Local Government Energy Audit:
Energy Audit Report

Campbell Elementary School

24 Durham Avenue

Metuchen, NJ 08840

Metuchen Board of Education

February 8, 2019

Final Report by:

TRC Energy Services

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 Energy Services (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. We encourage the owner of the facility is encouraged 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.

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

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

Table of Contents

1 Executive Summary 1

1.1 Facility Summary 1
1.2 Your Cost Reduction Opportunities 1

Energy Conservation Measures 1
Energy Efficient Practices 3
On-Site Generation Measures 3

1.3 Implementation Planning 4

2 Facility Information and Existing Conditions 6

2.1 Project Contacts 6
2.2 General Site Information 6
2.3 Building Occupancy 6
2.4 Building Envelope 7
2.5 On-Site Generation 7
2.6 Energy-Using Systems 7

Lighting System 8
Hot Water Heating System 8
Direct Expansion Air Conditioning (AC) System (DX) 9
Domestic Hot Water Heating System 10
Food Service Equipment 10
Building Plug Load 10

2.7 Water-Using Systems 11

3 Site Energy Use and Costs 12

3.1 Total Cost of Energy 12
3.2 Electricity Usage 13
3.3 Natural Gas Usage 14
3.4 Benchmarking 15
3.5 Energy End-Use Breakdown 16

4 Energy Conservation Measures 17

4.1 Recommended ECMs 17
4.1.1 Lighting Upgrades 18

ECM 1: Install LED Fixtures 18
ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers 19
ECM 3: Retrofit Fixtures with LED Lamps 19
ECM 4: Install LED Exit Signs 20

4.1.2 Lighting Control Measures 21

ECM 5: Install Occupancy Sensor Lighting Controls 21
ECM 6: Install High/Low Lighting Controls 22

4.1.3 Motor Upgrades 23

ECM 7: Premium Efficiency Motors 23

4.1.4 Variable Frequency Drive (VFD) Measures 24
ECM 8: Install VFDs on Constant Volume (CV) HVAC 24
ECM 9: Install VFDs on Hot Water Pumps 25
4.2 ECMs Evaluated But Not Recommended 26
Install High Efficiency Air Conditioning Units 26
5 Energy Efficient Practices 27
Reduce Air Leakage 27
Close Doors and Windows 27
Use Window Treatments/Coverings 27
Perform Proper Lighting Maintenance 27
Develop a Lighting Maintenance Schedule 27
Ensure Lighting Controls Are Operating Properly 28
Perform Routine Motor Maintenance 28
Use Fans to Reduce Cooling Load 28
Practice Proper Use of Thermostat Schedules and Temperature Resets 28
Ensure Economizers are Functioning Properly 28
Clean Evaporator/Condenser Coils on AC Systems 28
Clean and/or Replace HVAC Filters 29
Check for and Seal Duct Leakage 29
Perform Proper Boiler Maintenance 29
Perform Proper Water Heater Maintenance 29
Plug Load Controls 29
Water Conservation 30
6 On-Site Generation Measures 31
6.1 Photovoltaic 32
6.2 Combined Heat and Power 33
7 Demand Response 34
8 Project Funding / Incentives 35
8.1 SmartStart 36
8.2 Direct Install 37
8.3 SREC Registration Program 37
8.4 Energy Savings Improvement Program 38
9 Energy Purchasing and Procurement Strategies 39
9.1 Retail Electric Supply Options 39
9.2 Retail Natural Gas Supply Options 39

Appendix A: Equipment Inventory & Recommendations

Appendix B: ENERGY STAR® Statement of Energy Performance

Table of Figures

Figure 1 – Previous 12 Month Utility Costs 1
Figure 2 – Potential Post-Implementation Costs 1
Figure 3 – Summary of Energy Reduction Opportunities 2
Figure 4 – Project Contacts 6
Figure 5 - Building Schedule 6
Figure 6 - Utility Summary 12
Figure 7 - Energy Cost Breakdown 12
Figure 8 - Electric Usage & Demand 13
Figure 9 - Electric Usage & Demand 13
Figure 10 - Natural Gas Usage 14
Figure 11 - Natural Gas Usage 14
Figure 12 - Energy Use Intensity Comparison – Existing Conditions 15
Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures 15
Figure 14 - Energy Balance (% and kBtu/SF) 16
Figure 15 – Summary of Recommended ECMs 17
Figure 16 – Summary of Lighting Upgrade ECMs 18
Figure 17 – Summary of Lighting Control ECMs 21
Figure 18 – Summary of Premium Efficiency Motor ECMs 23
Figure 19 – Summary of Variable Frequency Drive ECMs 24
Figure 20 – Summary of Measures Evaluated, But Not Recommended 26
Figure 21 - Photovoltaic Screening 32
Figure 22 - Combined Heat and Power Screening 33
Figure 23 - ECM Incentive Program Eligibility 35

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Campbell Elementary School.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey public schools in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Campbell Elementary School is a 57,768 square foot facility comprised of various space types including classrooms, offices, a gymnasium, library, small commercial kitchen and various storage and mechanical spaces.

Lighting at Campbell Elementary School consists of aging and inefficient fluorescent lighting and some incandescent lamps. Heating is supplied by hot water boilers. Cooing is supplied by various packaged, split-system, and ductless mini-split ACs. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 10 measures and recommends nine measures which together represent an opportunity for Campbell Elementary School to reduce annual energy costs by $24,177 and annual greenhouse gas emissions by 178,457 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 3.3 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Campbell Elementary School's annual energy use by 10%.

