Local Government Energy Audit Report

Petway Elementary School

January 3, 2020

Prepared for:
Vineland Public Schools
1115 S. Lincoln Avenue
Vineland, NJ 08361

Prepared by:
TRC
900 Route 9 North
Woodbridge, NJ 07095

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.

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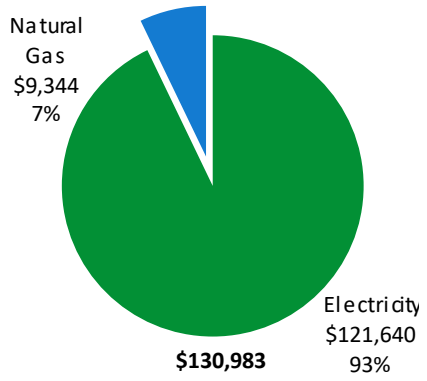
1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Petway 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 Companies Inc (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: $130,983 Electricity: 766,075 kWh Natural Gas: 6,908 Therms	
ENERGY STAR® Benchmarking Score	52 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

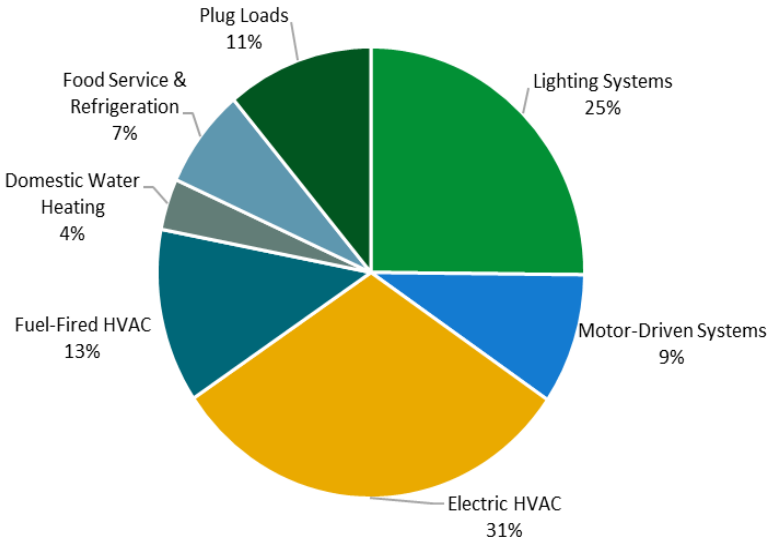


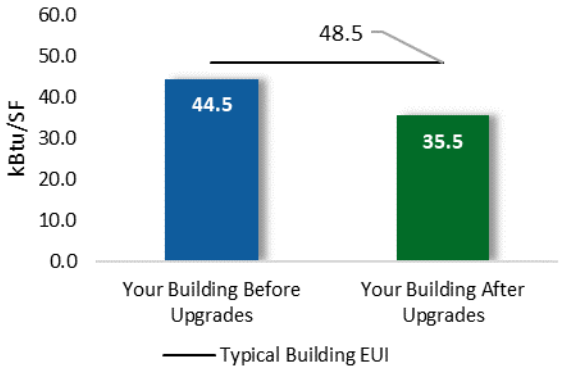
Figure 1 - Energy Use by System

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.

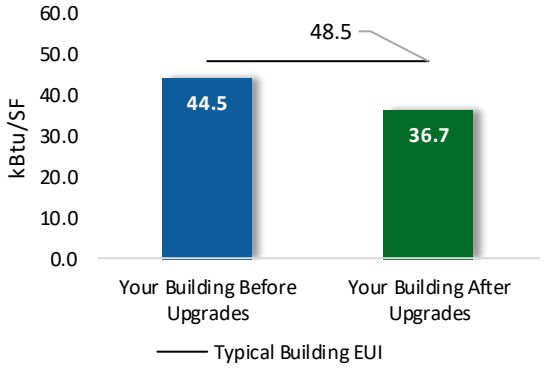
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$220,282
Potential Rebates & Incentives[1]	$60,518
Annual Cost Savings	$29,557
Annual Energy Savings	Electricity: 182,764 kWh
Greenhouse Gas Emission Savings	94 Tons
Simple Payback	5.4 Years
Site Energy Savings (all utilities)	20%



Scenario 2: Cost Effective Package[2]

Installation Cost	$146,497
Potential Rebates & Incentives	$49,738
Annual Cost Savings	$27,845
Annual Energy Savings	Electricity: 177,832 kWh
Greenhouse Gas Emission Savings	88 Tons
Simple Payback	3.5 Years
Site Energy Savings (all utilities)	17%



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			**144,434**	**34.2**	**-26**	**$22,583**	**$86,694**	**$0**	**$86,694**	**3.8**	**142,406**
ECM 1	Install LED Fixtures	Yes	17,820	0.0	0	$2,829	$28,847	$0	$28,847	10.2	17,944
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	229	0.1	0	$36	$101	$0	$101	2.8	225
ECM 3	Retrofit Fixtures with LED Lamps	Yes	126,386	34.2	-26	$19,718	$57,746	$0	$57,746	2.9	124,237
Lighting Control Measures			**14,545**	**3.3**	**-3**	**$2,268**	**$12,860**	**$0**	**$12,860**	**5.7**	**14,291**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	12,426	2.8	-3	$1,938	$10,610	$0	$10,610	5.5	12,209
ECM 5	Install High/Low Lighting Controls	Yes	2,119	0.5	0	$330	$2,250	$0	$2,250	6.8	2,082
Variable Frequency Drive (VFD) Measures			**17,241**	**28.2**	**0**	**$2,738**	**$46,712**	**$0**	**$46,712**	**17.1**	**17,362**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	17,241	28.2	0	$2,738	$46,712	$0	$46,712	17.1	17,362
Electric Unitary HVAC Measures			**4,932**	**3.7**	**0**	**$783**	**$53,394**	**$0**	**$53,394**	**68.2**	**4,966**
ECM 7	Install High Efficiency Heat Pumps	No	4,932	3.7	0	$783	$53,394	$0	$53,394	68.2	4,966
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**69**	**$930**	**$20,392**	**$6,400**	**$13,992**	**15.1**	**8,046**
ECM 8	Install High Efficiency Furnaces	No	0	0.0	69	$930	$20,392	$6,400	$13,992	15.1	8,046
Food Service & Refrigeration Measures			**1,612**	**0.2**	**0**	**$256**	**$230**	**$0**	**$230**	**0.9**	**1,623**
ECM 9	Vending Machine Control	Yes	1,612	0.2	0	$256	$230	$0	$230	0.9	1,623
TOTALS (COST EFFECTIVE MEASURES)			**177,832**	**65.9**	**-29**	**$27,845**	**$146,497**	**$0**	**$146,497**	**5.3**	**175,682**
TOTALS (ALL MEASURES)			**182,764**	**69.6**	**40**	**$29,557**	**$220,282**	**$6,400**	**$213,882**	**7.2**	**188,694**

* - 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 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			
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers			
ECM 3	Retrofit Fixtures with LED Lamps			
ECM 4	Install Occupancy Sensor Lighting Controls			
ECM 5	Install High/Low Lighting Controls			
ECM 6	Install VFDs on Constant Volume (CV) Fans			
ECM 7	Install High Efficiency Heat Pumps			
ECM 8	Install High Efficiency Furnaces	X		X
ECM 9	Vending Machine Control			

Figure 3 – Funding Options

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

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

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

Individual Measures with SmartStart

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

Turnkey Installation with Direct Install

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

Whole Building Approach with Pay for Performance

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

More Options from Around the State

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

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

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

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

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce 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 Petway 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.

