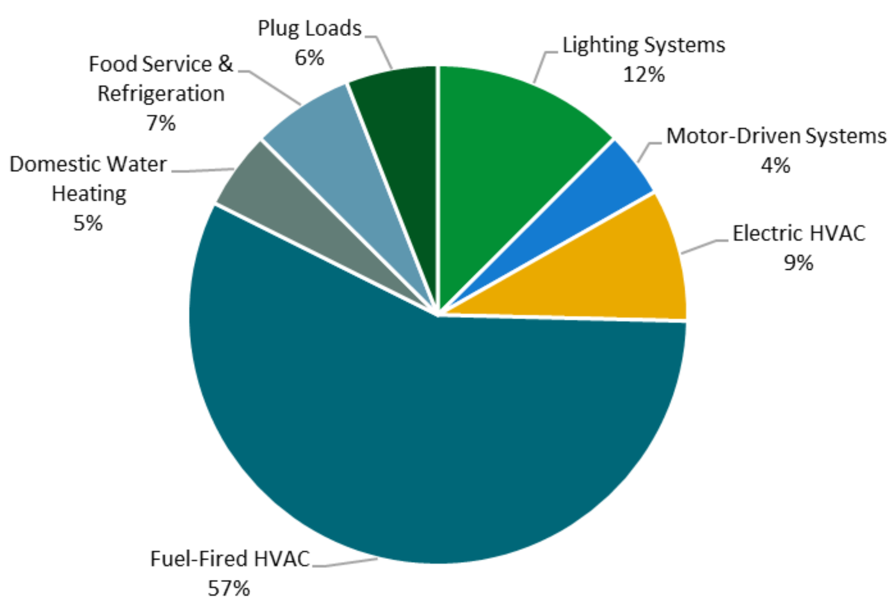


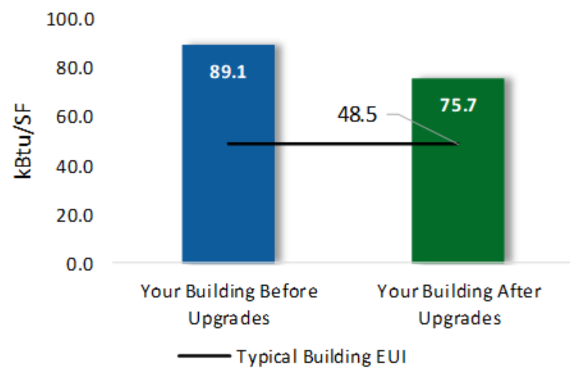

*Figure 1 - Energy Use by System*

## 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.

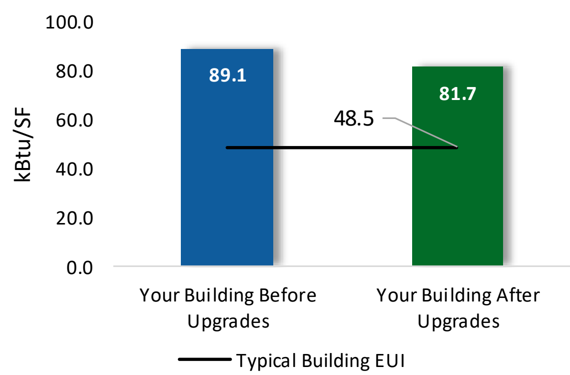
### Scenario 1: Full Package (all evaluated measures)

| | |
|---|---|
| Installation Cost | $432,008 |
| Potential Rebates & Incentives[1] | $39,800 |
| Annual Cost Savings | $19,533 |
| Annual Energy Savings | Electricity: 115,289 kWh<br>Natural Gas: 1,408 Therms |
| Greenhouse Gas Emission Savings | 66 Tons |
| Simple Payback | 20.1 Years |
| Site Energy Savings (all utilities) | 15% |




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

| | |
|---|---|
| Installation Cost | $54,369 |
| Potential Rebates & Incentives | $23,420 |
| Annual Cost Savings | $14,519 |
| Annual Energy Savings | Electricity: 90,230 kWh |
| Greenhouse Gas Emission Savings | 45 Tons |
| Simple Payback | 2.1 Years |
| Site Energy Savings (all utilities) | 8% |




### On-site Generation Potential

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **68,164** | **18.4** | **-14** | **$10,894** | **$32,391** | **$0** | **$32,391** | **3.0** | **67,016** |
| ECM 1 | Install LED Fixtures | Yes | 1,760 | 0.0 | 0 | $287 | $2,235 | $0 | $2,235 | 7.8 | 1,772 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 66,404 | 18.4 | -14 | $10,607 | $30,156 | $0 | $30,156 | 2.8 | 65,244 |
| **Lighting Control Measures** | | | **17,200** | **4.7** | **-4** | **$2,748** | **$17,277** | **$0** | **$17,277** | **6.3** | **16,900** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 14,767 | 4.1 | -3 | $2,359 | $14,352 | $0 | $14,352 | 6.1 | 14,509 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 2,434 | 0.7 | -1 | $389 | $2,925 | $0 | $2,925 | 7.5 | 2,391 |
| **Variable Frequency Drive (VFD) Measures** | | | **3,259** | **1.1** | **0** | **$531** | **$34,359** | **$0** | **$34,359** | **64.7** | **3,282** |
| ECM 5 | Install VFDs on Heating Water Pumps | No | 3,259 | 1.1 | 0 | $531 | $34,359 | $0 | $34,359 | 64.7 | 3,282 |
| **Electric Unitary HVAC Measures** | | | **5,162** | **4.5** | **0** | **$841** | **$87,608** | **$0** | **$87,608** | **104.2** | **5,199** |
| ECM 6 | Install High Efficiency Air Conditioning Units | No | 5,162 | 4.5 | 0 | $841 | $87,608 | $0 | $87,608 | 104.2 | 5,199 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **118** | **$1,768** | **$97,953** | **$13,824** | **$84,130** | **47.6** | **13,814** |
| ECM 7 | Install High Efficiency Hot Water Boilers | No | 0 | 0.0 | 89 | $1,326 | $58,780 | $9,170 | $49,610 | 37.4 | 10,364 |
| ECM 8 | Install High Efficiency Steam Boilers | No | 0 | 0.0 | 29 | $442 | $39,173 | $4,654 | $34,520 | 78.2 | 3,450 |
| **Domestic Water Heating Upgrade** | | | **172** | **0.0** | **40** | **$632** | **$15,090** | **$1,820** | **$13,270** | **21.0** | **4,894** |
| ECM 9 | Install High Efficiency Gas-Fired Water Heater | No | 0 | 0.0 | 35 | $519 | $15,025 | $1,820 | $13,205 | 25.5 | 4,054 |
| ECM 10 | Install Low-Flow DHW Devices | Yes | 172 | 0.0 | 6 | $113 | $65 | $0 | $65 | 0.6 | 840 |
| **Food Service & Refrigeration Measures** | | | **4,694** | **0.5** | **0** | **$764** | **$4,636** | **$0** | **$4,636** | **6.1** | **4,727** |
| ECM 11 | Replace Refrigeration Equipment | Yes | 3,082 | 0.4 | 0 | $502 | $4,406 | $0 | $4,406 | 8.8 | 3,104 |
| ECM 12 | Vending Machine Control | Yes | 1,612 | 0.2 | 0 | $263 | $230 | $0 | $230 | 0.9 | 1,623 |
| **Custom Measures** | | | **8,319** | **3.0** | **0** | **$1,355** | **$142,694** | **$0** | **$142,694** | **105.3** | **8,377** |
| ECM 13 | Replace Unit Ventilators and Install EC motor | No | 8,319 | 3.0 | 0 | $1,355 | $142,694 | $0 | $142,694 | 105.3 | 8,377 |
| **TOTALS (COST EFFECTIVE MEASURES)** | | | **90,230** | **23.6** | **-12** | **$14,519** | **$54,369** | **$0** | **$54,369** | **3.7** | **89,482** |
| **TOTALS (ALL MEASURES)** | | | **106,970** | **32.2** | **141** | **$19,533** | **$432,008** | **$15,644** | **$416,364** | **21.3** | **124,208** |

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

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

*Figure 2 – Evaluated Energy Improvements*

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

## 1.1 Planning Your Project

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

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

### Pick Your Installation Approach

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

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

| Energy Conservation Measure | | SmartStart | Direct Install | Pay For Performance |
|---|---|---|---|---|
| ECM 1 | Install LED Fixtures | | X | |
| ECM 2 | Retrofit Fixtures with LED Lamps | | X | |
| ECM 3 | Install Occupancy Sensor Lighting Controls | | X | |
| ECM 4 | Install High/Low Lighting Controls | | X | |
| ECM 5 | Install VFDs on Heating Water Pumps | | X | |
| ECM 6 | Install High Efficiency Air Conditioning Units | | X | |
| ECM 7 | Install High Efficiency Hot Water Boilers | X | X | |
| ECM 8 | Install High Efficiency Steam Boilers | X | X | |
| ECM 9 | Install High Efficiency Gas-Fired Water Heater | X | X | |
| ECM 10 | Install Low-Flow DHW Devices | | X | |
| ECM 11 | Replace Refrigeration Equipment | | X | |
| ECM 12 | Vending Machine Control | | X | |
| ECM 13 | Replace Unit Ventilators and Install EC motor | | | |

*Figure 3 – Funding Options*

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

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

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

*Individual Measures with SmartStart*

For facilities wishing to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

*Turnkey Installation with Direct Install*

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

*Whole Building Approach with Pay for Performance*

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings.

## More Options from Around the State

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

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

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

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

*Ongoing Electric Savings with Demand Response*

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

# 2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Dane Barse Elementary School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

## 2.1 Site Overview

On September 5, 2019, TRC performed an energy audit at Dane Barse Elementary School located in Vineland, New Jersey. TRC met with Noel Feliciano Plumer to review the facility operations and help focus our investigation on specific energy-using systems.