Figure 1 – Previous 12 Month Utility Costs

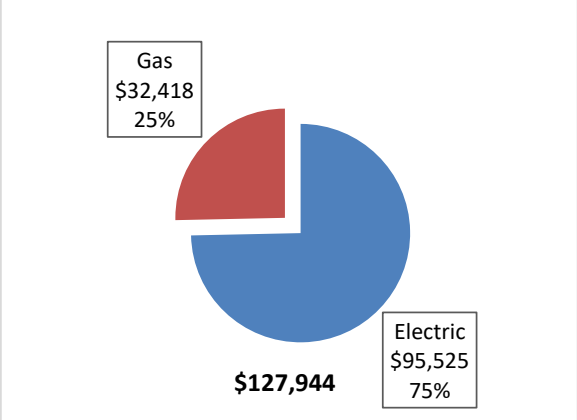
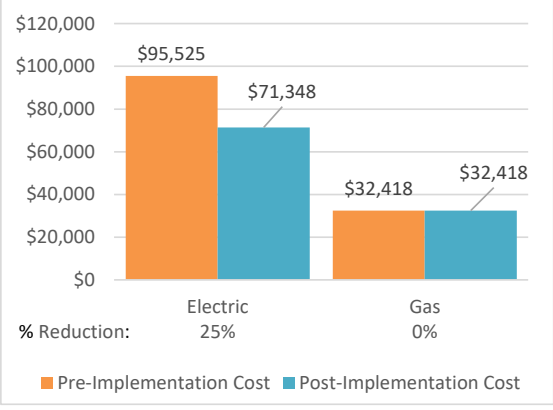


Figure 2 – Potential Post-Implementation Costs



A detailed description of Campbell Elementary School's existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**128,224**	**23.3**	**0.0**	**$17,493.12**	**$50,525.61**	**$11,440.00**	**$39,085.61**	**2.2**	**129,120**
ECM 1	Install LED Fixtures	Yes	3,854	0.5	0.0	$525.84	$3,863.86	$400.00	$3,463.86	6.6	3,881
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	86	0.1	0.0	$11.75	$137.55	$20.00	$117.55	10.0	87
ECM 3	Retrofit Fixtures with LED Lamps	Yes	124,178	22.7	0.0	$16,941.18	$46,451.79	$11,020.00	$35,431.79	2.1	125,046
ECM 4	Install LED Exit Signs	Yes	105	0.0	0.0	$14.34	$72.42	$0.00	$72.42	5.0	106
Lighting Control Measures			**25,148**	**4.4**	**0.0**	**$3,430.79**	**$24,348.00**	**$2,520.00**	**$21,828.00**	**6.4**	**25,323**
ECM 5	Install Occupancy Sensor Lighting Controls	Yes	19,866	3.7	0.0	$2,710.22	$20,948.00	$2,520.00	$18,428.00	6.8	20,005
ECM 6	Install High/Low Lighitng Controls	Yes	5,282	0.8	0.0	$720.57	$3,400.00	$0.00	$3,400.00	4.7	5,319
Motor Upgrades			**673**	**0.2**	**0.0**	**$91.86**	**$2,307.58**	**$0.00**	**$2,307.58**	**25.1**	**678**
ECM 7	Premium Efficiency Motors	Yes	673	0.2	0.0	$91.86	$2,307.58	$0.00	$2,307.58	25.1	678
Variable Frequency Drive (VFD) Measures			**23,174**	**4.8**	**0.0**	**$3,161.49**	**$18,034.00**	**$1,800.00**	**$16,234.00**	**5.1**	**23,336**
ECM 8	Install VFDs on Constant Volume (CV) HVAC	Yes	11,173	3.0	0.0	$1,524.23	$10,820.40	$1,800.00	$9,020.40	5.9	11,251
ECM 9	Install VFDs on Hot Water Pumps	Yes	12,001	1.8	0.0	$1,637.26	$7,213.60	$0.00	$7,213.60	4.4	12,085
Electric Unitary HVAC Measures			**6,851**	**4.1**	**0.0**	**$934.61**	**$26,233.11**	**$1,518.00**	**$24,715.11**	**26.4**	**6,899**
	Install High Efficiency Electric AC	No	6,851	4.1	0.0	$934.61	$26,233.11	$1,518.00	$24,715.11	26.4	6,899
TOTALS FOR HIGH PRIORITY MEASURES			**177,218**	**32.8**	**0.0**	**$24,177.26**	**$95,215.19**	**$15,760.00**	**$79,455.19**	**3.3**	**178,457**
TOTALS FOR ALL EVALUATED MEASURES			**184,069**	**36.8**	**0.0**	**$25,111.87**	**$121,448.30**	**$17,278.00**	**$104,170.30**	**4.1**	**185,356**

* - All incentives presented in this table are based on NJ Smart Start Building 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).

Lighting Upgrades generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measures save energy by reducing the power used by the lighting components due to improved electrical efficiency.

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when not needed. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Motor Upgrades generally involve replacing older standard efficiency motors with high efficiency standard (NEMA Premium®). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient that usage a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

Energy Efficient Practices

TRC also identified 17 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Campbell Elementary School include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

For details on these Energy Efficient Practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Campbell Elementary School. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

For details on our evaluation and on-site generation potential, please refer to Section 6.

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Direct Install
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)

For facilities wanting 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 in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

This facility may also qualify for the Direct Install program which can provide 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, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (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. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce 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. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage 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 DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located in Section 8. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Michael Havier	Business Administrator	maharvier@metboe.k12.nj.us	732-321-8700 ext. 1011
Designated Representative			
Gerard Redmond	Maintenance Supervisor	N/A	732-261-7311
TRC Energy Services			
Alexander Klieverik	Auditor	aklieverik@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On August 16, 2018, TRC performed an energy audit at Campbell Elementary School located in Metuchen, New Jersey. TRC's team met with Gerard Redmond, Maintenance Supervisor to review the facility operations and help focus our investigation on specific energy-using systems.

Campbell Elementary School is a 57,768 square foot facility comprised of various space types including classrooms, offices, a gymnasium, library, small commercial kitchen and various storage and mechanical spaces.

The building was constructed in 1950. Over the last five years the facility has replaced all of its existing T12 fluorescent fixtures with T8 fluorescent fixtures.

2.3 Building Occupancy

The building is open Monday through Friday as well as some weekends. The typical schedule is presented in the table below. During a typical day, the facility is occupied by 100 staff and 681 students.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Campbell Elementary School	Weekday	6:30 AM to 9:00 PM
Campbell Elementary School	Weekend	As needed

2.4 Building Envelope

The building is constructed of concrete block and structural steel with a brick facade. The building has flat roof sections covered with black membrane, and some pitched roof sections that are in fair condition. The buildings have double-pane windows which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of aluminum and in good condition except that some door seals have worn out which increases the level of outside air infiltration.