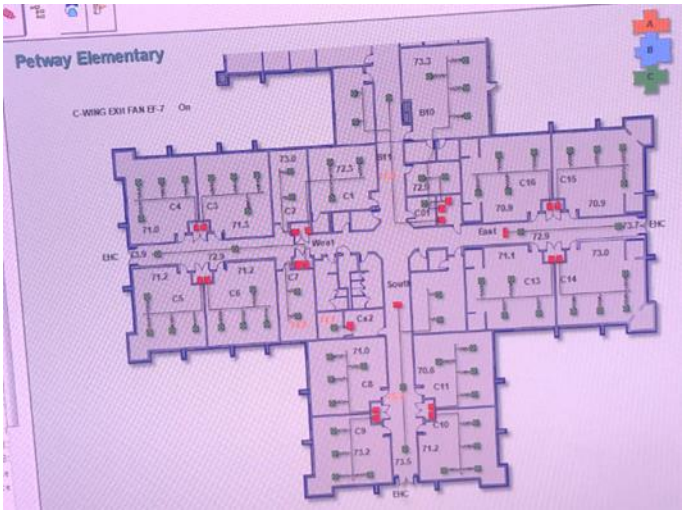
TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

2.1 Site Overview

On August 22, 2019, TRC performed an energy audit at Petway 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.

Petway Elementary School is a single-story, 74,300 square foot building built in 2006. Spaces include: classrooms, gymnasium, offices, cafeteria, stairwells, a commercial kitchen, and a mechanical space.

The school is 100% cooled and heated. There are no envelope concerns as the building is fairly new. The HVAC equipment includes geothermal heat pump systems.



Petway Elementary School Building Map

2.2 Building Occupancy

The facility is occupied for ten months out of the year. Typical weekday occupancy is 561 including full time staff and students.

Building Name	Weekday/Weekend	Operating Schedule
Petway Elementary School	Weekday	6:00 AM - 11:00 PM
	Weekend	Saturday: Sometimes Sunday: No Operation

Figure 4 - Building Occupancy Schedule

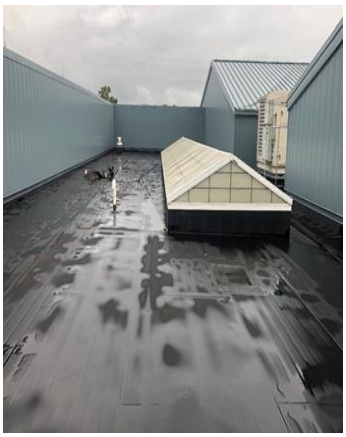
2.3 Building Envelope

Building walls are concrete block over structural steel with a brick facade. The roof has pitched and flat portions. The flat portions are covered with black EPDM membrane and the pitched portions are made of aluminum cladding. The roofs were observed to be in good condition.

Most of the windows are double glazed and have aluminum frames with a thermal break. The glass-to-frame seals are in good condition. Exterior doors are metal or aluminum framed glass doors with undamaged seals. The doors are in good condition.

Building Facade

Pitched Roof with Aluminum Frames



Flat Membrane Roof

Aluminum Frames Window

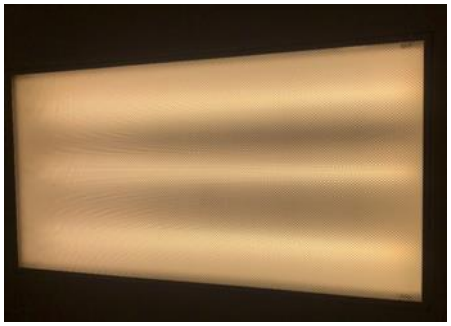
Metal Frames Glass Doors

Metal Frames Exit Doors

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are 30-Watt T12 lamps in the hallway display case. Additionally, there are 26-watt and 32-watt compact fluorescent lamps (CFL) and 90-watt halogen incandescent lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 2- 3- or 4-lamp, 2- or 4-foot long troffers or surface mounted fixtures. Most fixtures are in good condition and the lighting in the areas are generally sufficient. All exit signs are LED units.



Linear T8 Troffer Fixture

Surface Mounted T8 Fixture

Recessed CFL Fixture

Multipurpose Room Lighting

Wall Mounted Occupancy Sensor

Exterior LED Recessed

Wall Mounted LED Fixture

Up light LED Flight Light

Pole Mounted HPS Lamps

The exterior lighting consists of pole mounted 150-watt high pressure sodium fixtures, LED wall pack, recessed fixtures, and 32-watt CFL fixtures. All exterior lighting is controlled by a timeclock or photocells.

2.5 Air Handling Systems

Heat Pumps

The space cooling and heating is provided by several Trane Axiom™ water source heat pump units. Their capacities range from 1-ton to 15-ton and each has a condensate drain. All of the units are 13 years old, and according to the ASHRAE standard 13256, the estimated service life for a commercial water source heat pump is 19 years. Geothermal energy systems take advantage of the fact that subsurface earth temperatures are constant year round, which makes the earth an ideal heat source and heat sink for heat pumps. The units are controlled using a Trane Summit energy management system (EMS).

Packaged Units

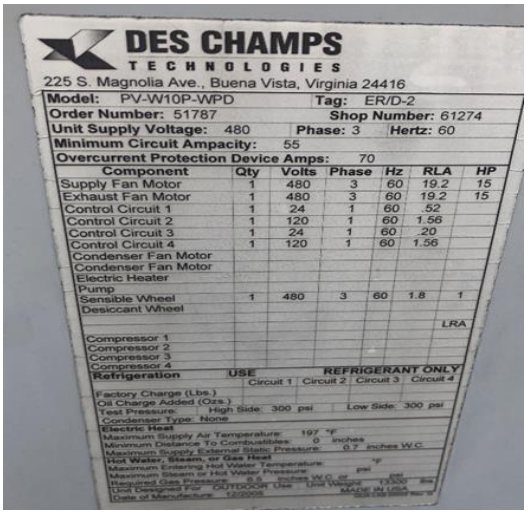
There are three Des Champs heat recovery units. Each unit includes two gas-fired furnaces. The capacities of these units have been assumed for analytical purposes. The packaged units were installed in 2006 and they appear in fair condition.

Two Trane makeup air (MUA) units provide heating and ventilation to the kitchen and other areas. They have a heating capacity of 100 MBh and 200 MBh. They are also original to the building.

The packaged units are controlled with the EMS.

Refer to Appendix A for detailed information about each unit.

Trane Water Source Heat Pumps



DES CHAMPS Energy Recovery Units

Trane MUA

Electric Resistance Heater

2.6 Water to Refrigerant Heat Exchanger

There are three 20 ton water to water heat pumps located in the mechanical room. They contain a source side water to refrigerant heat exchanger, and a load side water to refrigerant heat exchanger. The source for the water to water heat pump is connected to a ground source loop system. During the refrigeration cycle, heat is transferred from the source-side heat exchanger to the load-side heat exchanger, or vice versa. The load-side heat exchanger provides conditioned fluid (hot or cold). The ground water is circulated to the heat pumps using two variable speed 40 hp pumps.

Supplemental heating in the mechanical and kitchen storage rooms is provided by electric resistance heaters that are controlled with local thermostats.

