



Local Government Energy Audit Report

J. Cresswell Stuart Early Childhood Development Center

(J.C. Stuart Elementary School)

Enter Date

Prepared for:

Willingboro Public Schools

70 Sunset Road

Willingboro, NJ 08046

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

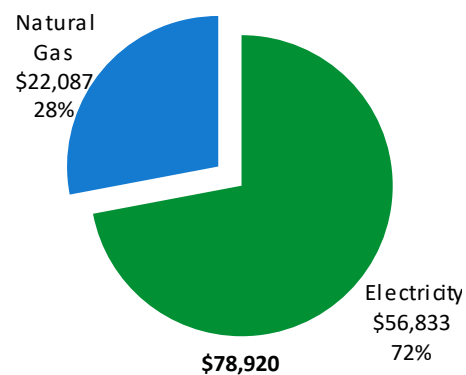
BUILDING PERFORMANCE REPORT



Costs: \$78,920

Electricity:
417,951 kWh

Natural Gas:
27,313 Therms



ENERGY STAR®
Benchmarking Score

58
(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.

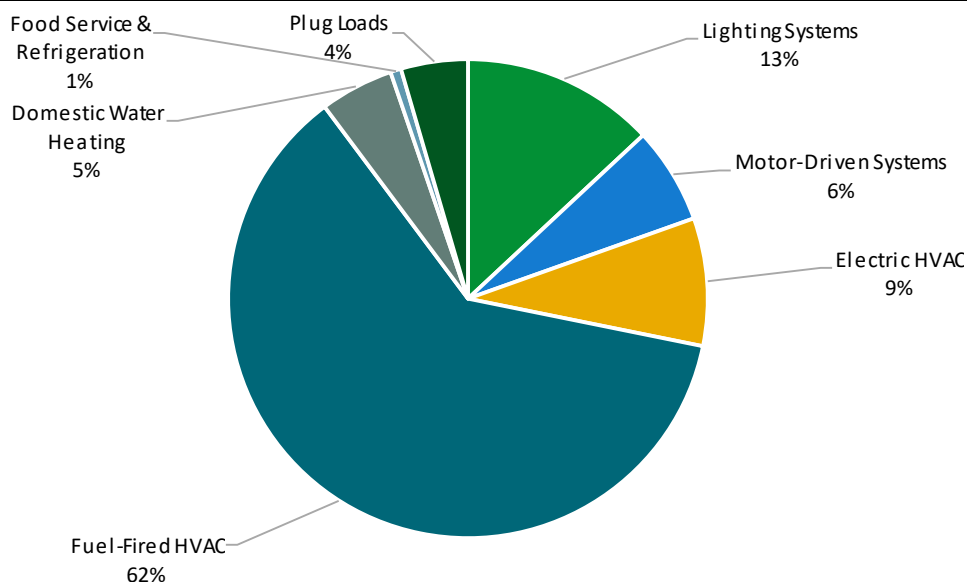


Figure 1 - Energy Use by System

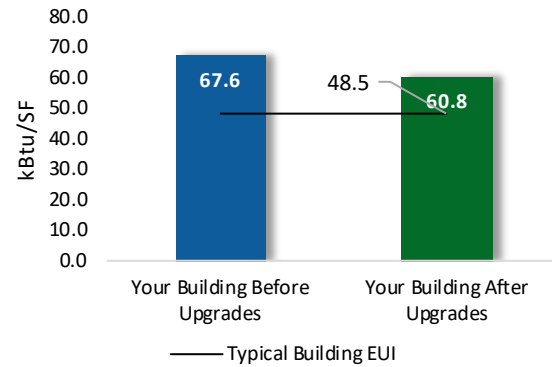
POTENTIAL IMPROVEMENTS



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.

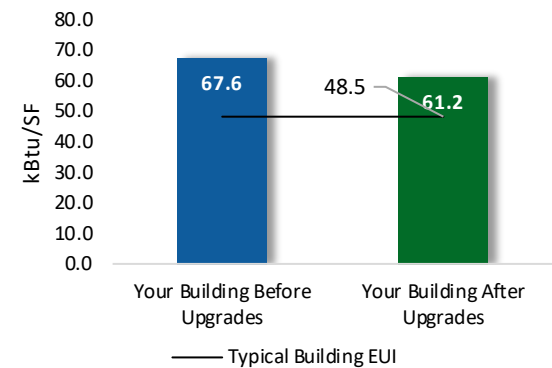
Scenario 1: Full Package (all evaluated measures)

Installation Cost	\$115,136
Potential Rebates & Incentives ¹	\$38,646
Annual Cost Savings	\$17,124
Annual Energy Savings	Electricity: 126,379 kWh
Greenhouse Gas Emission Savings	63 Tons
Simple Payback	4.5 Years
Site Energy Savings (all utilities)	10%



Scenario 2: Cost Effective Package²

Installation Cost	\$92,766
Potential Rebates & Incentives	\$37,253
Annual Cost Savings	\$16,429
Annual Energy Savings	Electricity: 122,110 kWh
Greenhouse Gas Emission Savings	60 Tons
Simple Payback	3.4 Years
Site Energy Savings (all utilities)	9%



On-site Generation Potential

Photovoltaic	Medium
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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades			91,592	25.9	-17	\$12,315	\$54,676	\$24,068	\$30,608	2.5	90,216
ECM 1	Install LED Fixtures	Yes	9,338	0.0	0	\$1,270	\$13,368	\$2,810	\$10,558	8.3	9,400
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	146	0.0	0	\$20	\$101	\$20	\$81	4.1	143
ECM 3	Retrofit Fixtures with LED Lamps	Yes	82,108	25.8	-17	\$11,026	\$41,207	\$21,238	\$19,969	1.8	80,673
Lighting Control Measures			21,584	6.7	-5	\$2,899	\$32,485	\$11,485	\$21,000	7.2	21,207
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	19,132	6.0	-4	\$2,569	\$27,310	\$6,510	\$20,800	8.1	18,798
ECM 5	Install High/Low Lighting Controls	Yes	2,452	0.8	-1	\$329	\$5,175	\$4,975	\$200	0.6	2,409
Variable Frequency Drive (VFD) Measures			11,591	3.4	0	\$1,576	\$16,244	\$1,600	\$14,644	9.3	11,672
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	7,322	2.9	0	\$996	\$5,375	\$1,600	\$3,775	3.8	7,373
ECM 7	Install VFDs on Heating Water Pumps	No	4,269	0.6	0	\$581	\$10,869	\$0	\$10,869	18.7	4,299
Domestic Water Heating Upgrade			0	0.0	14	\$115	\$11,500	\$1,393	\$10,107	88.1	1,661
ECM 8	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	14	\$115	\$11,500	\$1,393	\$10,107	88.1	1,661
Food Service & Refrigeration Measures			1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
ECM 9	Vending Machine Control	Yes	1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
TOTALS (COST EFFECTIVE MEASURES)			122,110	35.7	-22	\$16,429	\$92,766	\$37,253	\$55,513	3.4	120,419
TOTALS (ALL MEASURES)			126,379	36.2	-8	\$17,124	\$115,136	\$38,646	\$76,490	4.5	126,379

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

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

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X	X	
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X	X	
ECM 3	Retrofit Fixtures with LED Lamps	X	X	
ECM 4	Install Occupancy Sensor Lighting Controls	X	X	
ECM 5	Install High/Low Lighting Controls	X	X	
ECM 6	Install VFDs on Constant Volume (CV) Fans	X	X	
ECM 7	Install VFDs on Heating Water Pumps		X	
ECM 8	Install High Efficiency Gas-Fired Water Heater	X	X	
ECM 9	Vending Machine Control	X	X	

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 (NJBP) has sponsored this Local Government Energy Audit (LGEA) Report for J. C. Stuart. 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 October 18, 2019, TRC performed an energy audit at J. C. Stuart located in Willingboro, New Jersey. This facility was previously referred to as J.C. Stuart Elementary School; this report discusses the building under its current designation. TRC met with Orlando L. Chandler to review the facility operations and help focus our investigation on specific energy-using systems.