2.5 On-Site Generation

Campbell Elementary School does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

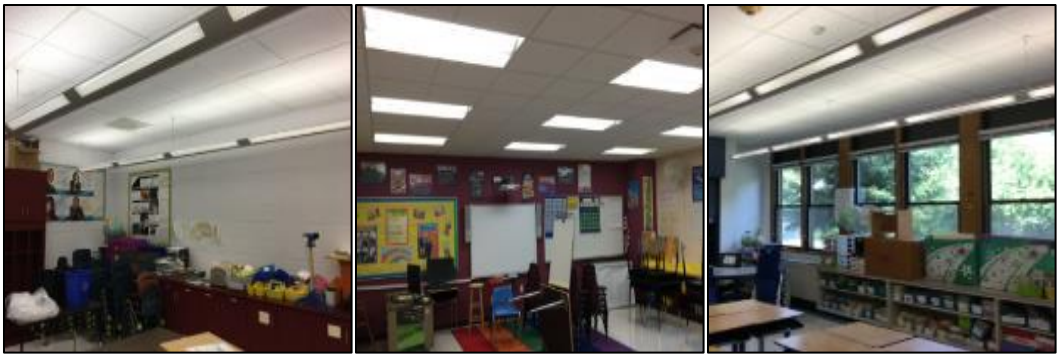
Lighting System

Lighting at the facility is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent (CFL), and incandescent lamps. Most of the fluorescent fixtures are 2-lamp or 4-lamp, 4-foot long troffers with diffusers.

The library is primarily lit with fluorescent T8 U-lamps in recessed ceiling fixtures.

Lighting control throughout the building is provided by wall switches and occupancy sensors. The occupancy sensors are located in 18 classrooms and four restrooms, and are either wall or ceiling-mounted depending on the space layout. Stairwells, elevator lobbies and main lobby areas do not contain any occupancy sensors and are on while the building is open.

The building's exterior lighting consists primarily of plug-in compact fluorescent (CFL) fixtures that are manually controlled by wall switches. There are also some screw-in incandescent fixtures, high pressure sodium wall packs, and metal halide fixtures.



Hot Water Heating System

The hot water system consists of three Fulton 1,850 MBh output, condensing boilers. The boilers have a nominal combustion efficiency of 92.5%. The hot water heating system is configured in a constant flow primary distribution with two 7.5 HP hot water pumps. Hot water is supplied at 180°F when the outside air temperature is below 55°F and the setpoint is reset to 165°F when the outside air is above 60°F. The boilers provide hot water to the gymnasium rooftop air handlers and the perimeter unit ventilators.

The boilers operate in a lead/lag configuration. Both boilers may be required during cold weather. The lead boiler is rotated weekly.

The boilers are in good condition and well maintained.

Direct Expansion Air Conditioning (AC) System (DX)

Four mini-split ductless heat pumps, and two cooling only mini-split air ACs are used to condition the server room and classrooms 26A, 26B, 22, and 21. The server room unit is located on the roof of the building and the others are located on the ground outside the classrooms. Three units have a cooling capacity of 9,000 Btu/hr and a heating capacity of 10 kBtu/hr with a COP of 4.0. The other unit has a cooling capacity of 18,000 Btu/hr and a heating capacity of 10 kBtu/hr with a COP of 4.0. Classrooms 21 and 22 are served by two cooling-only mini-split ACs, each with a capacity of 9,000 Btu/hr.



There are three AAON direct-expansion (DX) package units with outside air economizers used to condition the library, faculty room, main office and classrooms 34, 35, and 43. The units are located on the roof of the building and provide constant air volume. The library, faculty room, and classroom 43 are supplied by a 20-ton unit with a single 7.5 hp supply fan and a 3 hp return fan. The main office is supplied by a 6-ton unit with a single 2 hp supply fan and a 1 hp return fan. Classrooms 34 and 35 are supplied by a 2-ton packaged unit with a 0.5 HP supply fan. All the packaged units utilize a scroll compressor and a DX coil. The units have outside air economizers to utilize free cooling when the outside air temperature is lower than the return air temperature.



The packaged units are controlled by programmable thermostats located in the spaces they serve. The thermostats are set to maintain a setpoint of 74°F from 7:00 AM to 5:00 PM every day.

There are six cooling-only split system ACs are used to condition the special services suite, nurse's office, classrooms 10, 15, 33, and 107. The fan and evaporator are located in the recessed ceilings of the space. The compressor and condensing unit are located on the roof or the ground adjacent to the space. The units provide constant air volume and have a capacity of 2, 3, or 3.5 tons. The units utilize a scroll compressor and a direct-expansion (DX) coil.

The split-system units are manually controlled by a thermostat located in zone. The unit operates on demand to maintain a space temperature setpoint around 75°F (adjustable by staff). The unit may operate when the space is occupied Monday through Friday and occasionally on weekends.

Domestic Hot Water Heating System

The domestic hot water heating system for the main part of the facility consists of one A.O. Smith gas-fired condensing hot water heater with an input rating of 199 kBtu/hr each and a nominal efficiency of 80%. The water heater has an 81-gallon storage tank. Two ¼ HP recirculation pumps distribute 120°F water to the entire site except the kitchen, garage, and two classrooms. The recirculation pumps operate based on an aquastat.

The kitchen, garage, and two classrooms have individual electric water heaters with various input and storage capacities. The kitchen is served by an A.O. Smith unit with 3 kW input and 15-gallon capacity. The garage is served by an A.O. Smith unit with 4.5 kW input and 40-gallon capacity. Classroom 21 is served by a Vanguard unit with 2.5 kW input and 6-gallon capacity. Classroom 104 is served by an A.O. Smith unit with 6 kW input and 10-gallon capacity.

Food Service Equipment

The school has a small kitchen that is used to prepare lunches for the students. The cooking is done at the high school and brought to Campbell School to be warmed using gas-fired steamer trays. There are also two refrigerator chests, two freezer chests, and one large 30 cu. ft. stand-up freezer.

Building Plug Load

There are 130 computer work stations with LCD monitors throughout the facility. There is no centralized PC power management software installed.

There are 180 Chromebook laptops, 13 desk printers, 13 projectors, 30 smartboards, 11 microwave ovens, ten compact refrigerators, 20 LCD TVs, three photocopiers, and one server closest throughout the facility. The server room is served by a ductless mini-split AC unit.