Dane Barse Elementary School is a 1-story, 40,030 square foot building built in 1951. Spaces include: classrooms, gymnasium, auditorium, offices, cafeteria, a kitchen and a mechanical space.

The building is heated using forced draft steam and hot water boilers and cooled using split AC units. In the year 2001, the school underwent an electric upgrade. The 1951 and 1966 section windows and exterior doors are in very poor condition and need to be considered for replacement.

## 2.2 Building Occupancy

The facility is occupied ten months of the year. Typical weekday occupancy is 364 people including full time staff and students.

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Dane Barse Elementary School | Weekday | 6:00 AM - 4:00 PM |
| | Weekend | No Operation |

*Figure 4 - Building Occupancy Schedule*

## 2.3 Building Envelope

Building walls are concrete block over structural steel with a brick facade. The older sections have a flat roof and are covered with black membrane. The 1998 addition of the school has a pitched roof with asphalt shingles. These are all in good condition. The walls are made of concrete masonry units (CMUs) with drywall interior finish.

Most of the windows are single glazed and have aluminum frames without a thermal break. The windows are in poor condition. Exterior doors have metal frames and are in fair condition. The main entrance doors are glazed with aluminum frames. Degraded window and door seals increase drafts and outside air infiltration.

*Flat Roof*

*1998 Section Pitched Roof & Facade*

*Building Wall*

*Window*



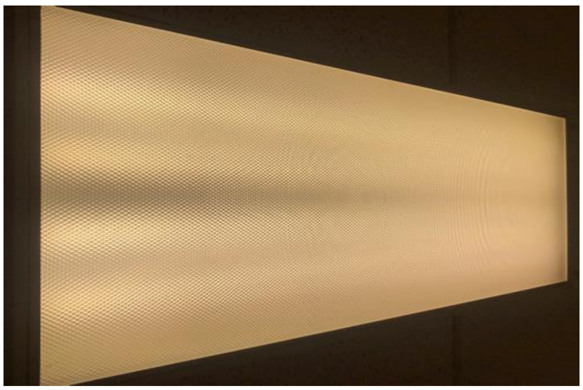
*Exterior Doors*

## 2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also some 23W, 26W, and 42W compact fluorescent lamps (CFLs), as well as 65W incandescent and 70W halogen incandescent lamps serving smaller spaces. Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 2- 3- or 4-lamp, 4-foot long troffers or surface mounted fixtures and 2-foot fixtures with U-bend lamps. Most fixtures are in good condition. All exit signs are LED units. Interior lighting levels were generally sufficient lit.

Exterior fixtures include wall pack units with 9W, 75W, and 250W LED lamps. There are also 175W metal halide lamps and 42W CFLs.  Recessed fixtures include 50W metal halide lamps. All exterior fixtures are controlled using photocells.



*Linear T8 & U-Shape Fixtures*


*CFL & LED Exit Sign Fixtures*

*Exterior Wall Mounted LED Corn Bulb Fixtures*

## 2.5 Air Handling Systems

**Unit Ventilators**

Unit ventilators have supply fan motors with fan coil valves that operate with a pneumatic control system. There are approximately 20 units throughout the original building that supply heating to the classrooms. This system is original to the building and appears to be in poor operating condition. The unit ventilators have been evaluated for replacement.

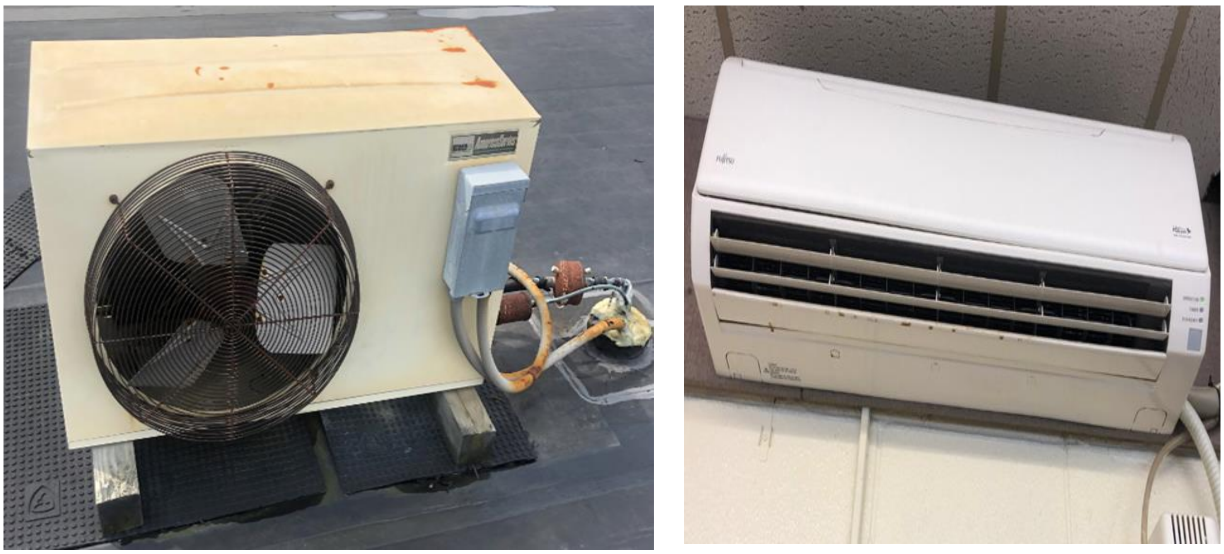
*Unit Ventilator*

**Air Conditioners**

The office spaces, library, security rooms, speech room, maintenance room, and server room are all cooled using split AC units. The cooling capacities range from 0.75-ton to 20-ton and have an average EER of 10.8. Several classrooms are cooled using LG 1.2-ton capacity window AC units, each with an EER of 9.2. These units were installed in 2011 and are in good condition.

The 20 ton outdoor condensing unit of the Trane indoor air handling unit serving the 1998 section was installed in 2011 and is in good condition. All other units have passed their useful life and have been evaluated for replacement.

The space temperatures for areas served by split AC units are controlled using programmable thermostats located in the respective spaces.



*Split System AC*


*Window ACs*

## 2.6 Steam and Hot Water Heating Systems

Space heating for the 1951 section of the school is provided by one 1939 MBh HB Smith forced draft steam boiler while the 1966 section is heated using two 1310 MBh HB Smith non-condensing hot water boilers. All boilers have an estimated combustion efficiency of 78%. There is one 0.5 hp condensate pump and 0.8 hp boiler feed water pumps. Heating hot water is distributed using two 5 hp constant speed pumps. The boilers are 21 years old and are in poor condition. They have been evaluated for replacement. Space temperatures are controlled locally using thermostats which can be adjusted by a few degrees. The Novar EMS controls the boiler and the supply temperatures.

The 1998 section of the building is served by an indoor Trane AHU with a Reznor gas-fired furnace and direct expansion coil (DX) in ductwork. The furnace has an output capacity of 180 MBh with a combustion efficiency of 80%. Additionally, the basement spaces of the 1998 section are heated using a 74 MBh Goodman condensing furnace with a combustion efficiency of 92.5%. The furnaces are in good condition. Space temperatures are controlled locally using thermostats.

*Steam Boiler*

*Hot Water Boilers*

*5 hp Hot Water Pumps*

*Local Thermostat*

*Indoor Trane AHU*


*Reznor Gas-Fired Furnace*

*Goodman Gas-Fired Furnace*

## 2.7 Domestic Hot Water

The school has one gas-fired and one electric water heater serving the domestic hot water needs. The State gas-fired unit has an input capacity of 260 MBh with a storage tank capacity of 100 gallons. It is 70% efficient. This unit has passed its useful life and has been evaluated for replacement. The Bradford White electric unit has an input capacity of 4.5 kW with a storage tank capacity of 50 gallons.

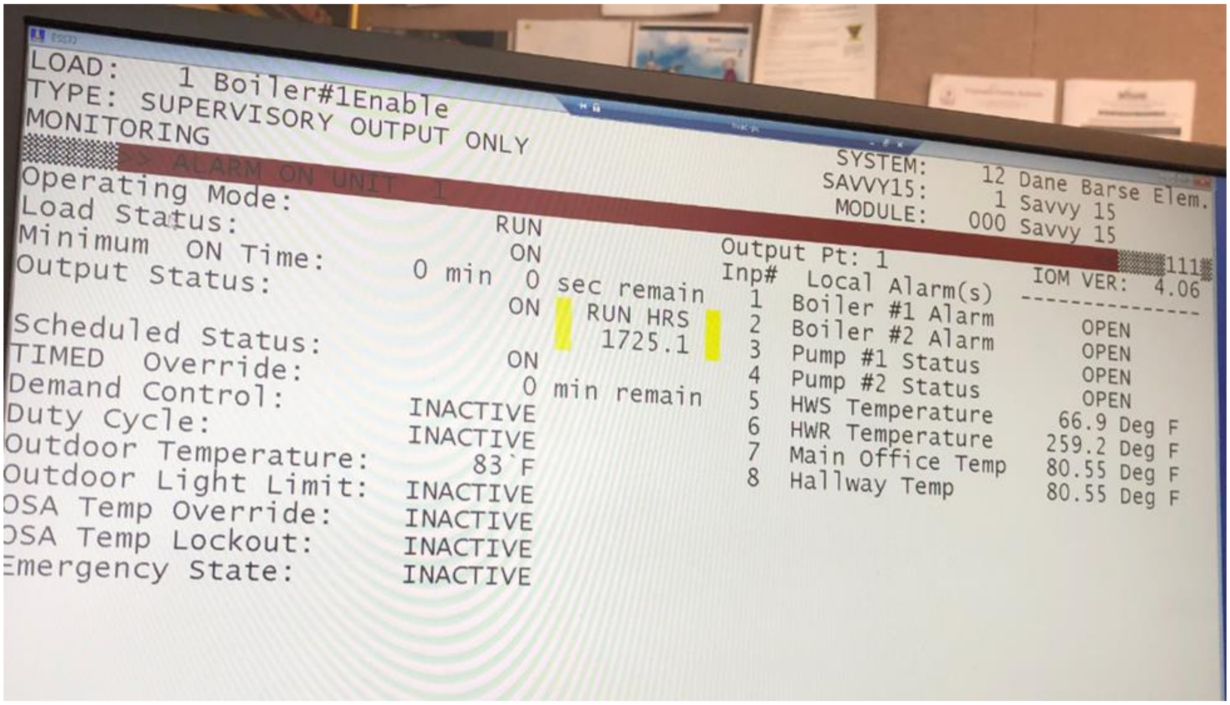
Hot water is circulated to end uses using fractional horse power pumps.