J. C. Stuart is a 1-story, 61,459 square foot building built in 1958. Spaces include: classrooms, gymnasium, offices, cafeteria, corridors, a commercial kitchen, and a mechanical space.

The building is a 100% heated using condensing hot water boilers and 95% cooled using window and split AC units. Recent improvements include the installation of a HVAC between 2012 and 2013.

2.2 Building Occupancy

The facility is occupied from September through June during the hours mentioned below. There are maintenance activities that take place until late in the night. Typical weekday occupancy is 516 people including full time staff and students.

Building Name	Weekday/Weekend	Operating Schedule
J.C.Stuart Elementary School	Weekday	7:30 AM - 3:30 PM
	Weekend	No Operation

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel with a brick and steel facade. The roof is flat and covered with grey membrane, and it is in good condition.

Most of the windows are double glazed reflective windows with low-e glass and aluminum frames. The glass-to-frame seals are in good condition. Exterior doors are made of fiber glass plastic and are in good condition. There was no excessive air infiltration observed onsite.



Roof



Windows



Exterior door



Roof and facade

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There is a 40-Watt T12 fixture in the display case. Additionally, there are a significant number of compact fluorescent lamps (CFL), a few 60-Watt incandescent lamps, and a sizable quantity of 9- and 10-Watt LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 1- or 2-lamp 4-foot long troffers, surface mounted fixtures, and 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition.

All exit signs are 2-Watt LED units. The majority of lighting is controlled using manual wall switches, but the restrooms are all controlled using occupancy sensors.

Interior lighting levels were generally sufficient.

Exterior lighting consists of wall pack fixtures with 100-Watt metal-halide lamps; wall mount scones with 18-Watt CFLs; parking lot pole fixtures with 250-Watt high pressure sodium; and ceiling mount 10-Watt LED fixtures.

All wall and ceiling mounted exterior fixtures are controlled using time switches while pole fixtures are controlled using photocells.



T8 troffers



Exterior ceiling mount fixture



Exterior wall mount fixture



Surface mount T8 fixtures

2.5 Air Handling Systems

Unit Ventilators

There are approximately 38-unit ventilators with hot water coils and supply fan motors that provide heating to the respective spaces. This system is original to the building and appears to be in good operating condition.

Air Handling Units

There are seven air handlers (marked AHU 1-7) serving various spaces, predominantly serving the corridors in the school. The air handlers have hot water coils served by the boilers and DX coils served by the split AC units. The temperature setpoint in the zones served by these units are vary between 70°F to 75°F depending on the active mode and controlled by the EMS.

Air Conditioners

The building is cooled using window AC units and split AC units.

Window AC units are mainly 2-ton Friedrich units with EERs of 9.8 or 10.3, serving the classrooms. These units were found in good condition and well maintained.

The split AC units have cooling capacities ranging from 2 ton to 28 ton with EER values ranging from 10-12. They serve various zones, including the main office, principal office, and nurse's office. The split units were installed in 2011 and are in good condition. Depending on the system, temperature controls are either internal to the units or provided by programmable thermostats in the respective zones.



Split System AC



Thermostat



Air Conditioner



Air Conditioner

2.6 Heating Hot Water/Steam] Systems

Space heating is provided by three gas fired condensing hot water Hydrotherm boilers, each with an output capacity of 1,853 MBh and a nominal efficiency of 92.7%.

The hot water from the boilers are distributed to the unit ventilators and air handling units using five heating hot water (HHW) pumps. The two 10 hp pumps are equipped with variable frequency drives and the three 2 hp pumps operate as constant speed. The air handlers are all constant volume systems.

The boilers were installed in the 2011, are in good condition, and well maintained. Loop and space temperatures are controlled by an EMS. The setpoint at the facility is 72.5°F.



Condensing boilers



Heating hot water pumps



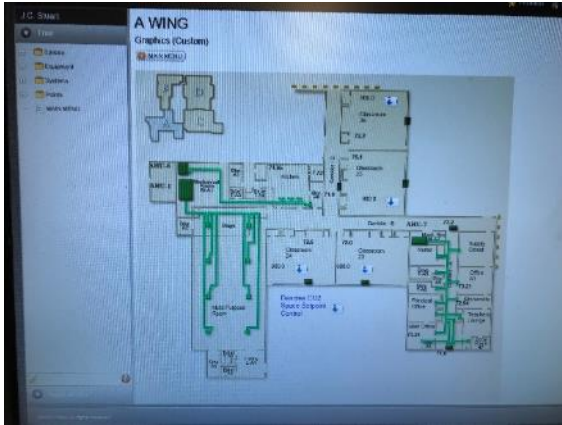
Air handling unit



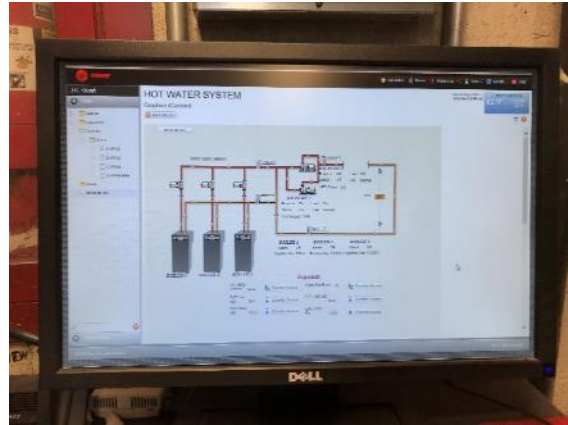
Unit ventilator

2.7 Building Energy Management Systems (EMS)

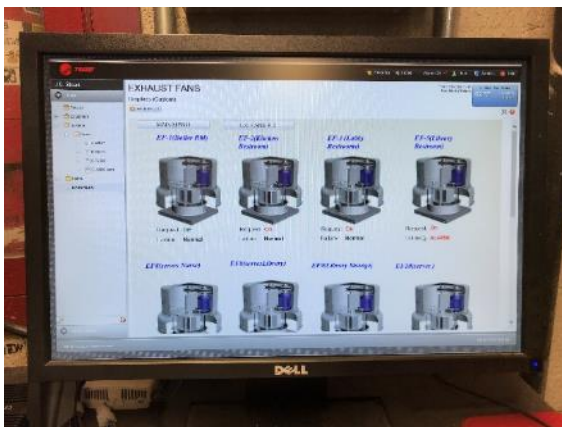
A Trane EMS controls the HVAC equipment, boilers, air handlers, motors, and the unit ventilators. The EMS provides equipment scheduling control, monitors and controls space temperatures, supply air temperatures, and heating water loop temperatures.



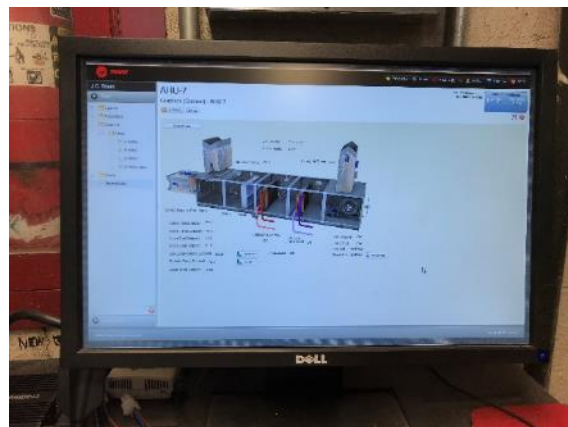
EMS – plans



EMS – boiler control



EMS – exhaust fans



EMS – AHU control

2.8 Domestic Hot Water

Hot water is produced with two 100 gallon, 199 MBh, 80% efficient gas-fired Bradford White storage water heaters. One was installed in 2008 and the other in 2008. The older unit has been evaluated for replacement.