2.7 Water-Using Systems

There are 19 restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.0 gallons per minute (gpm) or lower, the toilets are rated at 2.0 gallons per flush (gpf) and the urinals are rated at 1.6 gpf. There are no locker rooms at this building.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

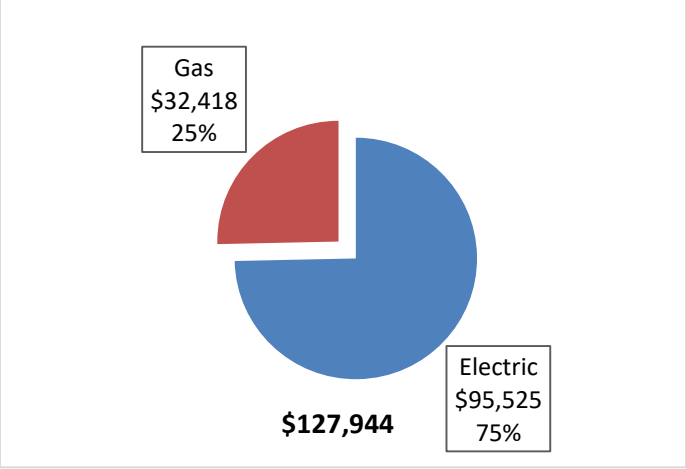
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Campbell Elementary School		
Fuel	**Usage**	**Cost**
Electricity	700,197 kWh	$95,525
Natural Gas	38,159 Therms	$32,418
Total		**$127,944**

The current annual energy cost for this facility is $127,944 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.136/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

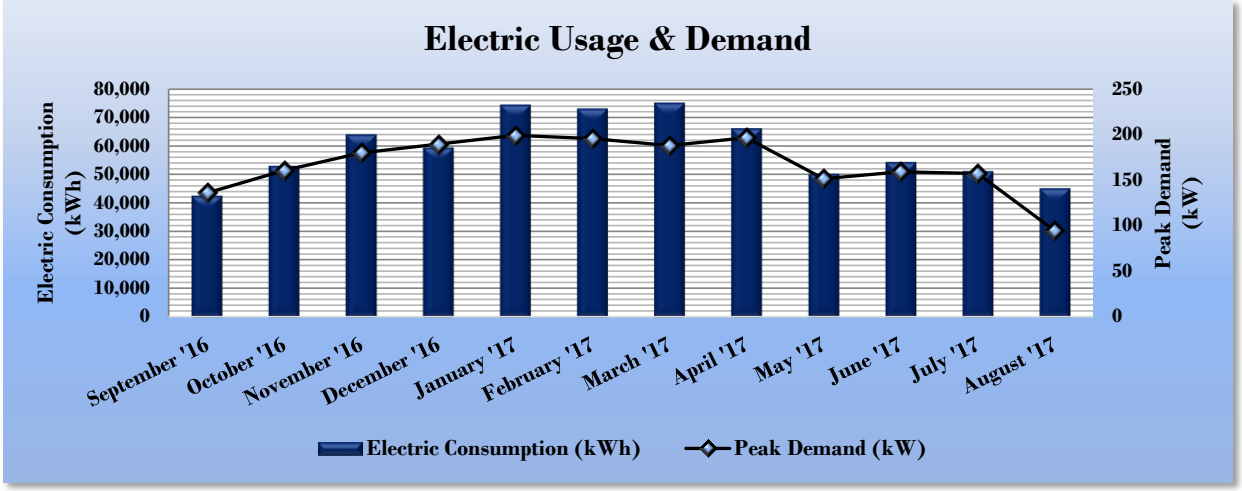


Figure 9 - Electric Usage & Demand

Electric Billing Data for Campbell Elementary School						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
9/27/16	32	42,490	136	$299	$4,383	Yes
10/26/16	29	52,961	161	$598	$7,033	No
11/28/16	33	63,906	180	$670	$8,512	Yes
12/28/16	30	59,430	190	$706	$8,081	No
1/27/17	30	74,327	199	$742	$9,960	No
2/28/17	32	73,022	196	$727	$9,386	No
3/29/17	29	75,000	188	$701	$9,553	No
4/28/17	30	66,056	197	$740	$8,643	No
5/30/17	32	50,178	152	$571	$6,879	No
6/28/17	29	54,316	159	$599	$8,786	No
7/29/17	31	51,109	157	$593	$8,410	No
8/30/17	32	45,075	95	$356	$6,946	Yes
Totals	**369**	**707,870**	**199.2**	**$7,303**	**$96,572**	3
Annual	**365**	**700,197**	**199.2**	**$7,223**	**$95,525**	

3.3 Natural Gas Usage

Natural gas is provided by Elizabethtown Gas. The average gas cost for the past 12 months is $0.850/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

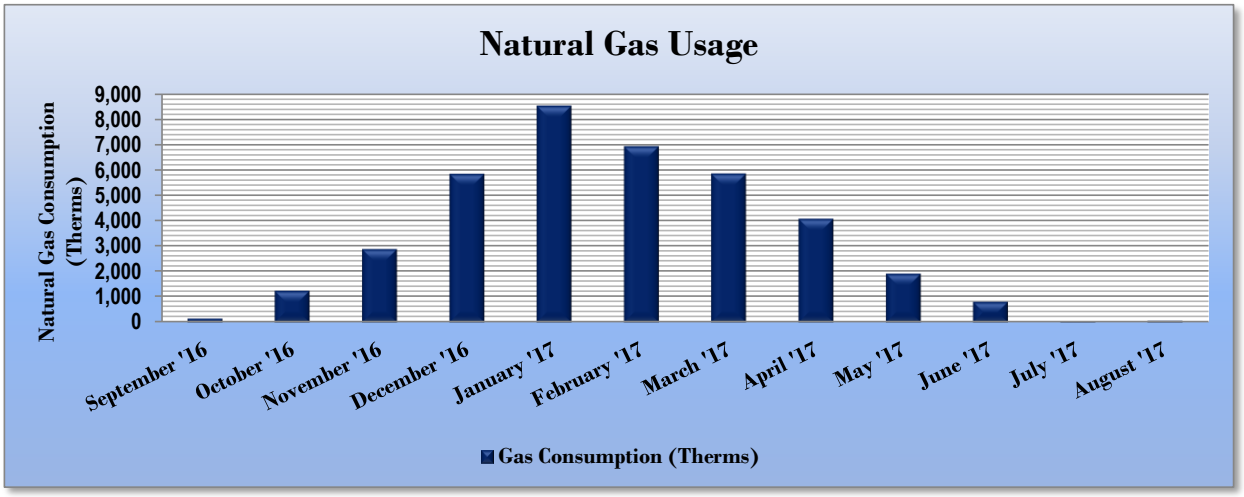


Figure 11 - Natural Gas Usage

Gas Billing Data for Campbell Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
9/20/16	32	152	$369
10/19/16	29	1,239	$1,192
11/17/16	29	2,887	$2,465
12/19/16	32	5,845	$4,737
1/19/17	31	8,529	$6,810
2/19/17	31	6,931	$5,589
3/18/17	27	5,856	$4,770
4/19/17	32	4,080	$3,330
5/18/17	29	1,921	$1,731
6/19/17	32	815	$907
7/19/17	30	53	$344
8/21/17	33	60	$353
Totals	**367**	**38,368**	**$32,596**
Annual	**365**	**38,159**	**$32,418**

3.4 Benchmarking

This facility was benchmarked using Portfolio Manager®, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager® analyzes your building's consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. 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.