*Gas-Fired Water Heater*

*Electric Water Heater*

## 2.8 Building Energy Management Systems (EMS)

A Novar EMS controls and monitors boilers, pumps, and space temperatures in certain zones. The system has a very limited controlling scope.




*Novar EMS*

## 2.9 Food Service and Refrigeration Equipment

The kitchen has a mix of gas and electric equipment including gas convection oven and steamer that are used to prepare meals for students. Most cooking is done using a convection gas-fired oven. Bulk prepared foods are held in several electric holding cabinets. Equipment is high efficiency and is in good condition.

The kitchen has a stand-up solid door refrigerator and several refrigerator chests. All equipment is standard efficiency and appears to be in good condition.

The kitchen has a single tank conveyor type high temperature dishwasher with an electric booster. This equipment is ENERGY STAR® qualified.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.


*Kitchen Equipment*

*Dishwasher*

*Reach in Refrigerator*

## 2.10 Plug Load & 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 approximately 35 computer work stations and 410 laptops throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart boards, projectors, and fans.

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

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

## 2.11 Water-Using Systems

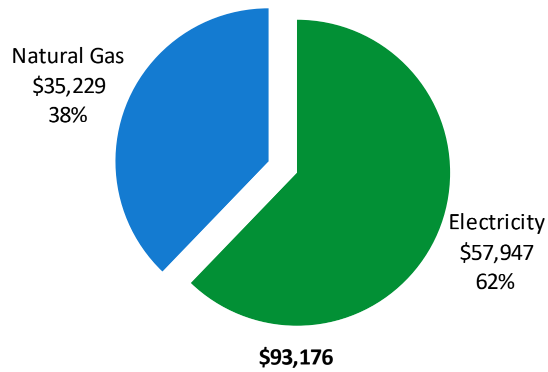
There are 9 sinks with faucet flow rates are at 2.2 gallons per minute (gpm). Toilets are rated at 1.6 gallons per flush (gpf) and urinals are rated at 1.0 gpf.

*Restroom Sink*

# 3 ENERGY USE AND COSTS

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

| Utility Summary | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 355,785 kWh | $57,947 |
| Natural Gas | 23,509 Therms | $35,229 |
| **Total** | | **$93,176** |




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

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

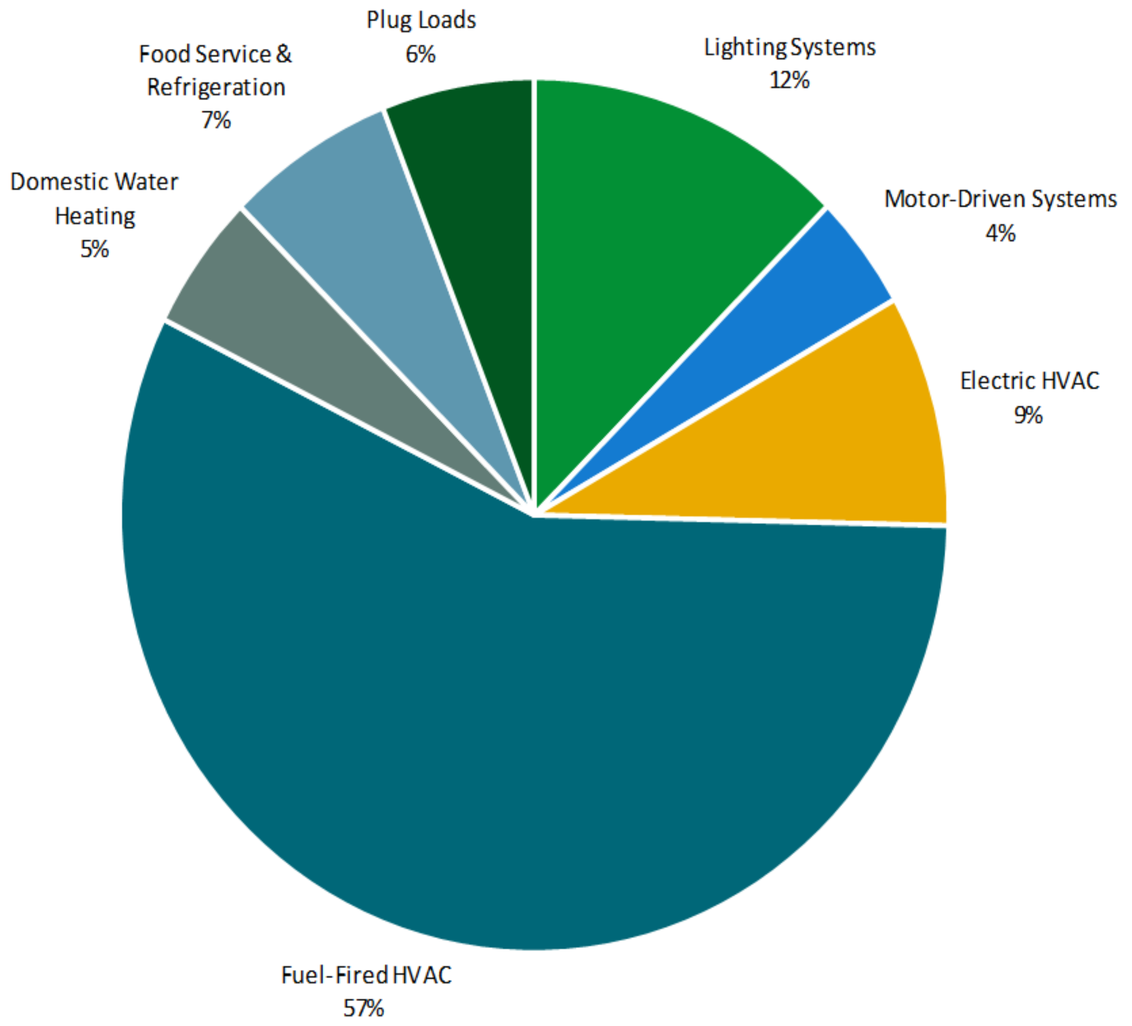
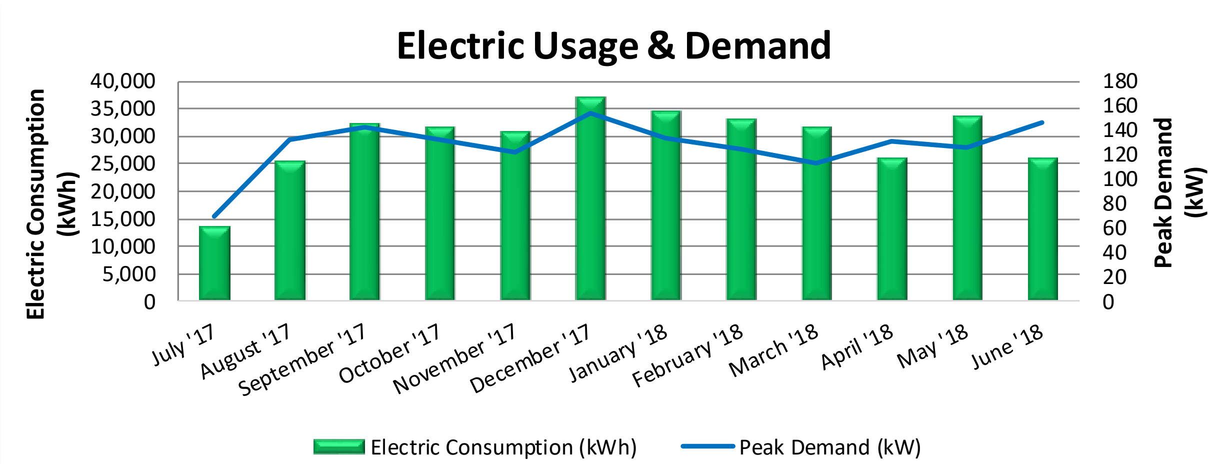



***Figure 5 - Energy Balance***

## 3.1 Electricity

City of Vineland delivers electricity under rate class GLP20.