2008 unit



2017 unit

2.9 Food Service and Refrigeration Equipment

The kitchen has all-electric equipment that is used to prepare or warm lunches for students. Most cooking is done using a convection oven. Equipment is standard high efficiency and in good condition.

There are two stand-up refrigerators with either solid or glass doors and a refrigerator chest in the kitchen. All equipment is standard efficiency and in good condition.

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



Refrigerator chest



Stand up solid door refrigerator



Oven



Glass door refrigerator

2.10 Plug Load & Vending Machines

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

There are approximately 153 computer work stations throughout the facility. Plug loads throughout the building include general café and office equipment. There are a couple of residential style refrigerators throughout the building that are used to store food by staff. These vary in condition and efficiency.

There is one refrigerated beverage vending machines, which is not equipped with occupancy-based controls.

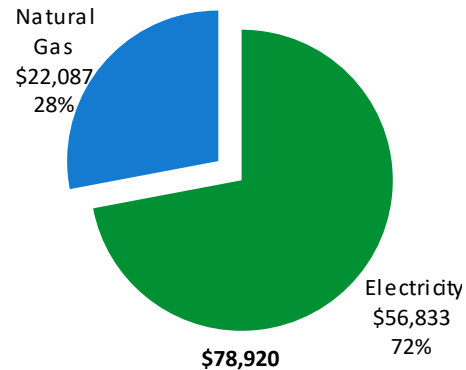
2.11 Water-Using Systems

There are 12 restrooms with faucet flow rates of 2.2 gallons per minute (gpm). Toilets are rated at 1.6 gallons per flush (gpf) and urinals are rated at 1.0 gpf.

3 ENERGY USE AND COSTS

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

Utility Summary		
Fuel	Usage	Cost
Electricity	417,951 kWh	\$56,833
Natural Gas	27,313 Therms	\$22,087
Total		\$78,920



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.

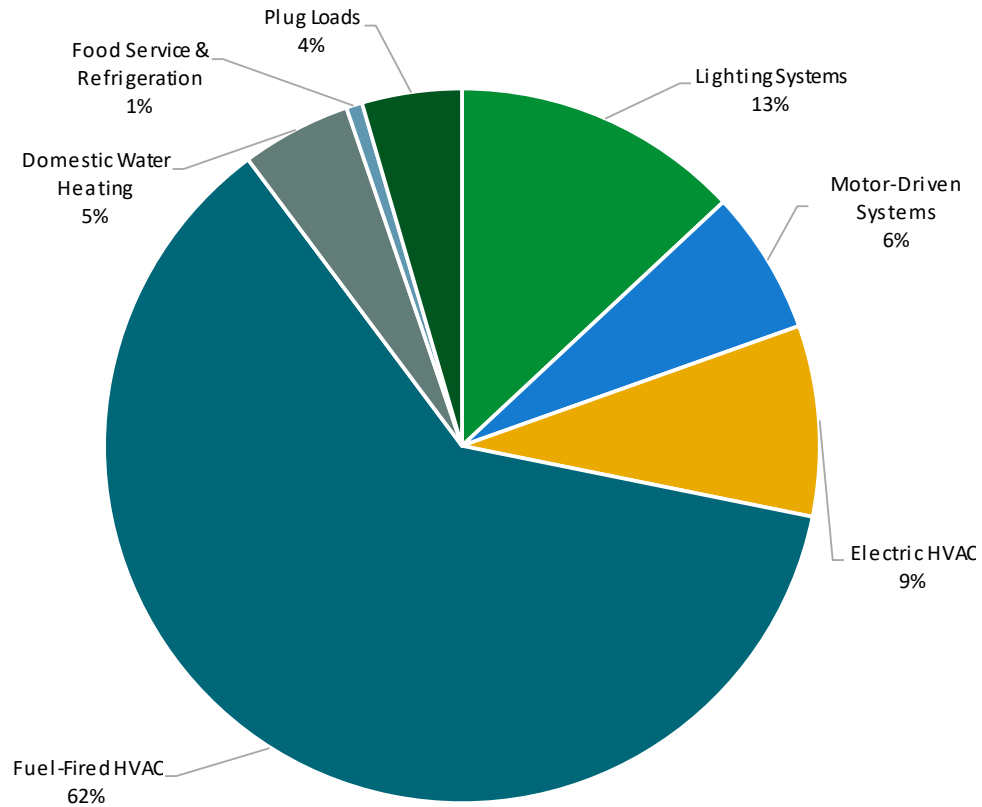
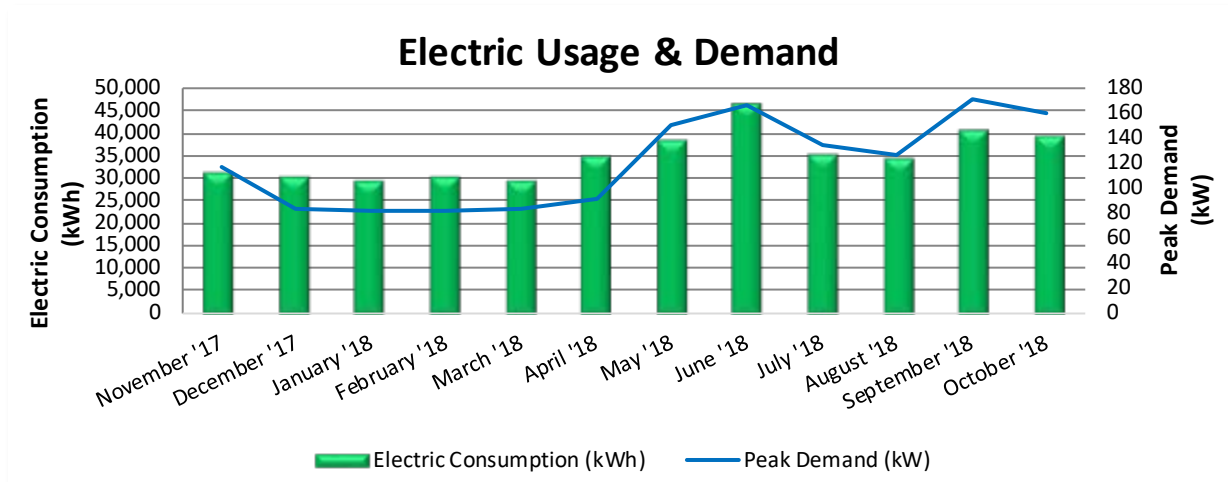


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class LPLS and BPL.