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Campbell Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	199.2	141.4
Site Energy Use Intensity (kBtu/ft^2)	107.4	58.2

Implementation of all recommended measures in this report would improve the building's estimated EUI significantly, as shown in the table below:

Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Campbell Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	166.4	141.4
Site Energy Use Intensity (kBtu/ft^2)	96.9	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is one of the building categories that are eligible to receive a score. This facility has a current score of **13**.

A Portfolio Manager® Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

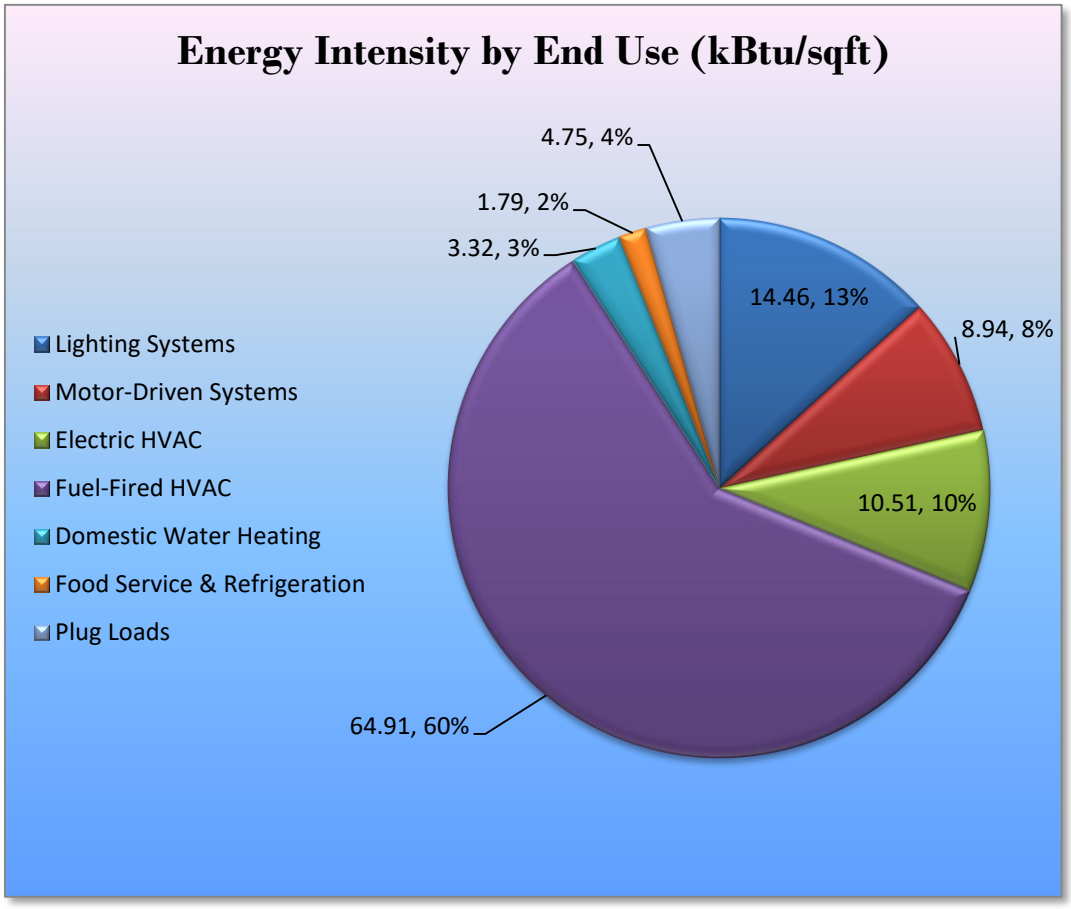
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager® account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance. Free online training is available to help you use ENREGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 14 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to Campbell Elementary School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**128,224**	**23.3**	**0.0**	**$17,493.12**	**$50,525.61**	**$11,440.00**	**$39,085.61**	**2.2**	**129,120**
ECM 1	Install LED Fixtures	3,854	0.5	0.0	$525.84	$3,863.86	$400.00	$3,463.86	6.6	3,881
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	86	0.1	0.0	$11.75	$137.55	$20.00	$117.55	10.0	87
ECM 3	Retrofit Fixtures with LED Lamps	124,178	22.7	0.0	$16,941.18	$46,451.79	$11,020.00	$35,431.79	2.1	125,046
ECM 4	Install LED Exit Signs	105	0.0	0.0	$14.34	$72.42	$0.00	$72.42	5.0	106
Lighting Control Measures		**25,148**	**4.4**	**0.0**	**$3,430.79**	**$24,348.00**	**$2,520.00**	**$21,828.00**	**6.4**	**25,323**
ECM 5	Install Occupancy Sensor Lighting Controls	19,866	3.7	0.0	$2,710.22	$20,948.00	$2,520.00	$18,428.00	6.8	20,005
ECM 6	Install High/Low Lighitng Controls	5,282	0.8	0.0	$720.57	$3,400.00	$0.00	$3,400.00	4.7	5,319
Motor Upgrades		**673**	**0.2**	**0.0**	**$91.86**	**$2,307.58**	**$0.00**	**$2,307.58**	**25.1**	**678**
ECM 7	Premium Efficiency Motors	673	0.2	0.0	$91.86	$2,307.58	$0.00	$2,307.58	25.1	678
Variable Frequency Drive (VFD) Measures		**23,174**	**4.8**	**0.0**	**$3,161.49**	**$18,034.00**	**$1,800.00**	**$16,234.00**	**5.1**	**23,336**
ECM 8	Install VFDs on Constant Volume (CV) HVAC	11,173	3.0	0.0	$1,524.23	$10,820.40	$1,800.00	$9,020.40	5.9	11,251
ECM 9	Install VFDs on Hot Water Pumps	12,001	1.8	0.0	$1,637.26	$7,213.60	$0.00	$7,213.60	4.4	12,085
TOTALS		**177,218**	**32.8**	**0.0**	**$24,177.26**	**$95,215.19**	**$15,760.00**	**$79,455.19**	**3.3**	**178,457**

* - All incentives presented in this table are based on NJ Smart Start Building 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).