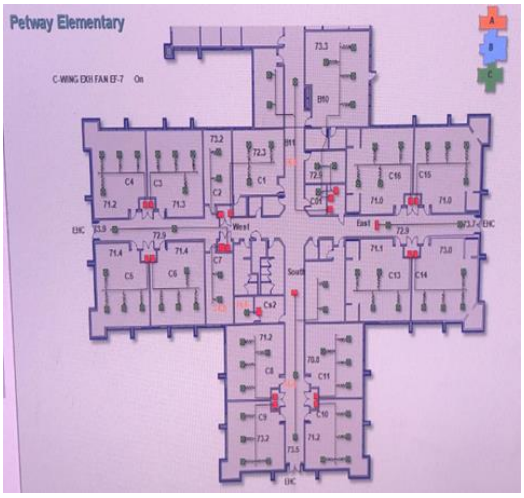
Water to Water Heat Pump

Variable Speed Water Pumps

Water Source Heat Pumps Loops

2.7 Building Energy Management Systems (EMS)

A Trane Tracer Summit EMS controls the HVAC equipment, furnaces, water source heat pumps, and the package units. The EMS provides equipment scheduling control, monitors and controls space temperatures, supply air temperatures, humidity, and heating water loop temperatures.



Trane Tracer Summit EMS

2.8 Domestic Hot Water

Hot water is produced by two 96% efficient, 100 gallon 240 MBh gas-fired storage water heaters, which serve the restrooms and kitchen. The water heaters were installed in 2006. They are in good operating condition. Hot water pipes are insulated, which is in good condition.

High Efficiency Domestic Water Heater

2.9 Food Service and Refrigeration Equipment

The kitchen has a mix of gas and electric equipment including a gas convection oven and steamer that are used to prepare meals for students. Most cooking is done using the 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 walk-in refrigerator has an estimated 0.6-ton compressor and a single-fan evaporator. The walk-in medium temperature freezer has an assessed 1-ton compressor and a two-fan evaporator.

Gas Fired Stove

Convection Oven

Standup Refrigerator

Walk-In Refrigerator

2.10 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 11 percent of total building energy use. This is higher than a typical building. You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area as well as Energy Efficient Best Practices.

2.11 Water-Using Systems

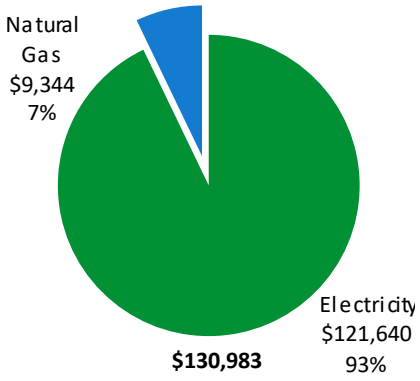
Faucet flow rates are at 1.5 gallons per minute (gpm) or higher. Toilets are rated at 1.6 gallons per flush (gpf) and urinals are rated at 1.0 gpf.

Typical School 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	766,075 kWh	$121,640
Natural Gas	6,908 Therms	$9,344
Total		**$130,983**



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.

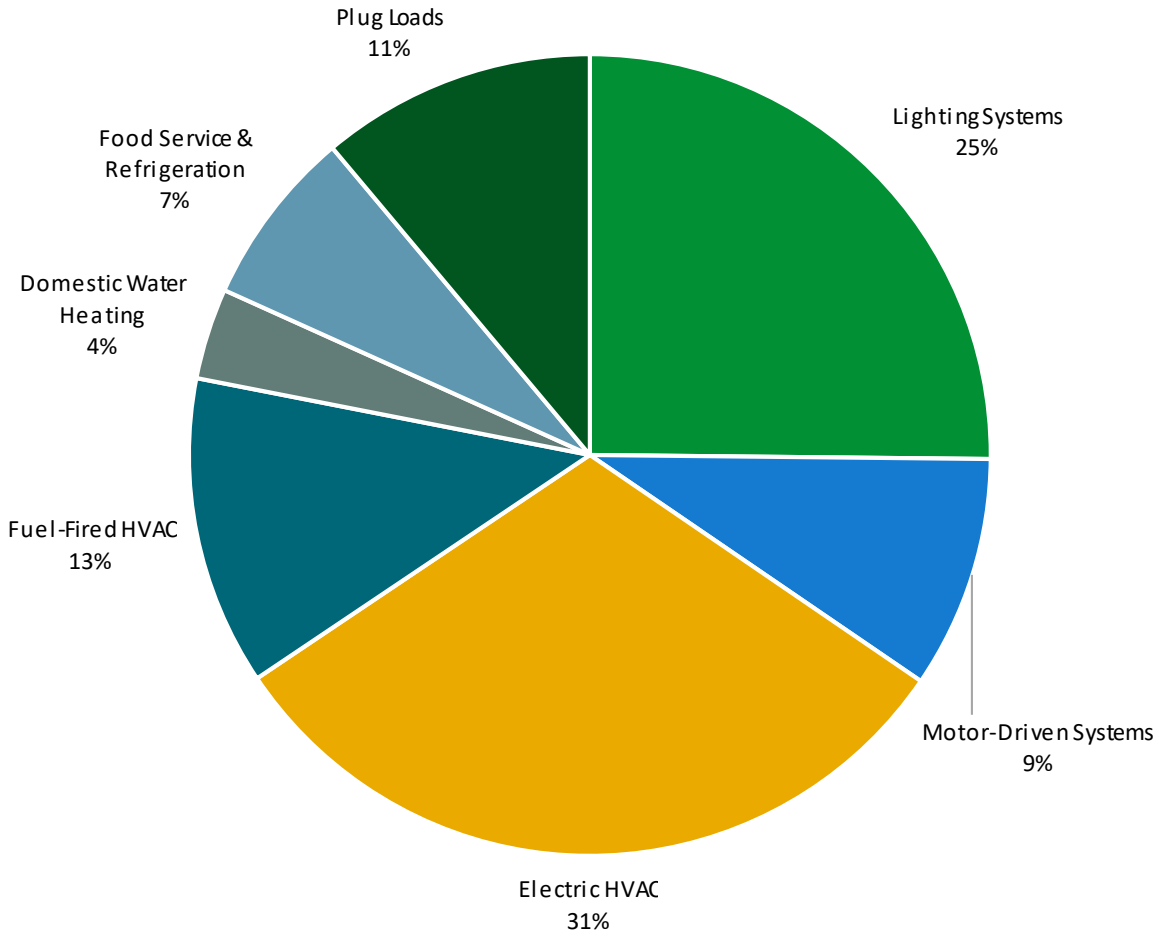
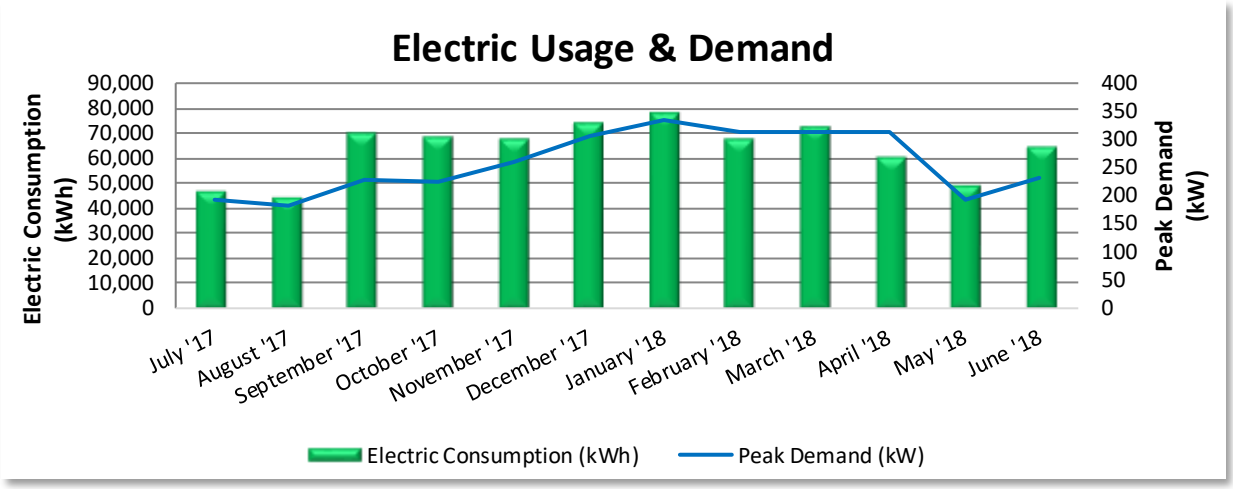


Figure 5 - Energy Balance

3.1 Electricity

City of Vineland delivers electricity under rate class GLP20.