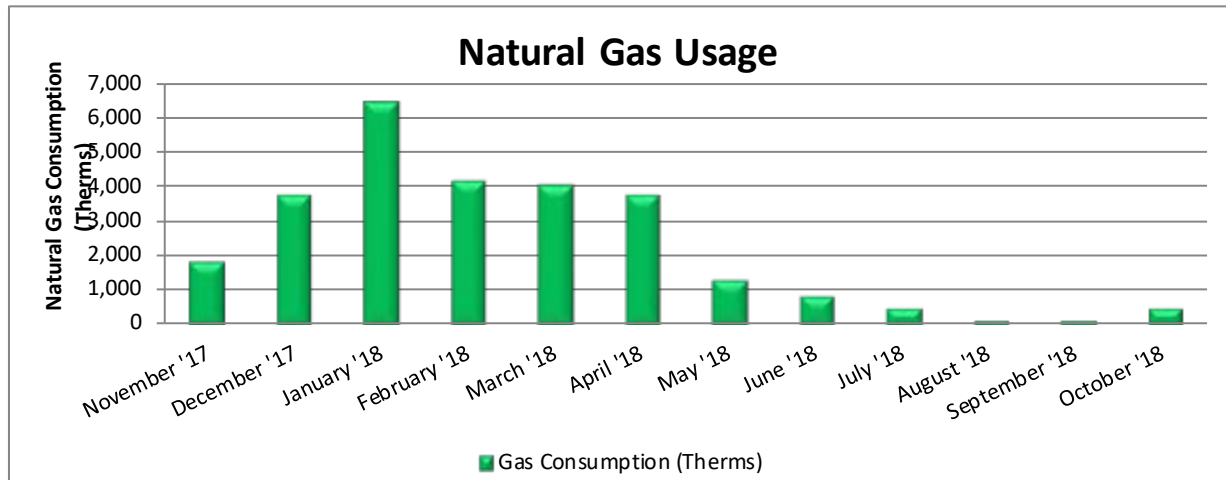
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
11/20/17	30	31,154	118	\$450	\$3,666
12/21/17	31	30,215	84	\$321	\$3,871
1/23/18	33	29,490	81	\$311	\$3,923
2/22/18	30	30,264	82	\$314	\$4,122
3/23/18	29	29,406	83	\$318	\$3,944
4/24/18	32	34,735	92	\$333	\$4,219
5/23/18	29	38,306	150	\$537	\$5,014
6/22/18	30	46,358	166	\$593	\$6,866
7/24/18	32	34,975	135	\$483	\$5,481
8/22/18	29	34,381	127	\$453	\$5,248
9/21/18	30	40,620	171	\$613	\$6,186
10/22/18	31	39,192	160	\$371	\$4,449
Totals	366	419,096	171	\$5,097	\$56,989
Annual	365	417,951	171	\$5,084	\$56,833

Notes:

- Peak demand of 171 kW occurred in September '18.
- Average demand over the past 12 months was 121 kW.
- The average electric cost over the past 12 months was \$0.136/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class LVG, with natural gas supply provided by Direct Energy, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
11/20/17	30	1,837	\$1,914
12/21/17	31	3,784	\$3,233
1/23/18	33	6,442	\$5,240
2/22/18	30	4,184	\$3,671
3/23/18	29	4,028	\$3,571
4/24/18	32	3,750	\$2,099
5/23/18	29	1,305	\$800
6/22/18	30	835	\$547
7/24/18	32	497	\$369
8/22/18	29	124	\$172
9/21/18	30	114	\$167
10/22/18	31	487	\$365
Totals	366	27,388	\$22,147
Annual	365	27,313	\$22,087

Notes:

- The average gas cost for the past 12 months is \$0.809/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.

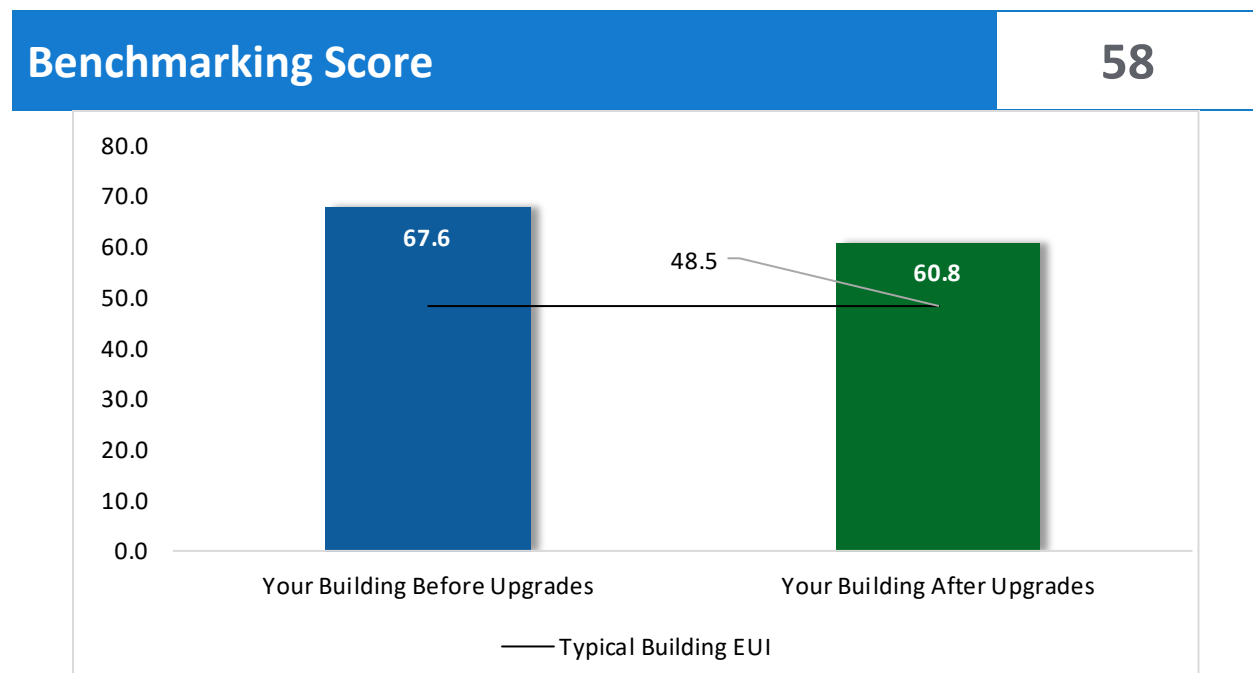


Figure 6 - Energy Use Intensity Comparison³

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 website⁴.

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

4 ENERGY CONSERVATION MEASURES

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades			91,592	25.9	-17	\$12,315	\$54,676	\$24,068	\$30,608	2.5	90,216
ECM 1	Install LED Fixtures	Yes	9,338	0.0	0	\$1,270	\$13,368	\$2,810	\$10,558	8.3	9,400
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	146	0.0	0	\$20	\$101	\$20	\$81	4.1	143
ECM 3	Retrofit Fixtures with LED Lamps	Yes	82,108	25.8	-17	\$11,026	\$41,207	\$21,238	\$19,969	1.8	80,673
Lighting Control Measures			21,584	6.7	-5	\$2,899	\$32,485	\$11,485	\$21,000	7.2	21,207
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	19,132	6.0	-4	\$2,569	\$27,310	\$6,510	\$20,800	8.1	18,798
ECM 5	Install High/Low Lighting Controls	Yes	2,452	0.8	-1	\$329	\$5,175	\$4,975	\$200	0.6	2,409
Variable Frequency Drive (VFD) Measures			11,591	3.4	0	\$1,576	\$16,244	\$1,600	\$14,644	9.3	11,672
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	7,322	2.9	0	\$996	\$5,375	\$1,600	\$3,775	3.8	7,373
ECM 7	Install VFDs on Heating Water Pumps	No	4,269	0.6	0	\$581	\$10,869	\$0	\$10,869	18.7	4,299
Domestic Water Heating Upgrade			0	0.0	14	\$115	\$11,500	\$1,393	\$10,107	88.1	1,661
ECM 8	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	14	\$115	\$11,500	\$1,393	\$10,107	88.1	1,661
Food Service & Refrigeration Measures			1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
ECM 9	Vending Machine Control	Yes	1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
TOTALS			126,379	36.2	-8	\$17,124	\$115,136	\$38,646	\$76,490	4.5	126,379