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 16 below.

Figure 16 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**128,224**	**23.3**	**0.0**	**$17,493.12**	**$50,525.61**	**$11,440.00**	**$39,085.61**	**2.2**	**129,120**
ECM 1	Install LED Fixtures	3,854	0.5	0.0	$525.84	$3,863.86	$400.00	$3,463.86	6.6	3,881
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	86	0.1	0.0	$11.75	$137.55	$20.00	$117.55	10.0	87
ECM 3	Retrofit Fixtures with LED Lamps	124,178	22.7	0.0	$16,941.18	$46,451.79	$11,020.00	$35,431.79	2.1	125,046
ECM 4	Install LED Exit Signs	105	0.0	0.0	$14.34	$72.42	$0.00	$72.42	5.0	106

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	3,854	0.5	0.0	$525.84	$3,863.86	$400.00	$3,463.86	6.6	3,881

Measure Description

We recommend replacing existing exterior fixtures containing HID lamps with new high-performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that HID lamps.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	86	0.1	0.0	$11.75	$137.55	$20.00	$117.55	10.0	87
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T12 fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	118,570	22.0	0.0	$16,176.02	$45,295.96	$10,970.00	$34,325.96	2.1	119,399
Exterior	5,609	0.7	0.0	$765.16	$1,155.83	$50.00	$1,105.83	1.4	5,648

Measure Description

We recommend retrofitting existing incandescent, linear fluorescent, and compact fluorescent lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs 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.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes and more than ten times longer than many incandescent lamps.

ECM 4: Install LED Exit Signs

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	105	0.0	0.0	$14.34	$72.42	$0.00	$72.42	5.0	106
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing all incandescent or compact fluorescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

4.1.2 Lighting Control Measures

Our recommendations for upgrades to lighting control measures are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**25,148**	**4.4**	**0.0**	**$3,430.79**	**$24,348.00**	**$2,520.00**	**$21,828.00**	**6.4**	**25,323**
ECM 5	Install Occupancy Sensor Lighting Controls	19,866	3.7	0.0	$2,710.22	$20,948.00	$2,520.00	$18,428.00	6.8	20,005
ECM 6	Install High/Low Lighitng Controls	5,282	0.8	0.0	$720.57	$3,400.00	$0.00	$3,400.00	4.7	5,319

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 5: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
19,866	3.7	0.0	$2,710.22	$20,948.00	$2,520.00	$18,428.00	6.8	20,005

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms, restrooms, storage rooms, closets, and offices areas. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are recommended for single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in locations without local switching or where wall switches are not in the line-of-sight of the main work area and in large spaces. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 6: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
5,282	0.8	0.0	$720.57	$3,400.00	$0.00	$3,400.00	4.7	5,319

Measure Description

We recommend installing 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. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

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

Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Motor Upgrades

Our recommendations for premium efficiency motor upgrades are summarized in Figure 18 below.

Figure 18 – Summary of Premium Efficiency Motor ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**673**	**0.2**	**0.0**	**$91.86**	**$2,307.58**	**$0.00**	**$2,307.58**	**25.1**	**678**
ECM 7	Premium Efficiency Motors	673	0.2	0.0	$91.86	$2,307.58	$0.00	$2,307.58	25.1	678

ECM 7: Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
673	0.2	0.0	$91.86	$2,307.58	$0.00	$2,307.58	25.1	678

Measure Description

We recommend replacing standard efficiency motors with NEMA Premium® efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

4.1.4 Variable Frequency Drive (VFD) Measures

For equipment with proposed VFDs, we have included replacing the controlled motor with a new motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be re-evaluated.

Our recommendations for variable frequency drive measures are summarized in Figure 19 below.

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**23,174**	**4.8**	**0.0**	**$3,161.49**	**$18,034.00**	**$1,800.00**	**$16,234.00**	**5.1**	**23,336**
ECM 8	Install VFDs on Constant Volume (CV) HVAC	11,173	3.0	0.0	$1,524.23	$10,820.40	$1,800.00	$9,020.40	5.9	11,251
ECM 9	Install VFDs on Hot Water Pumps	12,001	1.8	0.0	$1,637.26	$7,213.60	$0.00	$7,213.60	4.4	12,085

ECM 8: Install VFDs on Constant Volume (CV) HVAC

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
11,173	3.0	0.0	$1,524.23	$10,820.40	$1,800.00	$9,020.40	5.9	11,251

Measure Description

We recommend installing variable frequency drives (VFDs) to control supply fan motor speeds to convert constant-volume, single-zone air handling systems into a variable-air-volume (VAV) systems. There are two rooftop units serving the library and gymnasium that can benefit from this installation. 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 will cause the VFD to modulate fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings results from reducing fan speed (and power) when there is a reduced load required for the zone. The magnitude of energy savings is based on the estimated amount of time that fan motors operate at partial load.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing will have to be determined during the final project design. The control system should be programmed to maintain the minimum air flow whenever the compressor is operating.

ECM 9: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
12,001	1.8	0.0	$1,637.26	$7,213.60	$0.00	$7,213.60	4.4	12,085

Measure Description

We recommend installing variable frequency drives (VFD) to control the two hot water distribution pumps. This measure requires that a majority of the hot water coils be served by two-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results 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.

4.2 ECMs Evaluated But Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in each measure description section.

Figure 20 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures	**6,851**	**4.1**	**0.0**	**$934.61**	**$26,233.11**	**$1,518.00**	**$24,715.11**	**26.4**	**6,899**
Install High Efficiency Electric AC	6,851	4.1	0.0	$934.61	$26,233.11	$1,518.00	$24,715.11	26.4	6,899
TOTALS	**6,851**	**4.1**	**0.0**	**$934.61**	**$26,233.11**	**$1,518.00**	**$24,715.11**	**26.4**	**6,899**

* - All incentives presented in this table are based on NJ Smart Start Building 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).

Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
6,851	4.1	0.0	$934.61	$26,233.11	$1,518.00	$24,715.11	26.4	6,899

Measure Description

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

Reasons for not Recommending

The payback period for the measure exceeds the expected life of the replacement equipment.