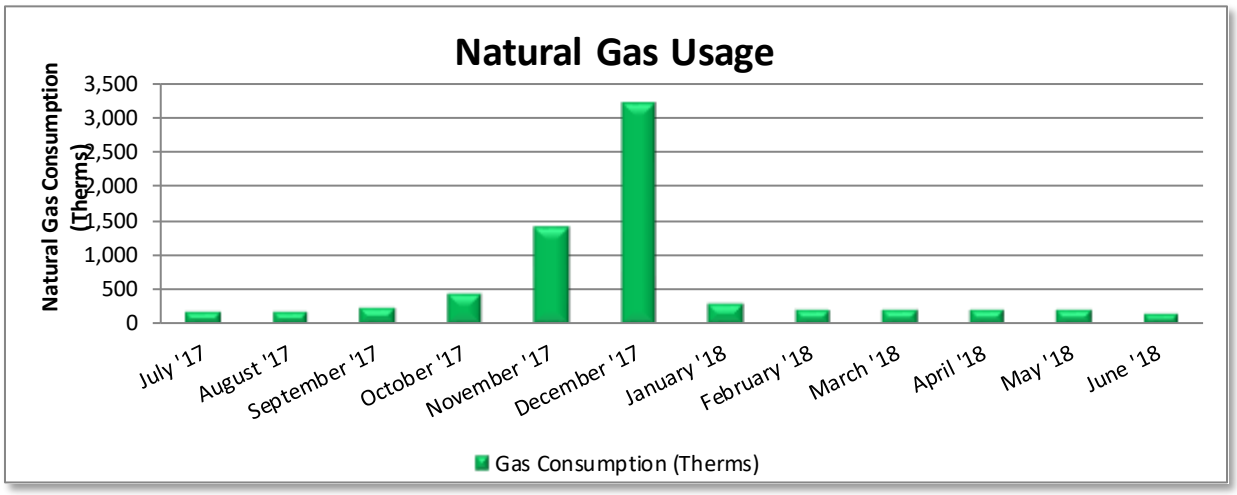
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
7/26/17	30	46,080	192	$1,384	$6,878
8/24/17	29	43,680	182	$1,316	$6,525
9/26/17	33	69,840	228	$2,223	$10,403
10/26/17	30	67,680	223	$2,119	$9,783
11/27/17	32	67,440	259	$2,461	$10,098
12/26/17	29	73,440	307	$2,917	$11,225
1/26/18	31	77,280	334	$3,173	$11,912
2/23/18	28	66,960	314	$2,983	$10,902
3/26/18	31	72,240	312	$2,964	$11,500
4/26/18	31	60,000	312	$3,198	$10,903
5/21/18	25	48,720	194	$1,989	$9,262
6/22/18	32	64,320	230	$2,415	$10,915
Totals	**361**	**757,680**	**334**	**$29,140**	**$120,306**
Annual	**365**	**766,075**	**334**	**$29,463**	**$121,640**

Notes:

- Peak demand of 334 kW occurred in January '18.
- Average demand over the past 12 months was 257 kW.
- The average electric cost over the past 12 months was $0.159/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, Amerigreen, South Jersey Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
8/8/17	30	176	$225
9/11/17	34	176	$231
10/9/17	28	239	$296
11/7/17	29	445	$540
12/7/17	30	1,401	$1,838
1/11/18	35	3,181	$4,360
2/9/18	29	302	$442
3/8/18	27	218	$331
4/9/18	32	218	$333
5/7/18	28	207	$270
6/7/18	31	207	$280
7/10/18	33	156	$223
Totals	**366**	**6,927**	**$9,369**
Annual	**365**	**6,908**	**$9,344**

Notes:

- The average gas cost for the past 12 months is $1.353/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.

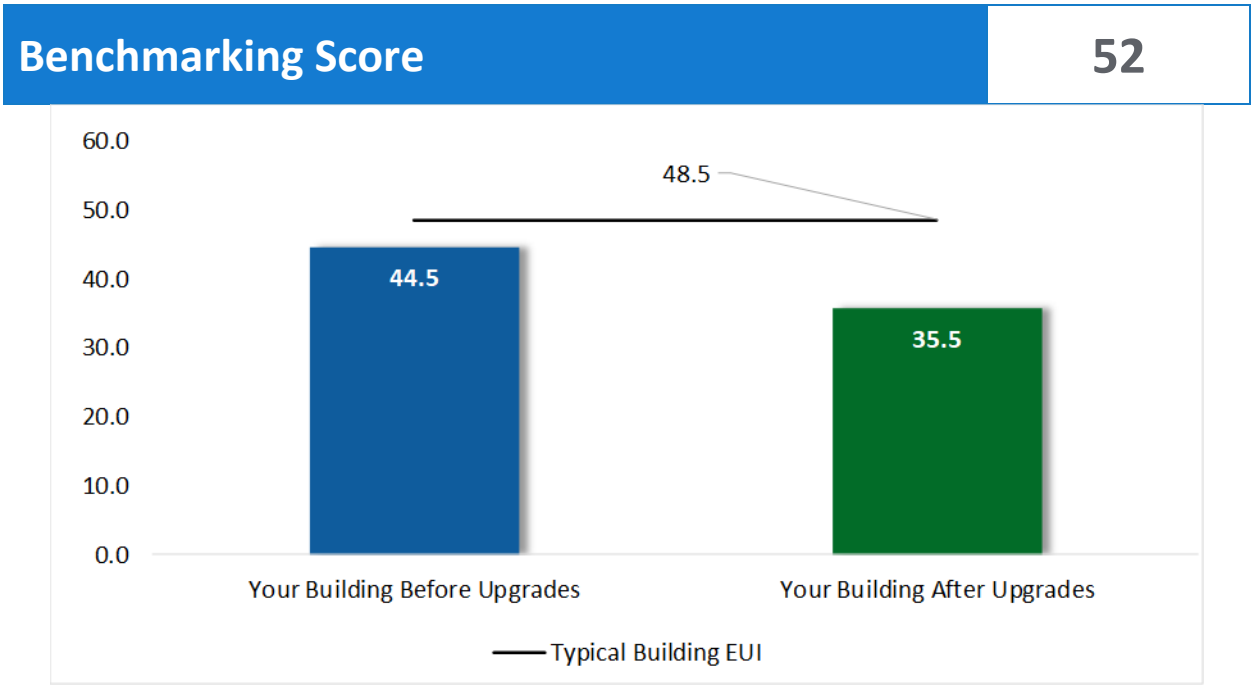


Figure 6 - Energy Use Intensity Comparison[3]