* - 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		91,592	25.9	-17	\$12,315	\$54,676	\$24,068	\$30,608	2.5	90,216
ECM 1	Install LED Fixtures	9,338	0.0	0	\$1,270	\$13,368	\$2,810	\$10,558	8.3	9,400
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	146	0.0	0	\$20	\$101	\$20	\$81	4.1	143
ECM 3	Retrofit Fixtures with LED Lamps	82,108	25.8	-17	\$11,026	\$41,207	\$21,238	\$19,969	1.8	80,673
Lighting Control Measures		21,584	6.7	-5	\$2,899	\$32,485	\$11,485	\$21,000	7.2	21,207
ECM 4	Install Occupancy Sensor Lighting Controls	19,132	6.0	-4	\$2,569	\$27,310	\$6,510	\$20,800	8.1	18,798
ECM 5	Install High/Low Lighting Controls	2,452	0.8	-1	\$329	\$5,175	\$4,975	\$200	0.6	2,409
Variable Frequency Drive (VFD) Measures		7,322	2.9	0	\$996	\$5,375	\$1,600	\$3,775	3.8	7,373
ECM 6	Install VFDs on Constant Volume (CV) Fans	7,322	2.9	0	\$996	\$5,375	\$1,600	\$3,775	3.8	7,373
Food Service & Refrigeration Measures		1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
ECM 9	Vending Machine Control	1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
TOTALS		122,110	35.7	-22	\$16,429	\$92,766	\$37,253	\$55,513	3.4	120,419

* - 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		91,592	25.9	-17	\$12,315	\$54,676	\$24,068	\$30,608	2.5	90,216
ECM 1	Install LED Fixtures	9,338	0.0	0	\$1,270	\$13,368	\$2,810	\$10,558	8.3	9,400
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	146	0.0	0	\$20	\$101	\$20	\$81	4.1	143
ECM 3	Retrofit Fixtures with LED Lamps	82,108	25.8	-17	\$11,026	\$41,207	\$21,238	\$19,969	1.8	80,673

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

ECM 1: Install LED Fixtures

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

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

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

Affected building areas: exterior fixtures; closet C2.

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: display case 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: areas with fluorescent fixtures with T8 tubes, CFLs, 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 ₂ e Emissions Reduction (lbs)
Lighting Control Measures		21,584	6.7	-5	\$2,899	\$32,485	\$11,485	\$21,000	7.2	21,207
ECM 4	Install Occupancy Sensor Lighting Controls	19,132	6.0	-4	\$2,569	\$27,310	\$6,510	\$20,800	8.1	18,798
ECM 5	Install High/Low Lighting Controls	2,452	0.8	-1	\$329	\$5,175	\$4,975	\$200	0.6	2,409

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 ₂ e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		11,591	3.4	0	\$1,576	\$16,244	\$1,600	\$14,644	9.3	11,672
ECM 6	Install VFDs on Constant Volume (CV) Fans	7,322	2.9	0	\$996	\$5,375	\$1,600	\$3,775	3.8	7,373
ECM 7	Install VFDs on Heating Water Pumps	4,269	0.6	0	\$581	\$10,869	\$0	\$10,869	18.7	4,299

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.

VAV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g. 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

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

Affected air handlers: AHU 1.

ECM 7: Install VFDs on Heating Water Pumps

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

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

Affected pumps: three 2 hp pumps.

4.4 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
	Domestic Water Heating Upgrade	0	0.0	14	\$115	\$11,500	\$1,393	\$10,107	88.1	1,661
ECM 8	Install High Efficiency Gas-Fired Water Heater	0	0.0	14	\$115	\$11,500	\$1,393	\$10,107	88.1	1,661

ECM 8: Install High Efficiency Gas-Fired Water Heater

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

4.5 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	1,623
ECM 9	Vending Machine Control	1,612	0.2	0	\$219	\$230	\$100	\$130	0.6	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 emissions⁵. 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.

Boiler Maintenance

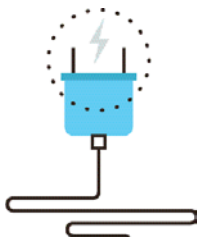
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is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

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 strips⁶. 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® website⁷ 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 **medium** potential for installing a PV array.

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

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

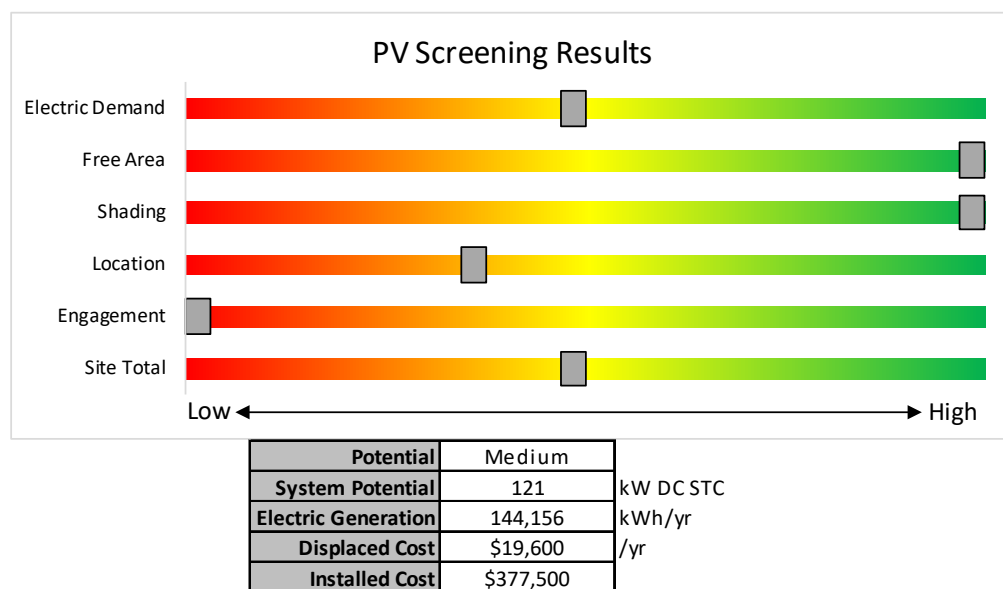


Figure 9 - Photovoltaic Screening

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

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

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec 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.

Low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

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

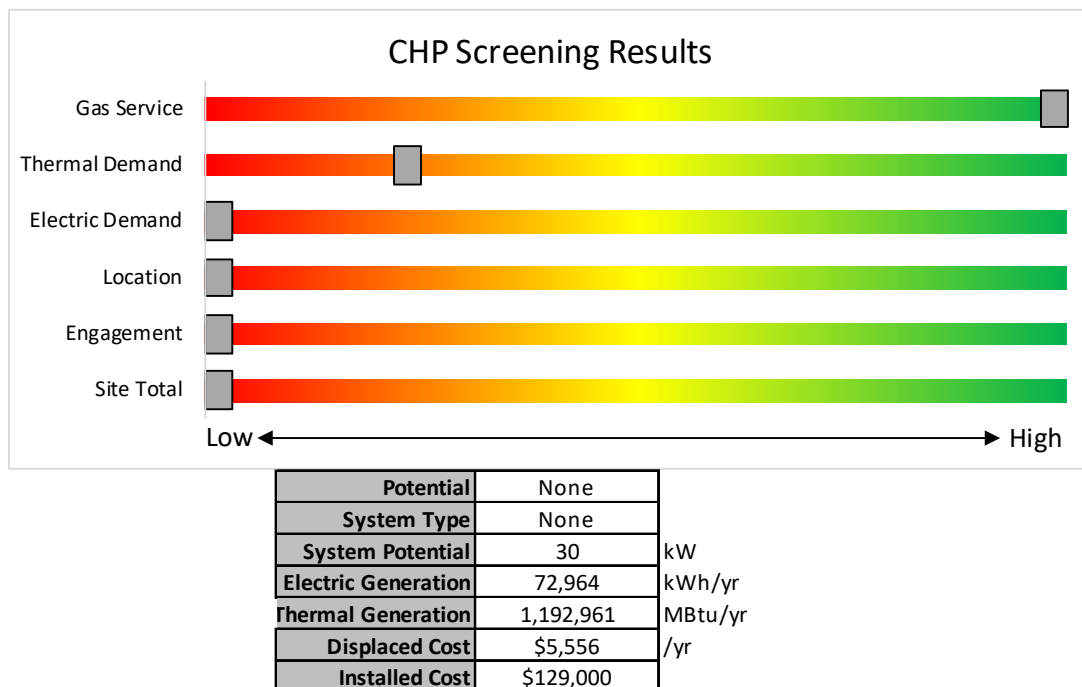


Figure 10 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

	SmartStart <i>Flexibility to install at your own pace</i>	Direct Install <i>Turnkey installation</i>	Pay for Performance <i>Whole building upgrades</i>
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.