5 ENERGY EFFICIENT PRACTICES

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

Reduce Air Leakage

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

Close Doors and Windows

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Use Window Treatments/Coverings

A substantial amount of heat gain can occur through uncovered or untreated windows, especially older single pane windows and east or west-facing windows. Treatments such as high-reflectivity films or covering windows with shades or shutters can reduce solar heat gain and, consequently, cooling load and can reduce internal heat loss and the associated heating load.

Perform Proper Lighting Maintenance

In order to sustain optimal lighting levels, lighting fixtures should undergo routine maintenance. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust on lamps, fixtures and reflective surfaces. Together, these factors can reduce total illumination by 20%-60% or more, while operating fixtures continue drawing full power. To limit this reduction, lamps, reflectors and diffusers should be thoroughly cleaned of dirt, dust, oil, and smoke film buildup approximately every 6–12 months.

Develop a Lighting Maintenance Schedule

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

Ensure Lighting Controls Are Operating Properly

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of 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.

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5°F-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further 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.

Ensure Economizers are Functioning Properly

Economizers, when properly configured, can be used to significantly reduce mechanical cooling. However, if the outdoor thermostat or enthalpy control is malfunctioning or the damper is stuck or improperly adjusted, benefits from the economizer may not be fully realized. As such, periodic inspection and maintenance is required to ensure proper operation. This maintenance should be scheduled with maintenance of the facility's air conditioning system and should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position. A malfunctioning economizer can significantly increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air.

Clean Evaporator/Condenser Coils on AC Systems

Dirty evaporators and condensers coils cause a restriction to air flow and restrict heat transfer. This results in increased evaporator and condenser fan load and a decrease in cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

Clean and/or Replace HVAC Filters

Air filters work to reduce the amount of indoor air pollution and increase occupant comfort. Over time, filters become less and less effective as particulate buildup increases. In addition to health concerns related to clogged filters, filters that have reached saturation also restrict air flow through the facility's air conditioning or heat pump system, increasing the load on the distribution fans and decreasing occupant comfort levels. Filters should be checked monthly and cleaned or replaced when appropriate.

Check for and Seal Duct Leakage

Duct leakage in commercial buildings typically accounts for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building, significantly increasing cooling and heating costs. By sealing sources of leakage, cooling, heating, and ventilation energy use can be reduced significantly, depending on the severity of air leakage.

Perform Proper Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up in order to sustain efficiency and equipment life.

Perform Proper Water Heater Maintenance

At least once a year, 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. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any 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 any 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 over three to four years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. 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. The EPA WaterSense™ ratings for urinals is 0.5 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

6 On-Site Generation Measures

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey's Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State's electrical needs to be met by renewable sources by 2050.

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at 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.

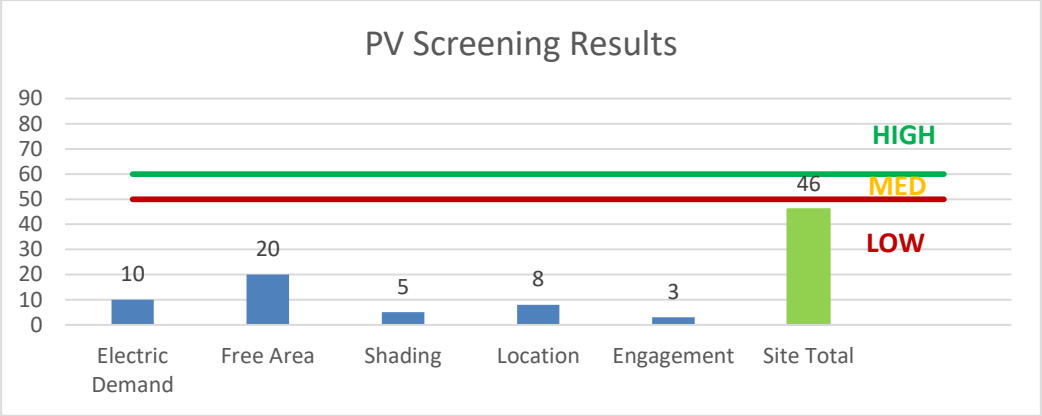
6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

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

If Campbell Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 21 - Photovoltaic Screening



Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order 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 developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

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

6.2 Combined Heat and Power

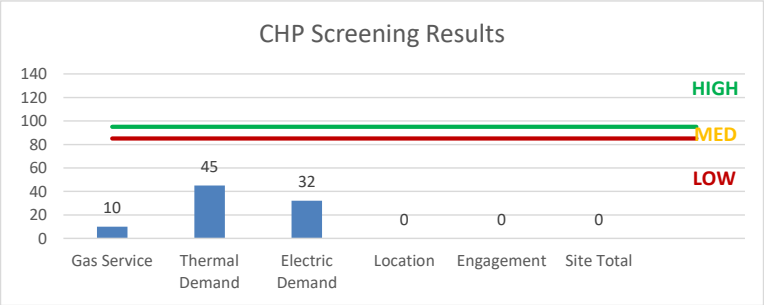
Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric generation from a CHP system is typically interconnected to local power distribution systems. Heat is recovered from exhaust and ancillary cooling systems and interconnected to the existing hot water (or steam) distribution systems.

CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP.

Lack of gas service, low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the lack of potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

For a list of qualified firms in New Jersey specializing in commercial CHP cost assessment and installation, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

Figure 22 - Combined Heat and Power Screening



7 DEMAND RESPONSE

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage 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 DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

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

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

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

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other DR program information.

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

It is our opinion that this building is not a good candidate for Demand Response (DR).

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund, your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 23 for a list of the eligible programs identified for each recommended ECM.

Figure 23 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
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 LED Exit Signs			X			
ECM 5	Install Occupancy Sensor Lighting Controls	X		X			
ECM 6	Install High/Low Lighitng Controls			X			
ECM 7	Premium Efficiency Motors			X			
ECM 8	Install VFDs on Constant Volume (CV) HVAC	X		X			
ECM 9	Install VFDs on Hot Water Pumps						

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a "whole-building" energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey's largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity's annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: www.njcleanenergy.com/ci.

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency 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

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, 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

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: www.njcleanenergy.com/SSB.

8.2 Direct Install

Overview

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.