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

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			**144,434**	**34.2**	**-26**	**$22,583**	**$86,694**	**$0**	**$86,694**	**3.8**	**142,406**
ECM 1	Install LED Fixtures	Yes	17,820	0.0	0	$2,829	$28,847	$0	$28,847	10.2	17,944
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	229	0.1	0	$36	$101	$0	$101	2.8	225
ECM 3	Retrofit Fixtures with LED Lamps	Yes	126,386	34.2	-26	$19,718	$57,746	$0	$57,746	2.9	124,237
Lighting Control Measures			**14,545**	**3.3**	**-3**	**$2,268**	**$12,860**	**$0**	**$12,860**	**5.7**	**14,291**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	12,426	2.8	-3	$1,938	$10,610	$0	$10,610	5.5	12,209
ECM 5	Install High/Low Lighting Controls	Yes	2,119	0.5	0	$330	$2,250	$0	$2,250	6.8	2,082
Variable Frequency Drive (VFD) Measures			**17,241**	**28.2**	**0**	**$2,738**	**$46,712**	**$0**	**$46,712**	**17.1**	**17,362**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	17,241	28.2	0	$2,738	$46,712	$0	$46,712	17.1	17,362
Electric Unitary HVAC Measures			**4,932**	**3.7**	**0**	**$783**	**$53,394**	**$0**	**$53,394**	**68.2**	**4,966**
ECM 7	Install High Efficiency Heat Pumps	No	4,932	3.7	0	$783	$53,394	$0	$53,394	68.2	4,966
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**69**	**$930**	**$20,392**	**$6,400**	**$13,992**	**15.1**	**8,046**
ECM 8	Install High Efficiency Furnaces	No	0	0.0	69	$930	$20,392	$6,400	$13,992	15.1	8,046
Food Service & Refrigeration Measures			**1,612**	**0.2**	**0**	**$256**	**$230**	**$0**	**$230**	**0.9**	**1,623**
ECM 9	Vending Machine Control	Yes	1,612	0.2	0	$256	$230	$0	$230	0.9	1,623
TOTALS			**182,764**	**69.6**	**40**	**$29,557**	**$220,282**	**$6,400**	**$213,882**	**7.2**	**188,694**

* - 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		**144,434**	**34.2**	**-26**	**$22,583**	**$86,694**	**$0**	**$86,694**	**3.8**	**142,406**
ECM 1	Install LED Fixtures	17,820	0.0	0	$2,829	$28,847	$0	$28,847	10.2	17,944
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	229	0.1	0	$36	$101	$0	$101	2.8	225
ECM 3	Retrofit Fixtures with LED Lamps	126,386	34.2	-26	$19,718	$57,746	$0	$57,746	2.9	124,237
Lighting Control Measures		**14,545**	**3.3**	**-3**	**$2,268**	**$12,860**	**$0**	**$12,860**	**5.7**	**14,291**
ECM 4	Install Occupancy Sensor Lighting Controls	12,426	2.8	-3	$1,938	$10,610	$0	$10,610	5.5	12,209
ECM 5	Install High/Low Lighting Controls	2,119	0.5	0	$330	$2,250	$0	$2,250	6.8	2,082
Variable Frequency Drive (VFD) Measures		**17,241**	**28.2**	**0**	**$2,738**	**$46,712**	**$0**	**$46,712**	**17.1**	**17,362**
ECM 6	Install VFDs on Constant Volume (CV) Fans	17,241	28.2	0	$2,738	$46,712	$0	$46,712	17.1	17,362
Food Service & Refrigeration Measures		**1,612**	**0.2**	**0**	**$256**	**$230**	**$0**	**$230**	**0.9**	**1,623**
ECM 9	Vending Machine Control	1,612	0.2	0	$256	$230	$0	$230	0.9	1,623
TOTALS		**177,832**	**65.9**	**-29**	**$27,845**	**$146,497**	**$0**	**$146,497**	**5.3**	**175,682**

* - 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		**144,434**	**34.2**	**-26**	**$22,583**	**$86,694**	**$0**	**$86,694**	**3.8**	**142,406**
ECM 1	Install LED Fixtures	17,820	0.0	0	$2,829	$28,847	$0	$28,847	10.2	17,944
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	229	0.1	0	$36	$101	$0	$101	2.8	225
ECM 3	Retrofit Fixtures with LED Lamps	126,386	34.2	-26	$19,718	$57,746	$0	$57,746	2.9	124,237

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 pole light fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

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

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

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

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent 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: all areas with fluorescent fixtures with T8 tubes, CFL, and 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		**14,545**	**3.3**	**-3**	**$2,268**	**$12,860**	**$0**	**$12,860**	**5.7**	**14,291**
ECM 4	Install Occupancy Sensor Lighting Controls	12,426	2.8	-3	$1,938	$10,610	$0	$10,610	5.5	12,209
ECM 5	Install High/Low Lighting Controls	2,119	0.5	0	$330	$2,250	$0	$2,250	6.8	2,082

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

ECM 4: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend 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 5: Install High/Low Lighting Controls

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

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety 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		**17,241**	**28.2**	**0**	**$2,738**	**$46,712**	**$0**	**$46,712**	**17.1**	**17,362**
ECM 6	Install VFDs on Constant Volume (CV) Fans	17,241	28.2	0	$2,738	$46,712	$0	$46,712	17.1	17,362

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 6: Install VFDs on Constant Volume (CV) Fans

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

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

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

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

Affected air handlers: 5 hp and 15 hp supply and exhaust fans.

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		**4,932**	**3.7**	**0**	**$783**	**$53,394**	**$0**	**$53,394**	**68.2**	**4,966**
ECM 7	Install High Efficiency Heat Pumps	4,932	3.7	0	$783	$53,394	$0	$53,394	68.2	4,966

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 water source heat pumps are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 7: Install High Efficiency Heat Pumps

Replace standard efficiency heat pumps with high efficiency heat pumps. A higher EER or SEER rating indicates a more efficient cooling system and a higher HSPF rating indicates more efficient heating mode. 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 heating and cooling loads, and the estimated annual operating hours.

Affected units: various water source heat pumps.

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**	**69**	**$930**	**$20,392**	**$6,400**	**$13,992**	**15.1**	**8,046**
ECM 8	Install High Efficiency Furnaces	0	0.0	69	$930	$20,392	$6,400	$13,992	15.1	8,046

ECM 8: Install High Efficiency Furnaces

Replace standard efficiency furnaces with high efficiency furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases which can significantly improve furnace efficiency. Savings result from improved system efficiency.

This measure is part of a measure to replace package units at this site and as such must be considered in combination with ECM 7.

Affected units: make up units and the gas fired furnace sections of DES CHAMPS packaged units.

4.6 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		**1,612**	**0.2**	**0**	**$256**	**$230**	**$0**	**$230**	**0.9**	**1,623**
ECM 9	Vending Machine Control	1,612	0.2	0	$256	$230	$0	$230	0.9	1,623

ECM 9: Vending Machine Control

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

5 Energy Efficient Best Practices

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 Controls

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

Motor 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.

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.

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

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.

Furnace Maintenance

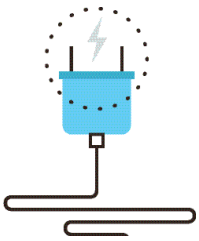
Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas / carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt,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

Water Heater Maintenance

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

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

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[6]. Your local utility may offer incentives or rebates for this equipment.