Based on the site building and utility data provided, the facility does not meet the requirements of the current P4P program.

Incentives

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

How to Participate

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

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

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

7.4 Combined Heat and Power

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

Incentives

Eligible Technologies	Size (Installed Rated Capacity) ¹	Incentive (\$/kW)	% of Total Cost Cap per Project ³	\$ Cap per Project ³		
Powered by non-renewable or renewable fuel source ⁴	≤500 kW	\$2,000	30-40% ²	\$2 million		
Gas Internal Combustion Engine	>500 kW - 1 MW	\$1,000				
Gas Combustion Turbine	> 1 MW - 3 MW	\$550	30%	\$3 million		
Microturbine	>3 MW	\$350				
Fuel Cells with Heat Recovery						
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 website⁹.

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 website¹⁰.

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	
MPR Room	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	1.1	3,492	-1	\$469	\$2,125	\$930	2.5	
MPR Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0	
MPR Storage	2	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	13	1,449	0.0	42	0	\$6	\$150	\$4	26.1	
MPR exit	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,100	0.1	268	0	\$36	\$290	\$80	5.8	
MPR exit	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	
MPR women's	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	53	0	\$7	\$37	\$20	2.3	
MPR men's	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	53	0	\$7	\$37	\$20	2.3	
MPR closet	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	13	2,100	0.0	12	0	\$2	\$17	\$2	9.8	
Kitchen	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.2	776	0	\$104	\$562	\$230	3.2	
Kitchen	1	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	1	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	7	0	\$1	\$0	\$0	0.0	
Kitchen office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6	
Kitchen storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	194	0	\$26	\$343	\$40	11.6	
Kitchen	2	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.0	31	0	\$4	\$304	\$74	54.7	
Kitchen	1	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	1	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	7	0	\$1	\$0	\$0	0.0	
Kitchen restroom	2	Compact Fluorescent: Screw-in spiral	Wall Switch	S	13	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.0	31	0	\$4	\$304	\$4	71.3	
Kitchen storeroom	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0	
Kitchen storeroom	1	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3	
Kitchen Hall	2	LED Lamps: 10W	Wall Switch	S	10	2,100	5	None	Yes	2	LED Lamps: 10W	High/Low Control	10	1,449	0.0	14	0	\$2	\$225	\$140	44.2	
Kitchen Hall	2	LED - Fixtures: Ceiling Mount	Wall Switch	S	20	2,100	5	None	Yes	2	LED - Fixtures: Ceiling Mount	High/Low Control	20	1,449	0.0	29	0	\$4	\$225	\$140	22.1	
Hally by kitchen	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.1	291	0	\$39	\$335	\$270	1.7	
Boiler restroom	1	LED Lamps: 10W	Wall Switch	S	20	2,100		None	No	1	LED Lamps: 10W	Wall Switch	20	2,100	0.0	0	0	\$0	\$0	\$0	0.0	
Boiler room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.1	381	0	\$51	\$183	\$100	1.6	
Wallpack	4	Metal Halide: (1) 100W Lamp	Time Switch		128	400	1	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Time Switch	38	400	0.0	143	0	\$19	\$3,864	\$800	157.2	
Wall mount	9	Compact Fluorescent: 4-pin	Time Switch		18	400	3	Relamp	No	9	LED Lamps: LED A19-lamp	Time Switch	13	400	0.0	19	0	\$3	\$155	\$18	51.8	
Wall sconces	7	Compact Fluorescent: 4-pin	Time Switch		18	400	3	Relamp	No	7	LED Lamps: LED A19-lamp	Time Switch	13	400	0.0	15	0	\$2	\$121	\$14	51.8	

	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	
Roadway and Parking lot	10	High-Pressure Sodium: (1) 250W Lamp	Photocell		295	4,380	1	Fixture Replacement	No	10	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	89	4,380	0.0	9,045	0	\$1,230	\$9,306	\$2,000	5.9	
Ceiling mount	3	LED - Fixtures: Ceiling Mount	Time Switch		10	400		None	No	3	LED - Fixtures: Ceiling Mount	Time Switch	10	400	0.0	0	0	\$0	\$0	\$0	0.0	
Main office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	291	0	\$39	\$380	\$130	6.4	
Main office storage	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0	
Principal office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	388	0	\$52	\$416	\$150	5.1	
Pricipal restroom	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0	
Teacher's lounge	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.2	485	0	\$65	\$453	\$170	4.3	
Teacher's lounge copy room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6	
Teacher's lounge pantry	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	194	0	\$26	\$189	\$40	5.7	
Display case	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,100	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,100	0.0	40	0	\$5	\$18	\$10	1.5	
Men's restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	194	0	\$26	\$343	\$110	8.9	
Men's restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	S	33	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,449	0.0	26	0	\$3	\$33	\$12	6.0	
Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.2	582	0	\$78	\$489	\$190	3.8	
Custodian closet	1	Compact Fluorescent: screw-in spiral	Wall Switch	S	26	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	15	2,100	0.0	25	0	\$3	\$34	\$4	8.9	
Women's restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	194	0	\$26	\$343	\$110	8.9	
Women's restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,100	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,449	0.0	49	0	\$7	\$33	\$12	3.1	
Nurse office	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,100	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,100	0.0	129	0	\$17	\$73	\$40	1.9	
Nurse office restroom	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0	
Main hall	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,100	3, 5	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,449	0.1	305	0	\$41	\$335	\$285	1.2	
Main hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.1	388	0	\$52	\$371	\$305	1.3	
Main hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0	
Main supply closet	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.2	582	0	\$78	\$489	\$120	4.7	
Exit E09	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	152	0	\$20	\$73	\$40	1.6	
DB play	2	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	S	46	2,100	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,449	0.1	166	0	\$22	\$371	\$90	12.6	
Room 04	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7	

Existing 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 04	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 04 closet	1	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3
Closet 05	1	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3
Room 05	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 05	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 06	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 06	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 07	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 07	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 07 closet	1	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3
Library hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.1	291	0	\$39	\$335	\$270	1.7
Library men's	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	53	0	\$7	\$37	\$20	2.3
Library women's	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	53	0	\$7	\$37	\$20	2.3
Library	44	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	44	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	1.3	4,268	-1	\$573	\$2,687	\$1,160	2.7
Library	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
Librarian	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	388	0	\$52	\$416	\$150	5.1
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6
KG Hall	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.5	1,552	0	\$208	\$1,034	\$770	1.3
KG Hall	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 08	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 08	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 08 closet	1	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3
Paint storage art	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	13	2,100	0.0	12	0	\$2	\$17	\$2	9.8
Room 09	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 09	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3