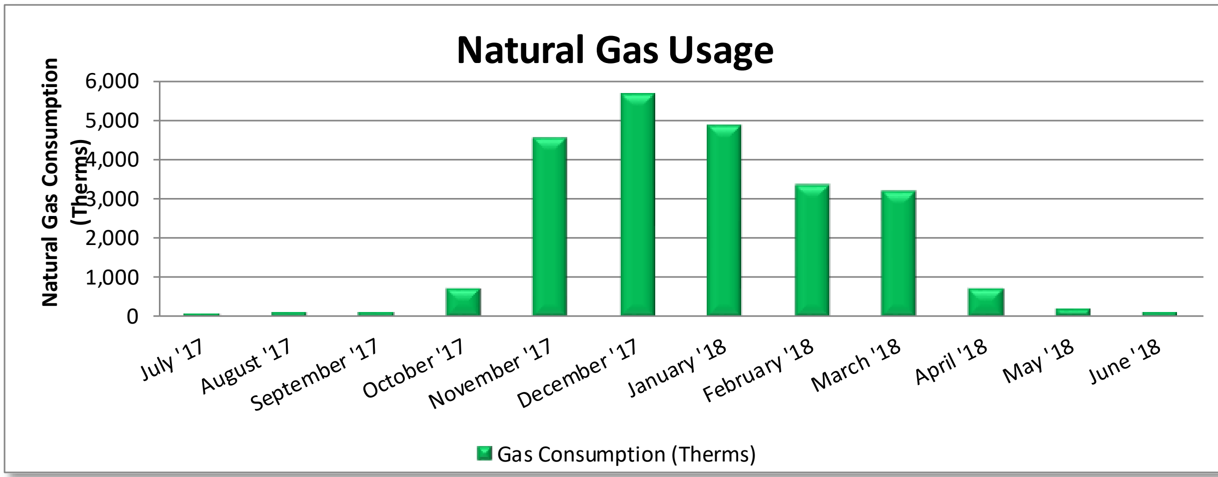

| Electric Billing Data | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 8/8/17 | 30 | 13,520 | 70 | $473 | $2,093 |
| 9/9/17 | 32 | 25,440 | 132 | $1,287 | $4,277 |
| 10/10/17 | 31 | 32,400 | 142 | $1,349 | $5,066 |
| 11/7/17 | 28 | 31,680 | 132 | $1,254 | $4,824 |
| 12/8/17 | 31 | 30,960 | 122 | $1,159 | $4,714 |
| 1/9/18 | 32 | 37,040 | 154 | $1,463 | $5,699 |
| 2/6/18 | 28 | 34,640 | 134 | $1,273 | $5,413 |
| 3/8/18 | 30 | 33,240 | 124 | $1,178 | $5,195 |
| 4/10/18 | 33 | 31,840 | 113 | $1,158 | $5,290 |
| 5/4/18 | 24 | 26,000 | 131 | $1,343 | $4,733 |
| 6/7/18 | 34 | 33,760 | 126 | $1,323 | $5,792 |
| 7/10/18 | 33 | 26,240 | 146 | $1,533 | $5,010 |
| **Totals** | **366** | **356,760** | **154** | **$14,793** | **$58,105** |
| **Annual** | **365** | **355,785** | **154** | **$14,752** | **$57,947** |

Notes:

- Peak demand of 154 kW occurred in December '17.
- Average demand over the past 12 months was 127 kW.
- The average electric cost over the past 12 months was $0.163/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

## 3.2 Natural Gas

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




| Gas Billing Data | | | |
|---|---|---|---|
| **Period Ending** | **Days in Period** | **Natural Gas Usage (Therms)** | **Natural Gas Cost** |
| 8/14/17 | 30 | 65 | $103 |
| 9/16/17 | 33 | 94 | $138 |
| 10/12/17 | 26 | 122 | $164 |
| 11/11/17 | 30 | 690 | $835 |
| 12/14/17 | 33 | 4,545 | $5,895 |
| 1/16/18 | 33 | 5,655 | $8,809 |
| 2/15/18 | 30 | 4,881 | $7,657 |
| 3/15/18 | 28 | 3,351 | $5,285 |
| 4/16/18 | 32 | 3,193 | $4,949 |
| 5/15/18 | 29 | 712 | $1,107 |
| 6/15/18 | 31 | 173 | $240 |
| 7/16/18 | 31 | 91 | $144 |
| **Totals** | **366** | **23,573** | **$35,326** |
| **Annual** | **365** | **23,509** | **$35,229** |

Notes:

- The average gas cost for the past 12 months is $1.499/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 | 15 |
|---|---|

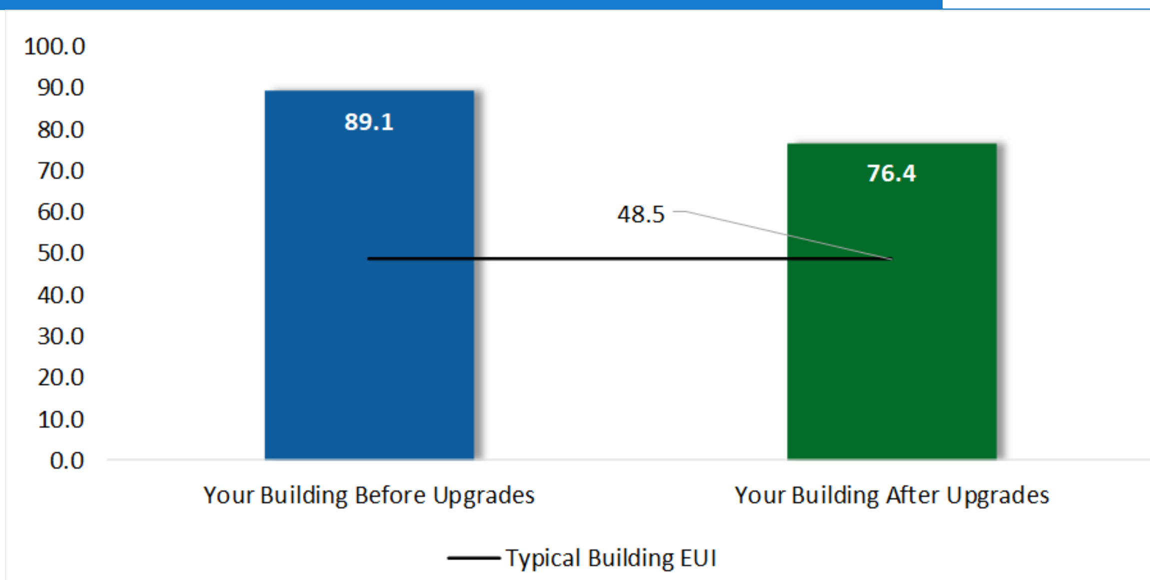



***Figure 6 - Energy Use Intensity Comparison[3]***

This building performs at, or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

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 website[4].

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

# 4 Energy Conservation Measures

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

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

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

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

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

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **68,164** | **18.4** | **-14** | **$10,894** | **$32,391** | **$0** | **$32,391** | **3.0** | **67,016** |
| ECM 1 | Install LED Fixtures | Yes | 1,760 | 0.0 | 0 | $287 | $2,235 | $0 | $2,235 | 7.8 | 1,772 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 66,404 | 18.4 | -14 | $10,607 | $30,156 | $0 | $30,156 | 2.8 | 65,244 |
| **Lighting Control Measures** | | | **17,200** | **4.7** | **-4** | **$2,748** | **$17,277** | **$0** | **$17,277** | **6.3** | **16,900** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 14,767 | 4.1 | -3 | $2,359 | $14,352 | $0 | $14,352 | 6.1 | 14,509 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 2,434 | 0.7 | -1 | $389 | $2,925 | $0 | $2,925 | 7.5 | 2,391 |
| **Variable Frequency Drive (VFD) Measures** | | | **3,259** | **1.1** | **0** | **$531** | **$34,359** | **$0** | **$34,359** | **64.7** | **3,282** |
| ECM 5 | Install VFDs on Heating Water Pumps | No | 3,259 | 1.1 | 0 | $531 | $34,359 | $0 | $34,359 | 64.7 | 3,282 |
| **Electric Unitary HVAC Measures** | | | **5,162** | **4.5** | **0** | **$841** | **$87,608** | **$0** | **$87,608** | **104.2** | **5,199** |
| ECM 6 | Install High Efficiency Air Conditioning Units | No | 5,162 | 4.5 | 0 | $841 | $87,608 | $0 | $87,608 | 104.2 | 5,199 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **118** | **$1,768** | **$97,953** | **$13,824** | **$84,130** | **47.6** | **13,814** |
| ECM 7 | Install High Efficiency Hot Water Boilers | No | 0 | 0.0 | 89 | $1,326 | $58,780 | $9,170 | $49,610 | 37.4 | 10,364 |
| ECM 8 | Install High Efficiency Steam Boilers | No | 0 | 0.0 | 29 | $442 | $39,173 | $4,654 | $34,520 | 78.2 | 3,450 |
| **Domestic Water Heating Upgrade** | | | **172** | **0.0** | **40** | **$632** | **$15,090** | **$1,820** | **$13,270** | **21.0** | **4,894** |
| ECM 9 | Install High Efficiency Gas-Fired Water Heater | No | 0 | 0.0 | 35 | $519 | $15,025 | $1,820 | $13,205 | 25.5 | 4,054 |
| ECM 10 | Install Low-Flow DHW Devices | Yes | 172 | 0.0 | 6 | $113 | $65 | $0 | $65 | 0.6 | 840 |
| **Food Service & Refrigeration Measures** | | | **4,694** | **0.5** | **0** | **$764** | **$4,636** | **$0** | **$4,636** | **6.1** | **4,727** |
| ECM 11 | Replace Refrigeration Equipment | Yes | 3,082 | 0.4 | 0 | $502 | $4,406 | $0 | $4,406 | 8.8 | 3,104 |
| ECM 12 | Vending Machine Control | Yes | 1,612 | 0.2 | 0 | $263 | $230 | $0 | $230 | 0.9 | 1,623 |
| **Custom Measures** | | | **8,319** | **3.0** | **0** | **$1,355** | **$142,694** | **$0** | **$142,694** | **105.3** | **8,377** |
| ECM 13 | Replace Unit Ventilators and Install EC motor | No | 8,319 | 3.0 | 0 | $1,355 | $142,694 | $0 | $142,694 | 105.3 | 8,377 |
| **TOTALS** | | | **106,970** | **32.2** | **141** | **$19,533** | **$432,008** | **$15,644** | **$416,364** | **21.3** | **124,208** |