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

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[7] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[8] 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.

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

[8] 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.

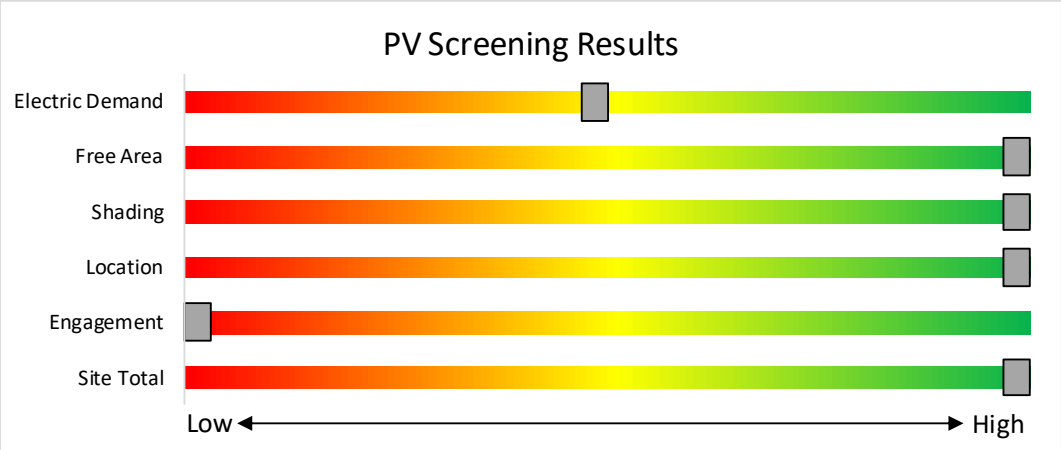
6.1 Solar Photovoltaic

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	161	kW DC STC
Electric Generation	191,811	kWh/yr
Displaced Cost	$30,460	/yr
Installed Cost	$418,600	

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

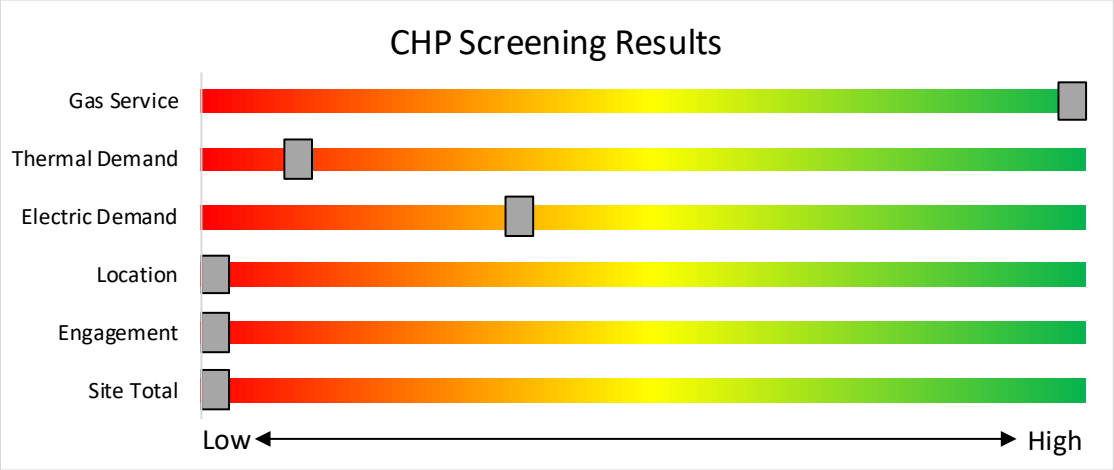
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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

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

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

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. 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	0	kW
Electric Generation	0	kWh/yr
Thermal Generation	0	MBtu/yr
Displaced Cost	#DIV/0!	/yr
Installed Cost	$0	

Figure 10 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

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

7.1 SmartStart

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

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

Equipment with Prescriptive Incentives Currently Available:

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

Incentives

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

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

How to Participate

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

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

7.2 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.

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 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.

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[9].

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[10].

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

[10] 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
Mech room	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,928	0.5	2,126	0	$332	$730	$0	2.2
Mech 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
Cafeteria	30	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,928	3, 4	Relamp	Yes	30	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,020	1.6	7,148	-1	$1,115	$3,001	$0	2.7
Cafeteria	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	4	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	4	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.1	346	0	$54	$217	$0	4.0
Cafeteria	15	Halogen Incandescent: Flood light - 1 lamp	Wall Switch	S	90	2,928	3, 4	Relamp	Yes	15	LED Lamps: Flood light - 1 lamp	Occupancy Sensor	14	2,020	0.9	3,898	-1	$608	$993	$0	1.6
Cafeteria	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.2	811	0	$127	$219	$0	1.7
Cafeteria	6	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,928	3, 4	Relamp	Yes	6	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	18	2,020	0.1	260	0	$41	$326	$0	8.1
Kitchen	16	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3	Relamp	No	16	LED Lamps: 4 pin - 2 lamps	Wall Switch	36	2,928	0.2	804	0	$125	$870	$0	6.9
Kitchen	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,928	0.4	1,594	0	$249	$548	$0	2.2
Kitchen	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,928	0.1	319	0	$50	$110	$0	2.2
Closet	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	S	17	2,928		None	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,928	0.0	0	0	$0	$0	$0	0.0
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,928	0.1	319	0	$50	$110	$0	2.2
Kitchen hood	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,928	0.1	319	0	$50	$110	$0	2.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,928	0.0	159	0	$25	$55	$0	2.2
Room BS6	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.2	811	0	$127	$489	$0	3.9
Gym	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.7	3,246	-1	$506	$1,416	$0	2.8
Gym	28	Halogen Incandescent: Flood light - 1 lamp	Wall Switch	S	90	2,928	3, 4	Relamp	Yes	28	LED Lamps: Flood light - 1 lamp	Occupancy Sensor	14	2,020	1.6	7,276	-2	$1,135	$1,656	$0	1.5
Gym	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
Stage 1	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.4	1,893	0	$295	$627	$0	2.1
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	270	0	$42	$189	$0	4.5
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	270	0	$42	$189	$0	4.5
Room B07	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2