	Existing Conditions						Proposed Conditions									Energy Impact & Financial Analysis							
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years		
1st quad	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.2	776	0	\$104	\$562	\$230	3.2		
Closet C6	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	13	2,100	0.0	12	0	\$2	\$17	\$2	9.8		
Girls restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	210	0	\$28	\$146	\$80	2.3		
Room 21	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,100	3, 4	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,449	0.3	1,016	0	\$136	\$905	\$340	4.1		
Room 10	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 10	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3		
Room 10 closet	1	Incandescent: 60W	Wall Switch	S	60	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	118	0	\$16	\$17	\$2	1.0		
Room 09	1	LED Lamps: 9W A-lamp	Wall Switch	S	9	2,100		None	No	1	LED Lamps: 9W A-lamp	Wall Switch	9	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Closet across 09	1	LED Lamps: 9W A-lamp	Wall Switch	S	9	2,100		None	No	1	LED Lamps: 9W A-lamp	Wall Switch	9	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Room 11	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 11	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3		
Room 22	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,449	0.3	1,067	0	\$143	\$923	\$350	4.0		
Room 22	2	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.1	249	0	\$33	\$34	\$4	0.9		
Closet D8	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Storage PTA	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6		
Boys restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	210	0	\$28	\$146	\$80	2.3		
Room 12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 12	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3		
Closet 07	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Room 13	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 13	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3		
Room 13 closet	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Exir E08	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6		
Quad 2nd hall	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.3	970	0	\$130	\$815	\$650	1.3		
Quad 2nd hall	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	\$0	\$0	\$0	0.0		

Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis									
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 14	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 14	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Closet D6	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Room 15	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 15	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Closet D5	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Room 16	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 16	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 16 closet	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Room 17	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 17 closet	1	Compact Fluorescent: 4-pin	Wall Switch	S	52	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	36	2,100	0.0	36	0	\$5	\$34	\$4	6.3
Room 17	1	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	1	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	7	0	\$1	\$0	\$0	0.0
Room 17	1	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	36	0	\$5	\$34	\$4	6.3
Exit E07	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6
Closet D4	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Room 18	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 18	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
Room 18 closet	1	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	15	2,100	0.0	25	0	\$3	\$34	\$4	8.9
Room 19	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 19	1	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.0	124	0	\$17	\$17	\$2	0.9
Room 19	2	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	72	0	\$10	\$69	\$8	6.3
PE storage	1	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	15	2,100	0.0	25	0	\$3	\$34	\$4	8.9
KG hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.2	776	0	\$104	\$517	\$385	1.3
KG hall	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
KG quad3 hall	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.3	970	0	\$130	\$815	\$650	1.3

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Closet D3	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	13	2,100	0.0	12	0	\$2	\$17	\$2	9.8		
Girls restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	210	0	\$28	\$146	\$80	2.3		
Room 20	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 20	3	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	108	0	\$15	\$103	\$12	6.3		
Closet D1	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Closet D2	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Room 21	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 21	3	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	108	0	\$15	\$103	\$12	6.3		
Boys restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	210	0	\$28	\$146	\$80	2.3		
Closet C2	1	Metal Halide: (1) 70W Lamp	Wall Switch	S	95	2,100	1	Fixture Replacement	No	1	LED - Fixtures: Other	Wall Switch	30	2,100	0.0	150	0	\$20	\$199	\$10	9.4		
01 closet	2	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	2	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	18	0	\$2	\$34	\$4	12.3		
PTA Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	97	0	\$13	\$307	\$20	22.0		
Room 02	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 02	3	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	108	0	\$15	\$103	\$12	6.3		
Closet C1	1	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	15	2,100	0.0	25	0	\$3	\$34	\$4	8.9		
Room 03	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7		
Room 03	3	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	108	0	\$15	\$103	\$12	6.3		
KG quad4	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.3	970	0	\$130	\$635	\$270	2.8		
KG quad4	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		
KG hallway	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.6	1,940	0	\$261	\$1,405	\$1,075	1.3		
KG 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		
Mech closet	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0		
Room 23	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.8	2,619	-1	\$352	\$1,796	\$750	3.0		
Room 23	3	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	108	0	\$15	\$103	\$12	6.3		
23 restroom	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	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 24	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.8	2,619	-1	\$352	\$1,526	\$680	2.4
Room 24	3	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	108	0	\$15	\$103	\$12	6.3
Room 24	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	97	0	\$13	\$37	\$20	1.3
Hall by MPR	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.3	1,067	0	\$143	\$852	\$670	1.3
Hall by MPR	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
Room 25	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.7	2,328	0	\$313	\$1,416	\$620	2.5
Room 25	2	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.1	249	0	\$33	\$34	\$4	0.9
Room 25 closet	1	Compact Fluorescent: Screw-in Spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3
Room 25 closet2	1	Incandescent: 60W	Wall Switch	S	60	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	118	0	\$16	\$17	\$2	1.0
Room 25 restroom	2	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	2	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	14	0	\$2	\$270	\$0	140.4
Room 26	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 26 closet	3	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.1	373	0	\$50	\$168	\$6	3.2
Room 26 restroom	2	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	2	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	14	0	\$2	\$270	\$0	140.4
Back foyer	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6
Custodian closet	2	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	2	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	14	0	\$2	\$116	\$0	60.3
Custodian storage	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Custodian storage	1	Compact Fluorescent: screw-in spiral	Wall Switch	S	13	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	9	0	\$1	\$17	\$2	12.3
Office B1	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,100	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,449	0.2	513	0	\$69	\$489	\$190	4.3
Office B1 closet	1	Incandescent: 60W	Wall Switch	S	60	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	9	2,100	0.0	118	0	\$16	\$17	\$2	1.0
Room 28 office	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,100	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,449	0.4	1,367	0	\$184	\$854	\$390	2.5
Music storage	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3	Relamp	No	1	LED Lamps: LED A19-lamp	Wall Switch	13	2,100	0.0	12	0	\$2	\$17	\$2	9.8
Women's restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	53	0	\$7	\$37	\$20	2.3
Men's restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.0	53	0	\$7	\$37	\$20	2.3
Room 27	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	194	0	\$26	\$73	\$40	1.3
Room 27	3	LED Lamps: 10W	Wall Switch	S	20	2,100	4	None	Yes	3	LED Lamps: 10W	Occupancy Sensor	20	1,449	0.0	43	0	\$6	\$270	\$70	34.7

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
Exit E04	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6
Custodian storage	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Room 29 Prek	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 29 Prek	1	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	1	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	7	0	\$1	\$270	\$70	208.0
Room 29 Prek	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	13	1,449	0.0	21	0	\$3	\$17	\$2	5.4
Room 29 Prek	1	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.0	124	0	\$17	\$17	\$2	0.9
Boys restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	210	0	\$28	\$146	\$80	2.3
Girls restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,449	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.1	210	0	\$28	\$146	\$80	2.3
Prek Room 30	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Prek Room 30	1	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	13	1,449	0.0	21	0	\$3	\$17	\$2	5.4
Prek Room 30	1	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.0	124	0	\$17	\$17	\$2	0.9
Room 31	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 31 closet	2	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	2	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	14	0	\$2	\$116	\$0	60.3
Room 31	2	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	2	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	14	0	\$2	\$270	\$70	104.0
Room 32	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 32	4	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	4	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	29	0	\$4	\$0	\$0	0.0
Prek hall	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.5	1,746	0	\$234	\$1,332	\$1,035	1.3
Prek hall	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
Exit E05	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,100	0.0	76	0	\$10	\$37	\$20	1.6
Room 33	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 33	3	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3, 4	Relamp	Yes	3	LED Lamps: LED A19-lamp	Occupancy Sensor	13	1,449	0.0	63	0	\$8	\$52	\$6	5.4
33 restroom	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	0.0	0	0	\$0	\$0	\$0	0.0
Room 34	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 34	2	Compact Fluorescent: Screw-in spiral	Wall Switch	S	18	2,100	3, 4	Relamp	Yes	2	LED Lamps: LED A19-lamp	Occupancy Sensor	13	1,449	0.0	42	0	\$6	\$34	\$4	5.4
Room 34 restroom	1	LED Lamps: 10W	Wall Switch	S	10	2,100		None	No	1	LED Lamps: 10W	Wall Switch	10	2,100	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 35	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 35	3	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	3	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	21	0	\$3	\$0	\$0	0.0
Room 36	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,449	0.6	2,037	0	\$274	\$1,307	\$560	2.7
Room 36	1	LED Lamps: 10W	Wall Switch	S	10	2,100	4	None	Yes	1	LED Lamps: 10W	Occupancy Sensor	10	1,449	0.0	7	0	\$1	\$0	\$0	0.0
Room 36	1	Compact Fluorescent: Screw-in spiral (2)	Wall Switch	S	26	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	15	1,449	0.0	36	0	\$5	\$34	\$4	6.3
Room 36	1	Incandescent: 60W	Wall Switch	S	60	2,100	3, 4	Relamp	Yes	1	LED Lamps: LED A19-lamp	Occupancy Sensor	9	1,449	0.0	124	0	\$17	\$17	\$2	0.9
Back hall	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,100	3, 5	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,449	0.3	970	0	\$130	\$815	\$650	1.3
Back hall	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