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

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

*Figure 7 – All Evaluated ECMs*

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **68,164** | **18.4** | **-14** | **$10,894** | **$32,391** | **$0** | **$32,391** | **3.0** | **67,016** |
| ECM 1 | Install LED Fixtures | 1,760 | 0.0 | 0 | $287 | $2,235 | $0 | $2,235 | 7.8 | 1,772 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 66,404 | 18.4 | -14 | $10,607 | $30,156 | $0 | $30,156 | 2.8 | 65,244 |
| **Lighting Control Measures** | | **17,200** | **4.7** | **-4** | **$2,748** | **$17,277** | **$0** | **$17,277** | **6.3** | **16,900** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 14,767 | 4.1 | -3 | $2,359 | $14,352 | $0 | $14,352 | 6.1 | 14,509 |
| ECM 4 | Install High/Low Lighting Controls | 2,434 | 0.7 | -1 | $389 | $2,925 | $0 | $2,925 | 7.5 | 2,391 |
| **Domestic Water Heating Upgrade** | | **172** | **0.0** | **6** | **$113** | **$65** | **$0** | **$65** | **0.6** | **840** |
| ECM 10 | Install Low-Flow DHW Devices | 172 | 0.0 | 6 | $113 | $65 | $0 | $65 | 0.6 | 840 |
| **Food Service & Refrigeration Measures** | | **4,694** | **0.5** | **0** | **$764** | **$4,636** | **$0** | **$4,636** | **6.1** | **4,727** |
| ECM 11 | Replace Refrigeration Equipment | 3,082 | 0.4 | 0 | $502 | $4,406 | $0 | $4,406 | 8.8 | 3,104 |
| ECM 12 | Vending Machine Control | 1,612 | 0.2 | 0 | $263 | $230 | $0 | $230 | 0.9 | 1,623 |
| **TOTALS** | | **90,230** | **23.6** | **-12** | **$14,519** | **$54,369** | **$0** | **$54,369** | **3.7** | **89,482** |

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

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

*Figure 8 – Cost Effective ECMs*

## 4.1 Lighting

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **68,164** | **18.4** | **-14** | **$10,894** | **$32,391** | **$0** | **$32,391** | **3.0** | **67,016** |
| ECM 1 | Install LED Fixtures | 1,760 | 0.0 | 0 | $287 | $2,235 | $0 | $2,235 | 7.8 | 1,772 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 66,404 | 18.4 | -14 | $10,607 | $30,156 | $0 | $30,156 | 2.8 | 65,244 |

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

### ECM 1: Install LED Fixtures

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

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

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

**Affected building areas:** exterior recessed and wallpack fixtures.

### ECM 2: Retrofit Fixtures with LED Lamps

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

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

**Affected building areas:** areas with fluorescent fixtures with T8 tubes, CFL, or incandescent lamps.

## 4.2 Lighting Controls

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Control Measures** | | **17,200** | **4.7** | **-4** | **$2,748** | **$17,277** | **$0** | **$17,277** | **6.3** | **16,900** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 14,767 | 4.1 | -3 | $2,359 | $14,352 | $0 | $14,352 | 6.1 | 14,509 |
| ECM 4 | Install High/Low Lighting Controls | 2,434 | 0.7 | -1 | $389 | $2,925 | $0 | $2,925 | 7.5 | 2,391 |

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 3: 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:** offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms.

### 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 taken into account when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

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

**Affected building areas**: hallways.

## 4.3 Variable Frequency Drives (VFD)

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variable Frequency Drive (VFD) Measures** | | **3,259** | **1.1** | **0** | **$531** | **$34,359** | **$0** | **$34,359** | **64.7** | **3,282** |
| ECM 5 | Install VFDs on Heating Water Pumps | 3,259 | 1.1 | 0 | $531 | $34,359 | $0 | $34,359 | 64.7 | 3,282 |

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

### ECM 5: Install VFDs on Heating Water Pumps

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

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

**Affected pumps:** two 5 hp pumps.

## 4.4 Electric Unitary HVAC

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Electric Unitary HVAC Measures** | | **5,162** | **4.5** | **0** | **$841** | **$87,608** | **$0** | **$87,608** | **104.2** | **5,199** |
| ECM 6 | Install High Efficiency Air Conditioning Units | 5,162 | 4.5 | 0 | $841 | $87,608 | $0 | $87,608 | 104.2 | 5,199 |

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 at this facility 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 ductless mini split units are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

## ECM 6: Install High Efficiency Air Conditioning Units

We evaluated replacing the standard efficiency split system and window air conditioning units with high efficiency air conditioning units. 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 load, and the estimated annual operating hours.

# 4.5 Gas-Fired Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Heating (HVAC/Process) Replacement** | | **0** | **0.0** | **118** | **$1,768** | **$97,953** | **$13,824** | **$84,130** | **47.6** | **13,814** |
| ECM 7 | Install High Efficiency Hot Water Boilers | 0 | 0.0 | 89 | $1,326 | $58,780 | $9,170 | $49,610 | 37.4 | 10,364 |
| ECM 8 | Install High Efficiency Steam Boilers | 0 | 0.0 | 29 | $442 | $39,173 | $4,654 | $34,520 | 78.2 | 3,450 |

## ECM 7: Install High Efficiency Hot Water Boilers

We have evaluated replacement of the older inefficient hot water boiler with high efficiency hot water boiler. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers which can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are evaluated when the return water temperature is less than 130°F during most of the operating hours.

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

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

## ECM 8: Install High Efficiency Steam Boilers

We evaluated replacement of the older inefficient steam boilers with high efficiency steam boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

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

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

## 4.6 Domestic Water Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic Water Heating Upgrade** | | **172** | **0.0** | **40** | **$632** | **$15,090** | **$1,875** | **$13,215** | **20.9** | **4,894** |
| ECM 8 | Install High Efficiency Gas-Fired Water Heater | 0 | 0.0 | 35 | $519 | $15,025 | $1,820 | $13,205 | 25.5 | 4,054 |
| ECM 9 | Install Low-Flow DHW Devices | 172 | 0.0 | 6 | $113 | $65 | $55 | $10 | 0.1 | 840 |

## ECM 9: Install High Efficiency Gas-Fired Water Heater

We evaluated replacing the existing tank water heater with a high efficiency condensing tank water heater. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

## ECM 10: 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 |

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.

## 4.7 Food Service & Refrigeration Measures

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Food Service & Refrigeration Measures** | | **4,694** | **0.5** | **0** | **$764** | **$4,636** | **$0** | **$4,636** | **6.1** | **4,727** |
| ECM 11 | Replace Refrigeration Equipment | 3,082 | 0.4 | 0 | $502 | $4,406 | $0 | $4,406 | 8.8 | 3,104 |
| ECM 12 | Vending Machine Control | 1,612 | 0.2 | 0 | $263 | $230 | $0 | $230 | 0.9 | 1,623 |

### ECM 11: Replace Refrigeration Equipment

Replace existing commercial freezers with new ENERGY STAR® rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

### ECM 12: Vending Machine Control

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

## 4.8 Custom Measures

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Custom Measures** | | **8,319** | **3.0** | **0** | **$1,355** | **$142,694** | **$0** | **$142,694** | **105.3** | **8,377** |
| ECM 12 | Replace Unit Ventilators and Install EC motor | 8,319 | 3.0 | 0 | $1,355 | $142,694 | $0 | $142,694 | 105.3 | 8,377 |

### ECM 13: Replace Unit Ventilators and Install EC motor

We evaluated replacing the unit ventilators (UV) in the facility, but the measure has a payback period longer than the expected life of the replacement equipment and is therefore not recommended.

Replacing the UVs with new units is projected to provide very little to no heating savings because the distribution of steam to the end points is not expected to vary from current conditions. Limited electric savings is expected from replacing the existing PSM fan motors with EC motors. For these reasons this measure should be considered more as a capital investment to improve comfort and reliability.

We recommend that you consider a comprehensive upgrade to the heating system, including evaluating the replacement of the existing steam boilers with condensing hot water boilers and converting the heating distribution system. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load at this facility. In many cases installing multiple modular boilers rather than one or two large boilers will result in higher overall plant efficiency while providing additional system redundancy.

# 5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

## Energy Tracking with ENERGY STAR® Portfolio Manager®

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

## Lighting Maintenance

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

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

## 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.

## Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

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

## AC System Evaporator/Condenser Coil Cleaning

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

## HVAC Filter Cleaning and Replacement

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

## Boiler Maintenance

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

## Furnace Maintenance

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

## Water Heater Maintenance

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

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

## Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense® website[6] 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.

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

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

# 6 On-site Generation

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

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

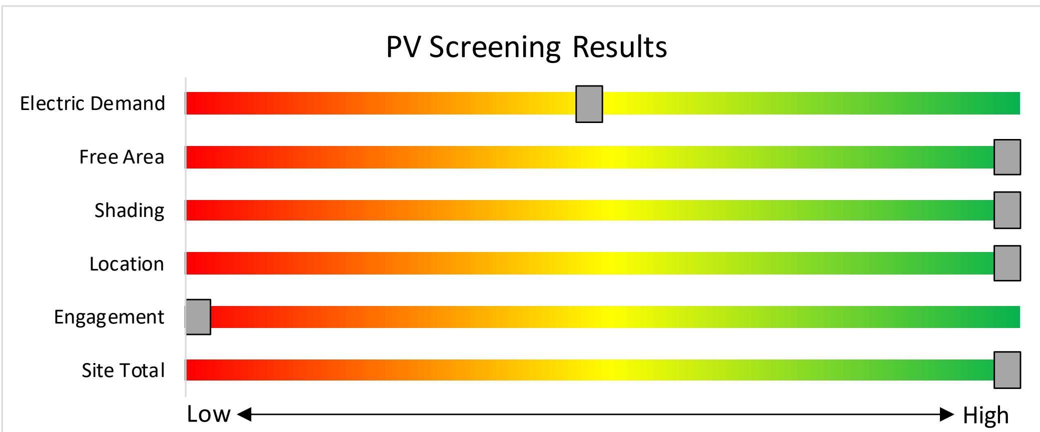
## 6.1 Solar Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has high potential for installing a PV array.