	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
Room B4	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	440	0	$69	$219	$0	3.2
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Library	55	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	55	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	2.5	11,157	-2	$1,740	$4,362	$0	2.5
Library	28	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	28	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.5	2,424	-1	$378	$2,332	$0	6.2
Library	4	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,928	3, 4	Relamp	Yes	4	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	18	2,020	0.0	173	0	$27	$217	$0	8.1
Library	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
Office	2	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	2	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.0	173	0	$27	$379	$0	14.0
Room B024	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.3	1,217	0	$190	$599	$0	3.2
Room B023	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	811	0	$127	$335	$0	2.6
Room BS13	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	811	0	$127	$335	$0	2.6
Room BM5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,928	0.0	106	0	$17	$37	$0	2.2
Exterior pole light	31	High-Pressure Sodium: (1) 150W Lamp	Timeclock		188	4,368	1	Fixture Replacement	No	31	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Timeclock	56	4,368	0.0	17,820	0	$2,829	$28,847	$0	10.2
Exterior wall pack	30	Compact Fluorescent: 4 pin - 2 lamps	Photocell		64	4,380	3	Relamp	No	30	LED Lamps: 4 pin - 2 lamps	Photocell	45	4,380	0.0	2,523	0	$401	$1,631	$0	4.1
Exterior recessed	17	LED Lamps: Screw-in 2 lamps	Photocell		38	4,380		None	No	17	LED Lamps: Screw-in 2 lamps	Photocell	38	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior wall pack	5	LED Lamps: Screw-in 1 lamp	Photocell		54	4,380		None	No	5	LED Lamps: Screw-in 1 lamp	Photocell	54	4,380	0.0	0	0	$0	$0	$0	0.0
Flag light	1	LED Lamps: Flood light - 1 lamp	Photocell		45	4,380		None	No	1	LED Lamps: Flood light - 1 lamp	Photocell	45	4,380	0.0	0	0	$0	$0	$0	0.0
Main lobby	12	Compact Fluorescent: Screw-in 2 lamps	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	12	LED Lamps: Screw-in 2 lamps	Occupancy Sensor	43	2,020	0.3	1,239	0	$193	$922	$0	4.8
Main lobby	9	Halogen Incandescent: Screw-in 1 lamp	Wall Switch	S	90	2,928	3, 4	Relamp	Yes	9	LED Lamps: Screw-in 1 lamp	Occupancy Sensor	14	2,020	0.5	2,339	0	$365	$542	$0	1.5
Main lobby recessed	10	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	10	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.2	866	0	$135	$544	$0	4.0
Main lobby	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.2	1,082	0	$169	$562	$0	3.3
Main lobby	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
A wing hallway	23	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	26	2,928	3, 5	Relamp	Yes	23	LED Lamps: 4 pin - 2 lamps	High/Low Control	18	2,020	0.2	996	0	$155	$2,150	$0	13.8
A wing hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 5	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,020	0.2	676	0	$105	$183	$0	1.7
A wing hallway	4	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 5	Relamp	Yes	4	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	2,020	0.1	346	0	$54	$217	$0	4.0
A wing hallway	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	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
Room B05	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	330	0	$51	$164	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,928	0.0	106	0	$17	$37	$0	2.2
Room B04	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	609	0	$95	$280	$0	3.0
Room B03	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	609	0	$95	$280	$0	3.0
Room B02	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	811	0	$127	$335	$0	2.6
Room B01	10	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	10	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.2	866	0	$135	$814	$0	6.0
Room B01	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.3	1,217	0	$190	$329	$0	1.7
Room B01	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 B06	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.3	880	0	$137	$438	$0	3.2
Room B1	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	660	0	$103	$329	$0	3.2
Room B2	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,980	0	$309	$986	$0	3.2
Room B2	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
Closet D1	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.0	110	0	$17	$55	$0	3.2
B wing hallway	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,928	3, 5	Relamp	Yes	12	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	2,020	0.2	822	0	$128	$840	$0	6.6
B wing 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 BM2	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.0	110	0	$17	$55	$0	3.2
Room A01	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room AM9	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room A02	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room A1	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.4	1,100	0	$172	$548	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room A03	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.0	110	0	$17	$55	$0	3.2
Room A04	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2

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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
Room AS2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	270	0	$42	$189	$0	4.5
Elec room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room A8	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A11	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A10	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,430	0	$223	$712	$0	3.2
Room A9	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,430	0	$223	$712	$0	3.2
Room A9	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Girls Restroom - Room AL4	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	541	0	$84	$416	$0	4.9
Room J1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom AL2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Boys Restroom - Room AL3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	541	0	$84	$416	$0	4.9
Room A2	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.3	990	0	$154	$493	$0	3.2
Room A7	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.3	990	0	$154	$493	$0	3.2
Room A6	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A3	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A5	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A4	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
A wing hallway	2	Compact Fluorescent: 4-pin - 4 lamps	Wall Switch	S	128	2,928	3	Relamp	No	2	LED Lamps: 4 pin - 4 lamps	Wall Switch	90	2,928	0.1	247	0	$39	$217	$0	5.6
Room A12	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,980	0	$309	$986	$0	3.2
Room A17	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,980	0	$309	$986	$0	3.2
Room A15	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A13	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room A16	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,430	0	$223	$712	$0	3.2
Room A14	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,430	0	$223	$712	$0	3.2

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Room B025	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	330	0	$51	$164	$0	3.2
Room BL3	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.2	811	0	$127	$489	$0	3.9
Room BL4	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.2	811	0	$127	$489	$0	3.9
Room BJ1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room B022	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B0221	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B016	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	609	0	$95	$434	$0	4.6
Room B016	5	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	5	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.1	433	0	$68	$542	$0	8.0
Room BL7	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room BS12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room B017	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B018	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B019	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B020	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Hallway display	2	Linear Fluorescent - T12: 3' T12 (30W) - 1L	Wall Switch	S	46	2,928	2	Relamp & Reballast	No	2	LED - Linear Tubes: (1) 3' Lamp	Wall Switch	11	2,928	0.1	229	0	$36	$101	$0	2.8
Room B011	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	406	0	$63	$110	$0	1.7
Room B011	4	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	4	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.1	346	0	$54	$487	$0	9.0
Room B012	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B010	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	440	0	$69	$219	$0	3.2
Room B015	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B014	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B013	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room B09	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	660	0	$103	$329	$0	3.2
Room B8	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.1	220	0	$34	$110	$0	3.2
Room BL6	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2

	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
Room BS9	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room BM4	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,928	0.0	106	0	$17	$37	$0	2.2
Room B11	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	660	0	$103	$329	$0	3.2
Room B10	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.7	2,310	0	$360	$1,150	$0	3.2
Room BS11	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	147	0	$23	$73	$0	3.2
Room B10A	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.0	110	0	$17	$55	$0	3.2
C wing hallway	21	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,928	3, 5	Relamp	Yes	21	LED - Linear Tubes: (2) 2' Lamps	High/Low Control	17	2,020	0.3	1,439	0	$224	$1,358	$0	6.1
C wing hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,020	0.2	811	0	$127	$444	$0	3.5
C wing hallway	4	Compact Fluorescent: 4 pin - 4 lamps	Wall Switch	S	128	2,928	3, 5	Relamp	Yes	4	LED Lamps: 4 pin - 4 lamps	High/Low Control	90	2,020	0.2	853	0	$133	$435	$0	3.3
C wing hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 5	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,020	0.2	811	0	$127	$219	$0	1.7
C wing hallway	4	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 5	Relamp	Yes	4	LED Lamps: 4 pin - 2 lamps	High/Low Control	36	2,020	0.1	346	0	$54	$217	$0	4.0
Room C17	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	660	0	$103	$329	$0	3.2
Room C1	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.4	1,100	0	$172	$548	$0	3.2
Room C01	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.0	110	0	$17	$55	$0	3.2
Room CSI	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room CS2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	147	0	$23	$73	$0	3.2
Electrical room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room C11	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room C8	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room C9	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room C10	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room CL4	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	541	0	$84	$416	$0	4.9
Room CJ1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room CL3	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.1	541	0	$84	$416	$0	4.9

	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
Room C2	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	660	0	$103	$329	$0	3.2
Room C7	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.2	660	0	$103	$329	$0	3.2
Room C6	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room C3	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room C4	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room C5	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.5	1,650	0	$257	$822	$0	3.2
Room CL5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,928	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,928	0.0	106	0	$17	$37	$0	2.2
Room C12	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,928	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.4	1,623	0	$253	$708	$0	2.8
Room C12	1	Compact Fluorescent: 4 pin - 2 lamps	Wall Switch	S	52	2,928	3, 4	Relamp	Yes	1	LED Lamps: 4 pin - 2 lamps	Occupancy Sensor	36	2,020	0.0	87	0	$14	$54	$0	4.0
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room CS3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,394	0.1	187	0	$29	$189	$0	6.5
Room C16	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,760	0	$274	$876	$0	3.2
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room C13	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,760	0	$274	$876	$0	3.2
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room C14	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,870	0	$292	$931	$0	3.2
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Room C15	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	2,020	3	Relamp	No	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,020	0.6	1,870	0	$292	$931	$0	3.2
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,020	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,020	0.0	73	0	$11	$37	$0	3.2