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	EF - 1,2,3,4,5,6,7,10,11,14	10	Exhaust Fan	0.2	60.0%	No	W	2,400		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Roof	EF-8,9,12,13	4	Exhaust Fan	0.3	60.0%	No	W	2,400		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Roof	Main office	1	Supply Fan	0.5	70.0%	No	W	2,400		No	70.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler room	AHU-6	1	Supply Fan	1.5	86.5%	No	W	2,400		No	86.5%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler room	P-4,5	2	Heating Hot Water Pump	10.0	91.7%	Yes	W	2,200		No	91.7%	No		0.0	0	0	\$0	\$0	\$0	0.0
Boiler room	AHU-1	1	Supply Fan	10.0	91.7%	No	W	2,400	6	No	91.7%	Yes	1	2.9	7,322	0	\$996	\$5,375	\$1,600	3.8
Boiler room	P-1,2,3 Boiler pumps	3	Heating Hot Water Pump	2.0	86.5%	No	W	2,200	7	No	86.5%	Yes	3	0.6	4,269	0	\$581	\$10,869	\$0	18.7
Classrooms	Unit ventilators	38	Supply Fan	0.1	60.0%	No	W	2,400		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Closet C6	AHU-4	1	Supply Fan	1.5	74.0%	No	W	2,400		No	74.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Closet D8	AHU-3	1	Supply Fan	0.8	74.0%	No	W	2,400		No	74.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Closet D3	AHU-2	1	Supply Fan	0.8	74.0%	No	W	2,400		No	74.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Closet C2	AHU-5	1	Supply Fan	0.8	74.0%	No	W	2,400		No	74.0%	No		0.0	0	0	\$0	\$0	\$0	0.0
Mech closet	AHU-7	1	Supply Fan	5.0	89.5%	No	W	2,400		No	89.5%	No		0.0	0	0	\$0	\$0	\$0	0.0
Recessed ceiling	CUH 1-11	6	Supply Fan	0.1	60.0%	No	W	2,400		No	60.0%	No		0.0	0	0	\$0	\$0	\$0	0.0

Electric HVAC Inventory & Recommendations

		Existing Conditions						Proposed Conditions						Energy Impact & Financial Analysis							
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Main office	1	Split-System AC	7.50		W		No							0.0	0	0	\$0	\$0	\$0	0.0
Roof	Main office	1	Electric Resistance Heat		6.80	W		No							0.0	0	0	\$0	\$0	\$0	0.0
Roof	CU-3	4	Split-System AC	3.00		W		No							0.0	0	0	\$0	\$0	\$0	0.0
Outdoor	CU-1	1	Split-System AC	28.92		W		No							0.0	0	0	\$0	\$0	\$0	0.0
Classrooms	Classrooms	17	Window AC	2.00		W		No							0.0	0	0	\$0	\$0	\$0	0.0
Classrooms	Classrooms	17	Window AC	2.00		W		No							0.0	0	0	\$0	\$0	\$0	0.0
Classrooms	Room 27	1	Split-System AC	2.00		W		No							0.0	0	0	\$0	\$0	\$0	0.0

Fuel Heating Inventory & Recommendations

		Existing Conditions				Proposed Conditions						Energy Impact & Financial Analysis							
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	B 1,2,3	3	Condensing Hot Water Boiler	#####	W		No						0.0	0	0	\$0	\$0	\$0	0.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantit y	System Type	Remaining Useful Life	ECM #	Replace?	System Quantit y	System Type	Fuel Type	System Efficiency	Efficienc y Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	DHW-1	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	\$0	\$0	\$0	0.0
Boiler room	DHW-2	1	Storage Tank Water Heater (> 50 Gal)	B	8	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	93.00%	Et	0.0	0	14	\$115	\$11,500	\$1,393	88.1

Commercial Refrigerator/Freezer Inventory & Recommendations

Existing Conditions				Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Refrigerator Chest	Yes		No	0.0	0	0	\$0	\$0	\$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes		No	0.0	0	0	\$0	\$0	\$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Yes		No	0.0	0	0	\$0	\$0	\$0	0.0

Cooking Equipment Inventory & Recommendations

Existing Conditions				Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipment?	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	Electric Convection Oven (Half Size)	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 ?
J.C.Stuart ES	153	Computer desktop	145.0	Yes
J.C.Stuart ES	10	Chrome carts	40.0	Yes
J.C.Stuart ES	2	Servers	1,200.0	Yes
J.C.Stuart ES	1	Laptop	75.0	Yes
J.C.Stuart ES	43	Printer - Small	60.0	Yes
J.C.Stuart ES	2	Printer - Medium	80.0	Yes
J.C.Stuart ES	4	Printer - Big	200.0	Yes
J.C.Stuart ES	1	Paper shredder	200.0	Yes
J.C.Stuart ES	15	Projector	400.0	Yes
J.C.Stuart ES	3	Microwave	900.0	Yes
J.C.Stuart ES	2	Refrigerator - Small	70.0	Yes
J.C.Stuart ES	2	Refrigerator - Large	220.0	Yes
J.C.Stuart ES	1	Coffee Machine	400.0	Yes
J.C.Stuart ES	1	Toaster oven	1,200.0	Yes
J.C.Stuart ES	3	Portable fan	70.0	Yes
J.C.Stuart ES	1	Television - CRT/DLP	120.0	Yes
J.C.Stuart ES	2	Hot/Cold Water dispenser	520.0	Yes
J.C.Stuart ES	2	Standing fan	80.0	Yes
J.C.Stuart ES	30	Smart TV	70.0	Yes
J.C.Stuart ES	1	Smart boards	5.0	Yes
J.C.Stuart ES	1	Table lamp	18.0	Yes
J.C.Stuart ES	2	Steam serving table	1,000.0	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
Faculty lounge	1	Refrigerated	9	Yes	0.2	1,612	0	\$219	\$230	\$100	0.6

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®
Score¹

J. Cresswell Stuart Early Childhood Development Center

Primary Property Type: K-12 School
Gross Floor Area (ft²): 61,459
Built: 1958

For Year Ending: September 30, 2018
Date Generated: December 11, 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 J. Cresswell Stuart Early Childhood Development Center 70 Sunset Road Willingboro, New Jersey 08046	Property Owner Willingboro School District 440 Beverly Rancocas Rd Willingboro, NJ 08046 (609) 835-8600	Primary Contact NJ Clean Energy LGEA Program 900 ROUTE 9 NORTH SUITE 404 WOODBIDGE, NJ 07095 732-855-2864 amiller@trcsolutions.com
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Property ID: 7956692

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel		National Median Comparison	
66.9 kBtu/ft²	Natural Gas (kBtu)	2,712,113 (66%)	National Median Site EUI (kBtu/ft²)	72.6
	Electric - Grid (kBtu)	1,400,159 (34%)	National Median Source EUI (kBtu/ft²)	119.5
			% Diff from National Median Source EUI	-8%
Source EUI	Annual Emissions			
110.1 kBtu/ft²	Greenhouse Gas Emissions (Metric Tons CO2e/year)		286	

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

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

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