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

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




| | | |
|---|---|---|
| **Potential** | High | |
| **System Potential** | 127 | kW DC STC |
| **Electric Generation** | 151,304 | kWh/yr |
| **Displaced Cost** | $24,640 | /yr |
| **Installed Cost** | $330,200 | |

*Figure 9 - Photovoltaic Screening*

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

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

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

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

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

## 6.2 Combined Heat and Power

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

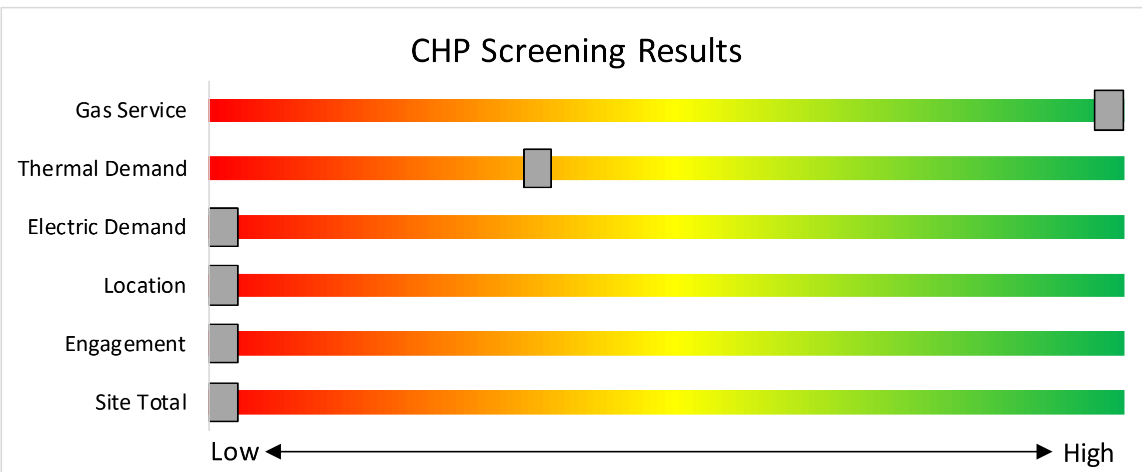
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

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

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

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.




| | | |
|---|---|---|
| **Potential** | None | |
| **System Type** | None | |
| **System Potential** | 30 | kW |
| **Electric Generation** | 55,796 | kWh/yr |
| **Thermal Generation** | 978,361 | MBtu/yr |
| **Displaced Cost** | $3,026 | /yr |
| **Installed Cost** | $99,000 | |

*Figure 10 - Combined Heat and Power Screening*

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

# 7 Project Funding and Incentives

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

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

## 7.1 SmartStart

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

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

**Equipment with Prescriptive Incentives Currently Available:**

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

**Incentives**

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

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

**How to Participate**

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

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

## 7.2 Direct Install

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

**Incentives**

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

**How to Participate**

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

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

## 7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings. P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

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

**Incentives**

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

**How to Participate**

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

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

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

## 7.4 Combined Heat and Power

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

**Incentives**

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

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

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

**How to Participate**

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

## 7.5 Energy Savings Improvement Program

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

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

**How to Participate**

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

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

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

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

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

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

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

## 7.6 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey SRECs. SREC's are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

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

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

Information about the SRP can be found at: [www.njcleanenergy.com/srec](www.njcleanenergy.com/srec).