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
Mech room	Heating systems	2	Heating Hot Water Pump	40.0	94.5%	Yes	W	800		No	94.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various spaces	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	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	Various spaces	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen	1	Kitchen Hood Exhaust Fan	1.5	60.0%	No	W	5,250		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM1	Room BM1	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM1	Room BM1	1	Supply Fan	0.5	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM2	Room BM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM2	Room BM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM2	Room AM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM2	Room AM2	1	Supply Fan	0.2	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AS2	Room AS2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AS2	Room AS2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AS2	Room AS2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM6	Room AM6	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM5	Room AM5	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM2	Room AM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM2	Room AM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM3	Room AM3	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM4	Room AM4	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room AM4	Room AM4	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM1	Room AM1	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM1	Room AM1	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM7	Room AM7	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM7	Room AM7	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room AM8	Room AM8	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM4	Room BM4	1	Supply Fan	0.5	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM4	Room BM4	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CS2	Room CS2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM6	Room CM6	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM5	Room CM5	2	Supply Fan	0.5	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM3	Room CM3	1	Supply Fan	0.5	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM3	Room CM3	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM2	Room CM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM2	Room CM2	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM1	Room CM1	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM1	Room CM1	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM4	Room CM4	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM4	Room CM4	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CS3	Room CS3	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room CS3	Room CS3	1	Supply Fan	0.5	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CS3	Room CS3	1	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM7	Room CM7	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room CM8	Room CM8	2	Supply Fan	0.3	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room	Mech room	1	Supply Fan	5.0	89.5%	No	B	575	6	No	89.5%	Yes	1	1.4	899	0	$143	$4,197	$0	29.4
Storage	Storage	1	Supply Fan	0.8	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Room BM5	Room BM5	1	Supply Fan	0.5	60.0%	No	B	575		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various spaces	3	Supply Fan	15.0	91.0%	No	B	575	6	No	92.4%	Yes	3	13.1	8,171	0	$1,297	$21,258	$0	16.4
Roof	Various spaces	3	Exhaust Fan	15.0	91.0%	No	B	575	6	No	92.4%	Yes	3	13.6	8,171	0	$1,297	$21,258	$0	16.4
Various spaces	Various spaces	26	Supply Fan	0.3	60.0%	No	B	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 (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
Room AM2	Room AM2	1	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM3	Room AM3	2	Water Source HP	2.50	35.70	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM4	Room AM4	1	Water Source HP	1.50	23.30	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM4	Room AM4	1	Water Source HP	1.00	14.60	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM1	Room AM1	1	Water Source HP	1.50	23.30	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM1	Room AM1	1	Water Source HP	2.00	29.70	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM7	Room AM7	1	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM7	Room AM7	1	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room AM8	Room AM8	2	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room BM4	Room BM4	1	Water Source HP	3.50	52.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room BM4	Room BM4	1	Water Source HP	2.00	27.70	B		No							0.0	0	0	$0	$0	$0	0.0
Room CS2	Room CS2	1	Water Source HP	2.00	27.70	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM6	Room CM6	2	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM5	Room CM5	2	Water Source HP	3.50	52.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM3	Room CM3	1	Water Source HP	3.50	52.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM3	Room CM3	1	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM2	Room CM2	1	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM2	Room CM2	1	Water Source HP	2.50	35.70	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM1	Room CM1	1	Water Source HP	1.50	23.30	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM1	Room CM1	1	Water Source HP	2.00	29.70	B		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
Room CM4	Room CM4	1	Water Source HP	1.00	14.60	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM4	Room CM4	1	Water Source HP	1.50	23.30	B		No							0.0	0	0	$0	$0	$0	0.0
Room CS3	Room CS3	1	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CS3	Room CS3	1	Water Source HP	3.50	52.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CS3	Room CS3	1	Water Source HP	1.00	14.60	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM7	Room CM7	2	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Room CM8	Room CM8	2	Water Source HP	3.00	44.40	B		No							0.0	0	0	$0	$0	$0	0.0
Various spaces	Various spaces	26	Water Source HP	1.50	23.30	B		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
Roof	Unknown	1	Furnace	100.00	B	8	Yes	1	Furnace	100.00	95.00%	AFUE	0.0	0	9	$118	$2,266	$800	12.4
Roof	Unknown	1	Furnace	200.00	B	8	Yes	1	Furnace	200.00	95.00%	AFUE	0.0	0	15	$203	$4,531	$800	18.4
Roof	Unknown	6	Furnace	100.00	B	8	Yes	6	Furnace	100.00	95.00%	AFUE	0.0	0	45	$609	$13,594	$4,800	14.4

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
Mech room	Restrooms and kitchen	2	Storage Tank Water Heater (> 50 Gal)	B		No						0.0	0	0	$0	$0	$0	0.0

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	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	Cooler (35F to 55F)		No	No	No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Medium Temp Freezer (0F to 30F)		No	No	No	0.0	0	0	$0	$0	$0	0.0

Commercial Refrigerator/Freezer Inventory & Recommendations

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker 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
Kitchen	1	Self-Contained Unit (<175 lbs/day), Batch	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	Insulated Food Holding Cabinet (1/2 Size)	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	Gas Convection Oven (Half Size)	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

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Vineland Public Schools	18	Microwave	900.0	Yes
Vineland Public Schools	1	Washer/Dryer	1,200.0	Yes
Vineland Public Schools	3	Kitchen table	771.0	Yes
Vineland Public Schools	19	Small Refrigerator	60.0	Yes
Vineland Public Schools	3	Refrigerator	220.0	Yes
Vineland Public Schools	4	Toaster	1,200.0	Yes
Vineland Public Schools	3	Water cooler	520.0	Yes
Vineland Public Schools	7	Wall TV	110.0	Yes
Vineland Public Schools	5	Coffee Machine	400.0	Yes
Vineland Public Schools	1	Kiln	1,100.0	Yes
Vineland Public Schools	75	Desktop computer	145.0	Yes
Vineland Public Schools	800	Laptop	75.0	Yes
Vineland Public Schools	15	Copy machine	200.0	Yes

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
Room 806	1	Refrigerated	9	Yes	0.2	1,612	0	$256	$230	$0	0.9

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

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ENERGY STAR® Score[1]

Petway Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 74,300
Built: 1927

For Year Ending: June 30, 2018
Date Generated: October 04, 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
Petway Elementary School 1115 S. Lincoln Avenue Vineland, New Jersey 08361	Vineland Public Schools 61 W. Landis Avenue Vineland, NJ 08360 856-794-6700, ext 2226	Gene Mercoli 61 W. Landis Avenue Vineland, NJ 08360 856-794-6700, ext. 2226 jrosado@trcsolutions.com

Property ID: 7566443

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
44.2 kBtu/ft²

Source EUI
107.6 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	692,837 (21%)
Electric - Grid (kBtu)	2,594,217 (79%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	45.4
National Median Source EUI (kBtu/ft²)	110.4
% Diff from National Median Source EUI	-3%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	300

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