# 8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

## 8.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[8].

## 8.2 Retail Natural Gas Supply Options

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

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

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

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

[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

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Recessed Exit 6 | 3 | LED Lamps: Screw-in 1 lamp | Photocell | | 11 | 4,380 | | None | No | 3 | LED Lamps: Screw-in 1 lamp | Photocell | 11 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Wall pack | 10 | LED Lamps: Corn bulb - 1 lamp | Photocell | | 54 | 4,380 | | None | No | 10 | LED Lamps: Corn bulb - 1 lamp | Photocell | 54 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Wall pack | 3 | LED Lamps: Flood light | Photocell | | 21 | 4,380 | | None | No | 3 | LED Lamps: Flood light | Photocell | 21 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Recessed | 2 | Metal Halide: (1) 50W Lamp | Photocell | | 72 | 4,380 | 1 | Fixture Replacement | No | 2 | LED - Fixtures: Downlight Recessed | Photocell | 22 | 4,380 | 0.0 | 442 | 0 | $72 | $304 | $0 | 4.2 |
| Wall pack | 4 | LED Lamps: Screw-in 1 lamp | Photocell | | 75 | 4,380 | | None | No | 4 | LED Lamps: Screw-in 1 lamp | Photocell | 75 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Wall pack | 1 | Compact Fluorescent: Screw-in 1 lamp | Photocell | | 42 | 4,380 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Photocell | 29 | 4,380 | 0.0 | 55 | 0 | $9 | $17 | $0 | 1.9 |
| Wall pack | 1 | LED Lamps: Screw-in 1 lamp | Photocell | | 9 | 4,380 | | None | No | 1 | LED Lamps: Screw-in 1 lamp | Photocell | 9 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Wall pack | 2 | Metal Halide: (1) 175W Lamp | Photocell | | 215 | 4,380 | 1 | Fixture Replacement | No | 2 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Photocell | 65 | 4,380 | 0.0 | 1,318 | 0 | $215 | $1,932 | $0 | 9.0 |
| Wall pack | 2 | LED Lamps: Screw-in 1 lamp | Photocell | | 250 | 4,380 | | None | No | 2 | LED Lamps: Screw-in 1 lamp | Photocell | 250 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 3 | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 7 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.2 | 610 | 0 | $97 | $256 | $0 | 2.6 |
| Boiler room 3 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Storage room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 980 | 2 | Relamp | No | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 980 | 0.1 | 107 | 0 | $17 | $110 | $0 | 6.4 |
| Lounge room | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.6 | 2,148 | 0 | $343 | $1,073 | $0 | 3.1 |
| Copy room 1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.1 | 391 | 0 | $62 | $416 | $0 | 6.7 |
| Copy room 2 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.1 | 391 | 0 | $62 | $416 | $0 | 6.7 |
| Lounge 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 |
| Stairwell | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.0 | 174 | 0 | $28 | $73 | $0 | 2.6 |
| Boiler room 2 | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 7 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.2 | 610 | 0 | $97 | $256 | $0 | 2.6 |
| Boiler room 2 | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Basement electrical room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 3 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.1 | 261 | 0 | $42 | $110 | $0 | 2.6 |
| Basement storage | 7 | Linear Fluorescent - T8: 8' T8 (59W) - 2L | Wall Switch | S | 110 | 2,400 | 2, 3 | Relamp | Yes | 7 | LED - Linear Tubes: (2) 8' Lamps | Occupancy Sensor | 72 | 1,656 | 0.3 | 1,115 | 0 | $178 | $736 | $0 | 4.1 |
| Basement storage | 13 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 13 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,441 | 0 | $230 | $591 | $0 | 2.6 |
| Basement storage | 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 |
| Music room | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 10 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.5 | 1,953 | 0 | $312 | $1,000 | $0 | 3.2 |
| Music room | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Music office | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,400 | 0.0 | 77 | 0 | $12 | $72 | $0 | 5.9 |
| Stairwell | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.0 | 87 | 0 | $14 | $37 | $0 | 2.6 |
| Stairwell | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2 | Relamp | No | 3 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,400 | 0.1 | 392 | 0 | $63 | $164 | $0 | 2.6 |
| Stairwell | 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 |
| Hallway new addition | 5 | Compact Fluorescent: 4 pin - 4 lamps | Wall Switch | S | 128 | 2,400 | 2, 4 | Relamp | Yes | 5 | LED Lamps: 4 pin - 4 lamps | High/Low Control | 90 | 1,656 | 0.2 | 874 | 0 | $140 | $769 | $0 | 5.5 |
| Hallway new addition | 4 | Compact Fluorescent: 4 pin - 1 lamp | Wall Switch | S | 32 | 2,400 | 2, 4 | Relamp | Yes | 4 | LED Lamps: 4 pin - 1 lamp | High/Low Control | 22 | 1,656 | 0.0 | 175 | 0 | $28 | $334 | $0 | 12.0 |
| Hallway new addition | 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 |
| Room 23 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.5 | 1,995 | 0 | $319 | $927 | $0 | 2.9 |
| Room 24 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.5 | 1,995 | 0 | $319 | $927 | $0 | 2.9 |
| Room 22 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.5 | 1,995 | 0 | $319 | $927 | $0 | 2.9 |
| Room 21 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.5 | 1,995 | 0 | $319 | $927 | $0 | 2.9 |
| Boys restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.1 | 499 | 0 | $80 | $434 | $0 | 5.5 |
| Boys restroom | 1 | Compact Fluorescent: 4 pin - 1 lamp | Wall Switch | S | 32 | 2,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: 4 pin - 1 lamp | Occupancy Sensor | 22 | 1,656 | 0.0 | 44 | 0 | $7 | $27 | $0 | 3.9 |
| Girls restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.1 | 499 | 0 | $80 | $434 | $0 | 5.5 |
| Girls restroom | 1 | Compact Fluorescent: 4 pin - 1 lamp | Wall Switch | S | 32 | 2,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: 4 pin - 1 lamp | Occupancy Sensor | 22 | 1,656 | 0.0 | 44 | 0 | $7 | $27 | $0 | 3.9 |
| Old section hallway | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 4 | Relamp | Yes | 18 | LED - Linear Tubes: (4) 4' Lamps | High/Low Control | 58 | 1,656 | 1.0 | 3,516 | -1 | $562 | $1,990 | $0 | 3.5 |
| Old section hallway | 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 |
| Library | 28 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 28 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.8 | 3,104 | -1 | $496 | $1,562 | $0 | 3.2 |
| Office | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.1 | 333 | 0 | $53 | $380 | $0 | 7.1 |
| Room 20 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Room 19 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Room 25 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Room 18 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Room 17 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Room 16 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boys restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.1 | 499 | 0 | $80 | $434 | $0 | 5.5 |
| Maintenance office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.1 | 222 | 0 | $35 | $189 | $0 | 5.3 |
| Room 8 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.2 | 665 | 0 | $106 | $489 | $0 | 4.6 |
| Speech office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.1 | 222 | 0 | $35 | $189 | $0 | 5.3 |
| Cafetorium | 28 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 28 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 1.5 | 5,469 | -1 | $874 | $2,585 | $0 | 3.0 |
| Cafetorium | 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 |
| Stage | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2 | Relamp | No | 6 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 2,400 | 0.2 | 887 | 0 | $142 | $438 | $0 | 3.1 |
| Stage | 6 | Halogen Incandescent: Screw-in 1 lamp | Wall Switch | S | 70 | 2,400 | 2 | Relamp | No | 6 | LED Lamps: Screw-in 1 lamp | Wall Switch | 11 | 2,400 | 0.3 | 942 | 0 | $151 | $211 | $0 | 1.4 |
| Kitchen storage | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 980 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 676 | 0.1 | 181 | 0 | $29 | $416 | $0 | 14.4 |
| Kitchen storage | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 10 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.2 | 871 | 0 | $139 | $365 | $0 | 2.6 |
| Kitchen | 13 | Incandescent: Screw-in 1 lamp | Wall Switch | S | 65 | 2,400 | 2 | Relamp | No | 13 | LED Lamps: Screw-in 1 lamp | Wall Switch | 10 | 2,400 | 0.5 | 1,896 | 0 | $303 | $224 | $0 | 0.7 |
| Kitchen office | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 2,400 | 0.0 | 148 | 0 | $24 | $73 | $0 | 3.1 |
| Closet | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 980 | 2 | Relamp | No | 2 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 980 | 0.1 | 121 | 0 | $19 | $146 | $0 | 7.6 |
| Closet | 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 |
| Main Lobby | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.2 | 781 | 0 | $125 | $562 | $0 | 4.5 |
| Main Lobby | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Main entrance | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,400 | 0.0 | 153 | 0 | $24 | $145 | $0 | 5.9 |
| Main office | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 14 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,552 | 0 | $248 | $781 | $0 | 3.2 |
| Principal's office | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.2 | 781 | 0 | $125 | $562 | $0 | 4.5 |
| Restroom 1 | 1 | Incandescent: Screw-in 1 lamp | Wall Switch | S | 65 | 2,400 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 10 | 2,400 | 0.0 | 146 | 0 | $23 | $17 | $0 | 0.7 |
| Restroom 2 | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,400 | 0.0 | 77 | 0 | $12 | $72 | $0 | 5.9 |
| Copy room 2 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.3 | 1,172 | 0 | $187 | $708 | $0 | 3.8 |
| TV room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.1 | 443 | 0 | $71 | $416 | $0 | 5.9 |
| Restrooom | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,400 | 0.0 | 77 | 0 | $12 | $72 | $0 | 5.9 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Location** | **Fixture Quantity** | **Fixture Description** | **Control System** | **Light Level** | **Watts per Fixture** | **Annual Operating Hours** | **ECM #** | **Fixture Recommendation** | **Add Controls?** | **Fixture Quantity** | **Fixture Description** | **Control System** | **Watts per Fixture** | **Annual Operating Hours** | **Total Peak kW Savings** | **Total Annual kWh Savings** | **Total Annual MMBtu Savings** | **Total Annual Energy Cost Savings** | **Total Installation Cost** | **Total Incentives** | **Simple Payback w/ Incentives in Years** |
| Art room | 16 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 16 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.9 | 3,125 | -1 | $499 | $1,438 | $0 | 2.9 |
| Custodial | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 980 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 980 | 0.0 | 36 | 0 | $6 | $37 | $0 | 6.4 |
| Girls restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 2,400 | 0.0 | 131 | 0 | $21 | $55 | $0 | 2.6 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 980 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 676 | 0.1 | 91 | 0 | $14 | $189 | $0 | 13.1 |
| Restroom 4 | 1 | Incandescent: Screw-in 1 lamp | Wall Switch | S | 65 | 2,400 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 10 | 2,400 | 0.0 | 146 | 0 | $23 | $17 | $0 | 0.7 |
| Closet | 1 | Compact Fluorescent: Screw-in 1 lamp | Wall Switch | S | 26 | 980 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 18 | 980 | 0.0 | 8 | 0 | $1 | $17 | $0 | 12.8 |
| Room 6 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Boys restroom | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | S | 93 | 2,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 1,656 | 0.1 | 333 | 0 | $53 | $380 | $0 | 7.1 |
| Room 14 | 1 | Compact Fluorescent: Screw-in 1 lamp | Wall Switch | S | 23 | 2,400 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 16 | 2,400 | 0.0 | 18 | 0 | $3 | $17 | $0 | 5.9 |
| Room 4 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Room 5 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Back hallway | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 4 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 1,656 | 0.1 | 443 | 0 | $71 | $371 | $0 | 5.2 |
| Back hallway | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Room 1A | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.2 | 781 | 0 | $125 | $562 | $0 | 4.5 |
| Room 1B | 14 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 14 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.7 | 2,734 | -1 | $437 | $1,292 | $0 | 3.0 |
| Closet | 1 | Compact Fluorescent: Screw-in 1 lamp | Wall Switch | S | 23 | 980 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 16 | 980 | 0.0 | 7 | 0 | $1 | $17 | $0 | 14.5 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 980 | 2 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 980 | 0.0 | 60 | 0 | $10 | $73 | $0 | 7.6 |
| Room 2 | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | S | 114 | 2,400 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,656 | 0.5 | 1,758 | 0 | $281 | $927 | $0 | 3.3 |
| Storage | 1 | Compact Fluorescent: Screw-in 1 lamp | Wall Switch | S | 23 | 980 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 16 | 980 | 0.0 | 7 | 0 | $1 | $17 | $0 | 14.5 |
| Restroom | 1 | Compact Fluorescent: Screw-in 1 lamp | Wall Switch | S | 23 | 2,400 | 2 | Relamp | No | 1 | LED Lamps: Screw-in 1 lamp | Wall Switch | 16 | 2,400 | 0.0 | 18 | 0 | $3 | $17 | $0 | 5.9 |
| Room 3 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,656 | 0.4 | 1,330 | 0 | $212 | $708 | $0 | 3.3 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 980 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 980 | 0.0 | 36 | 0 | $6 | $37 | $0 | 6.4 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | S | 62 | 2,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,400 | 0.0 | 87 | 0 | $14 | $37 | $0 | 2.6 |

## Motor Inventory & Recommendations

| | | Existing Conditions | | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Remaining Useful Life | Annual Operating Hours | ECM # | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Hallway | 1 | Exhaust Fan | 0.3 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Restroom | 2 | Exhaust Fan | 0.3 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Various spaces | 16 | Exhaust Fan | 0.2 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Hallway | 1 | Exhaust Fan | 0.3 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Kitchen | 2 | Exhaust Fan | 0.3 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Kitchen | 1 | Exhaust Fan | 0.3 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 3 | Condensate pump | 1 | Process Pump | 0.5 | 75.0% | No | W | 2,745 | | No | 75.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 3 | Feed water pump | 1 | Boiler Feed Water Pump | 0.8 | 78.0% | No | W | 2,745 | | No | 78.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 3 | Sump pump | 1 | Process Pump | 0.5 | 75.0% | No | W | 2,745 | | No | 75.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 3 | Air Compressor | 1 | Air Compressor | 0.8 | 78.0% | No | W | 1,300 | | No | 78.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 3 | Air Combustion | 1 | Combustion Air Fan | 1.5 | 84.0% | No | W | 2,745 | | No | 84.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 2 | Combustion fan | 2 | Combustion Air Fan | 0.8 | 78.0% | No | W | 2,745 | | No | 78.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 2 | Air compressor | 1 | Air Compressor | 2.0 | 84.0% | No | W | 1,300 | | No | 84.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler room 2 | HH | 2 | Heating Hot Water Pump | 5.0 | 87.5% | No | W | 980 | 5 | No | 89.5% | Yes | 2 | 1.1 | 3,259 | 0 | $531 | $34,359 | $0 | 64.7 |
| School | Unitvent | 20 | Supply Fan | 0.3 | 60.0% | No | W | 2,745 | | No | 60.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Electric HVAC Inventory & Recommendations

| | | Existing Conditions | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (MBh) | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (MBh) | Cooling Mode Efficiency (SEER/EER) | Heating Mode Efficiency (COP) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Speech room | 1 | Ductless Mini-Split AC | 1.50 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.50 | | 18.00 | | 0.2 | 223 | 0 | $36 | $4,109 | $0 | 113.1 |
| Roof | Maintenance room | 1 | Ductless Mini-Split AC | 0.75 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 0.75 | | 18.00 | | 0.1 | 112 | 0 | $18 | $2,055 | $0 | 113.1 |
| Roof | Guidance | 5 | Ductless Mini-Split AC | 1.50 | | B | 6 | Yes | 5 | Ductless Mini-Split AC | 1.50 | | 18.00 | | 1.0 | 1,115 | 0 | $182 | $20,546 | $0 | 113.1 |
| Roof | Nurse office | 1 | Ductless Mini-Split AC | 1.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.00 | | 18.00 | | 0.1 | 149 | 0 | $24 | $2,739 | $0 | 113.1 |
| Roof | Copy room | 1 | Ductless Mini-Split AC | 1.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.00 | | 18.00 | | 0.1 | 149 | 0 | $24 | $2,739 | $0 | 113.1 |
| Roof | Classroom | 1 | Ductless Mini-Split AC | 1.50 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.50 | | 18.00 | | 0.2 | 223 | 0 | $36 | $4,109 | $0 | 113.1 |
| Roof | Library | 1 | Ductless Mini-Split AC | 2.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 2.00 | | 18.00 | | 0.3 | 297 | 0 | $48 | $5,479 | $0 | 113.1 |
| Roof | Library | 1 | Ductless Mini-Split AC | 2.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 2.00 | | 18.00 | | 0.3 | 297 | 0 | $48 | $5,479 | $0 | 113.1 |
| Roof | Security | 1 | Ductless Mini-Split AC | 0.75 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 0.75 | | 18.00 | | 0.1 | 112 | 0 | $18 | $2,055 | $0 | 113.1 |
| Roof | Principal's office | 1 | Ductless Mini-Split AC | 1.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.00 | | 18.00 | | 0.1 | 149 | 0 | $24 | $2,739 | $0 | 113.1 |
| Roof | Office | 1 | Ductless Mini-Split AC | 1.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.00 | | 18.00 | | 0.1 | 149 | 0 | $24 | $2,739 | $0 | 113.1 |
| Roof | Classroom | 1 | Ductless Mini-Split AC | 1.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.00 | | 18.00 | | 0.1 | 149 | 0 | $24 | $2,739 | $0 | 113.1 |
| Roof | Classroom | 2 | Ductless Mini-Split AC | 1.50 | | B | 6 | Yes | 2 | Ductless Mini-Split AC | 1.50 | | 18.00 | | 0.4 | 446 | 0 | $73 | $8,218 | $0 | 113.1 |
| Roof | Classroom | 1 | Ductless Mini-Split AC | 1.50 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.50 | | 18.00 | | 0.2 | 223 | 0 | $36 | $4,109 | $0 | 113.1 |
| Roof | Server room | 1 | Ductless Mini-Split AC | 1.50 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 1.50 | | 18.00 | | 0.2 | 223 | 0 | $36 | $4,109 | $0 | 113.1 |
| Roof | Kitchen | 2 | Split-System AC | 2.00 | | B | 6 | Yes | 2 | Split-System AC | 2.00 | | 14.00 | | 0.5 | 589 | 0 | $96 | $5,985 | $0 | 62.4 |
| Ground floor | Classroom | 1 | Split-System AC | 0.83 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Ground floor | New addition | 1 | Split-System AC | 20.00 | | B | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Ground floor | Classroom | 1 | Ductless Mini-Split AC | 2.00 | | B | 6 | Yes | 1 | Ductless Mini-Split AC | 2.00 | | 18.00 | | 0.3 | 297 | 0 | $48 | $5,479 | $0 | 113.1 |
| Classroom | Classroom | 18 | Packaged Terminal AC | 1.19 | | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | | 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 (kBtu/hr) | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Cooling Mode Efficiency (SEER/EER) | Heating Mode Efficiency (COP) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| TV Room | TV room | 1 | Window AC | 2.00 | | B | 6 | Yes | 1 | Window AC | 2.00 | | 12.00 | | 0.2 | 260 | 0 | $42 | $2,178 | $0 | 51.3 |
| Classroom | Classroom | 18 | Electric Resistance Heat | | 17.06 | W | | No | | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Fuel Heating Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Output Capacity per Unit (MBh) | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Output Capacity per Unit (MBh) | Heating Efficiency | Heating Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler room 3 | Original Building - 1951 Section | 1 | Forced Draft Steam Boiler | ###### | B | 8 | Yes | 1 | Forced Draft Steam Boiler | ###### | 81.00% | Et | 0.0 | 0 | 29 | $442 | $39,173 | $4,654 | 78.2 |
| Room 2 | 1966 Section | 2 | Non-Condensing Hot Water Boiler | ###### | B | 7 | Yes | 2 | Non-Condensing Hot Water Boiler | ###### | 85.00% | Et | 0.0 | 0 | 89 | $1,326 | $58,780 | $9,170 | 37.4 |
| New addition | 1998 Section | 1 | Furnace | 180.00 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| New addition | 1998 Section | 1 | Furnace | 74.00 | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## DHW Inventory & Recommendations

| | | Existing Conditions | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Remaining Useful Life | ECM # | Replace? | System Quantity | System Type | Fuel Type | System Efficiency | Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler room 2 | Restrooms and kitchen | 1 | Storage Tank Water Heater (> 50 Gal) | B | 9 | Yes | 1 | Storage Tank Water Heater (> 50 Gal) | Natural Gas | 93.00% | Et | 0.0 | 0 | 35 | $519 | $15,025 | $1,820 | 25.5 |
| Closet | Closet | 1 | Storage Tank Water Heater (≤ 50 Gal) | W | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## 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 | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Restrooms | 10 | 6 | Faucet Aerator (Lavatory) | 2.20 | 0.50 | 0.0 | 0 | 6 | $85 | $43 | $0 | 0.5 |
| Kitchen | 10 | 3 | Faucet Aerator (Kitchen) | 2.20 | 1.50 | 0.0 | 172 | 0 | $28 | $22 | $0 | 0.8 |

## Commercial Refrigerator/Freezer Inventory & Recommendations

| | Existing Conditions | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Refrigerator/ Freezer Type | 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 | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Cafeteria | 3 | Refrigerator Chest | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Cafeteria | 1 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Cafeteria | 1 | Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Cafeteria | 2 | Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Cafeteria | 1 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | No | 11 | Yes | 0.1 | 662 | 0 | $108 | $1,664 | $0 | 15.4 |
| Cafeteria | 1 | Stand-Up Freezer, Solid Door (31 - 50 cu. ft.) | No | 11 | Yes | 0.3 | 2,420 | 0 | $394 | $2,742 | $0 | 7.0 |
| Cafeteria | 1 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Cooking Equipment Inventory & Recommendations

| | Existing Conditions | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Type | 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 | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Gas Fryer | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Gas Steamer | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Gas Convection Oven (Half Size) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Kitchen | 1 | Insulated Food Holding Cabinet (1/2 Size) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Dishwasher Inventory & Recommendations

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Dishwasher Type | Water Heater Fuel Type | Booster Heater Fuel Type | 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 | Total Installation Cost | Total Incentives | Payback w/ Incentives in Years |
| Kitchen | 1 | Single Tank Conveyor (High Temp) | Electric | Electric | Yes | | 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? |
| Dane Barse ES | 1 | Kiln | 11,500.0 | No |
| Dane Barse ES | 5 | Refrigeration | 200.0 | No |
| Dane Barse ES | 4 | Water cooler | 520.0 | No |
| Dane Barse ES | 8 | Microwave | 900.0 | No |
| Dane Barse ES | 22 | Television | 120.0 | No |
| Dane Barse ES | 3 | Coffee Machine | 400.0 | No |
| Dane Barse ES | 1 | Ice Machine | 380.0 | No |
| Dane Barse ES | 3 | Dehumidifier | 1,100.0 | No |
| Dane Barse ES | 1 | Washing Machine | 1,500.0 | No |
| Dane Barse ES | 1 | Kitchen electrical tables | 3,000.0 | No |
| Dane Barse ES | 1 | Electric booster pump | 27,000.0 | No |
| Dane Barse ES | 10 | Small Refrigerator | 80.0 | No |
| Dane Barse ES | 35 | Desktop Computer | 145.0 | No |
| Dane Barse ES | 12 | Printers | 80.0 | No |
| Dane Barse ES | 410 | Laptops | 75.0 | No |

## Vending Machine Inventory & Recommendations

| | Existing Conditions | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Vending Machine Type | ECM # | Install Controls? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Lounge | 1 | Refrigerated | 12 | Yes | 0.2 | 1,612 | 0 | $263 | $230 | $0 | 0.9 |
| Lounge | 1 | Non-Refrigerated | N/A | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

# 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

**15**

ENERGY STAR® Score[1]

### Dane Barse Elementary School

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 40,030
**Built:** 1971

**For Year Ending:** June 30, 2018
**Date Generated:** October 21, 2019

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

### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Dane Barse Elementary School<br>240 S. Orchard Road<br>Vineland, New Jersey 08360 | Vineland Public Schools<br>61 W. Landis Avenue<br>Vineland, NJ 08360<br>(856) 794-6700 | Gene Mercoli<br>61 W. Landis Avenue<br>Vineland, NJ 08360<br>856-794-6700, ext. 2226<br>wweaver@vineland.org |

**Property ID:** 7566438

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

**Site EUI**
89.2 kBtu/ft²

**Annual Energy by Fuel**

| | | |
|---|---|---|
| Natural Gas (kBtu) | 2,356,304 (66%) |
| Electric - Grid (kBtu) | 1,213,217 (34%) |

**Source EUI**
146.7 kBtu/ft²

**National Median Comparison**

| | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 61.1 |
| National Median Source EUI (kBtu/ft²) | 100.4 |
| % Diff from National Median Source EUI | 46% |

**Annual Emissions**

| | |
|---|---|
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 248 |

### Signature & Stamp of Verifying Professional

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

Signature: ______________________Date: ___________

**Licensed Professional**

____ ________
,
(____)____-______
_________________

**Professional Engineer Stamp**
**(if applicable)**

# APPENDIX C: GLOSSARY

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

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

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