8.3 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 in the SRP prior to the start of construction in order 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. SRECs 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 SRECs 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 RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. 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. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. 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 can be leveraged to help further reduce the total project cost of eligible measures.

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 utilized 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. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program description and application can be found at: www.njcleanenergy.com/ESIP.

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third-party (i.e., non-utility) energy supplier.

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 is purchasing electricity from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. 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 is typically dependent upon whether a customer seeks 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 is not purchasing natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility is purchasing natural gas from a third-party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third-party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: 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	Watts per Fixture	Annual Operating Hours	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
Boiler Room	5	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	1,095	Relamp	No	5	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	1,095	0.15	279	0.0	$38.09	$86.13	$0.00	2.26
Library	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.05	386	0.0	$52.68	$343.03	$55.00	5.47
Library	3	U-Bend Fluorescent - T8: U T8 (32W) - 3L	Wall Switch	92	4,026	Relamp	Yes	3	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	2,818	0.11	797	0.0	$108.67	$596.07	$35.00	5.16
Library	7	Compact Fluorescent: PL: (26W) - 1L	Wall Switch	26	4,026	Relamp	Yes	7	LED Screw-In Lamps: LED: PL: (20W) - 1L	Occupancy Sensor	20	2,818	0.06	400	0.0	$54.61	$446.54	$35.00	7.54
Library	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library	56	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	80	4,026	Relamp	Yes	56	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,818	2.09	14,753	0.0	$2,012.66	$5,137.76	$140.00	2.48
Library Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.27	1,931	0.0	$263.39	$635.15	$135.00	1.90
Faculty Room	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.38	2,703	0.0	$368.75	$781.21	$175.00	1.64
Faculty Room	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Copy Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.19	1,351	0.0	$184.38	$525.61	$105.00	2.28
Copy Room Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.03	193	0.0	$26.34	$152.52	$10.00	5.41
Girls RR	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	None	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Custodian Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
Boys RR	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	None	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 6	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 4	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 2	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 1	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.24	1,206	0.0	$164.48	$438.18	$120.00	1.93
CR 36	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.36	1,646	0.0	$224.53	$744.70	$165.00	2.58
CR 36 Storage Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	730	0.03	43	0.0	$5.84	$17.23	$5.00	2.09
CR 3	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 5	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 7	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
Supply Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
CR 9	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.11	506	0.0	$69.09	$416.06	$75.00	4.94

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
CR 41	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,640	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,848	0.10	446	0.0	$60.80	$416.06	$75.00	5.61
Custodian Office	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
CR 45	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.11	506	0.0	$69.09	$416.06	$75.00	4.94
CR 90	3	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,640	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.08	362	0.0	$49.33	$379.55	$65.00	6.38
CR 90 RR	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
Special Services	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.25	1,738	0.0	$237.05	$598.64	$125.00	2.00
Special Services RR	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
Special Services Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,730	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,730	0.03	98	0.0	$13.44	$54.77	$15.00	2.96
Special Services Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,730	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,730	0.04	131	0.0	$17.91	$73.03	$20.00	2.96
Special Services Kitchen Area	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	4,026	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,818	0.14	1,020	0.0	$139.09	$489.09	$95.00	2.83
Special Services Kitchen Area Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	730	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.02	28	0.0	$3.78	$36.52	$10.00	7.02
Special Services Back Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.16	1,158	0.0	$158.04	$489.09	$95.00	2.49
Girls RR	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	None	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Custodian Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
Boys RR	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	None	No	2	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	2,818	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Test Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	4,026	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,818	0.05	340	0.0	$46.36	$189.03	$20.00	3.65
CR 11	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 13	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 15	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.41	1,899	0.0	$259.08	$817.73	$185.00	2.44
CR 14	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 12	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 10	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.49	2,279	0.0	$310.89	$927.27	$215.00	2.29
Nurse's Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	4,026	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,818	0.12	869	0.0	$118.53	$434.32	$80.00	2.99
Nurse's Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	4,026	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,818	0.14	1,020	0.0	$139.09	$489.09	$95.00	2.83
Nurse's Office RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	728	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.02	28	0.0	$3.77	$36.52	$10.00	7.03

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
CR 17	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 17 RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	728	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.02	28	0.0	$3.77	$36.52	$10.00	7.03
CR 17 Water Heater Area	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.03	193	0.0	$26.34	$152.52	$10.00	5.41
CR 19	20	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.41	2,009	0.0	$274.13	$730.30	$200.00	1.93
CR 19 Storage Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.04	50	0.0	$6.76	$68.77	$10.00	8.70
CR 19 RR	1	Incandescent: Screw-In: (60W) - 2L	Wall Switch	120	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 2L	Occupancy Sensor	18	2,818	0.07	497	0.0	$67.84	$287.23	$40.00	3.64
CR 39	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,640	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,848	0.53	2,469	0.0	$336.80	$982.04	$230.00	2.23
CR 39 RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	728	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	728	0.03	41	0.0	$5.65	$54.77	$15.00	7.03
CR 39 Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	730	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	730	0.03	42	0.0	$5.67	$54.77	$15.00	7.02
CR 38	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,640	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,848	0.53	2,469	0.0	$336.80	$982.04	$230.00	2.23
CR 38 RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	728	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	728	0.03	41	0.0	$5.65	$54.77	$15.00	7.03
CR 38 Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	730	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	730	0.03	42	0.0	$5.67	$54.77	$15.00	7.02
CR 18	20	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.41	2,009	0.0	$274.13	$730.30	$200.00	1.93
CR 18 RR	1	Compact Fluorescent: PL: (23W) - 1L	Wall Switch	23	4,026	Relamp	No	1	LED Screw-In Lamps: LED: PL: (17W) - 1L	Wall Switch	17	4,026	0.00	27	0.0	$3.63	$25.22	$0.00	6.94
CR 16	18	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.37	1,808	0.0	$246.72	$657.27	$180.00	1.93
CR 16 Storage Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	730	0.03	43	0.0	$5.84	$17.23	$5.00	2.09
Electrical Room	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
CR 20	9	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.18	904	0.0	$123.36	$328.64	$90.00	1.93
CR 20 Storage Room	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	730	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.04	50	0.0	$6.76	$68.77	$10.00	8.70
CR 20	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,640	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.05	241	0.0	$32.89	$343.03	$55.00	8.76
CR 21	14	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	30	2,640	None	Yes	14	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	1,848	0.08	383	0.0	$52.19	$270.00	$35.00	4.50
CR 21 RR	1	LED - Fixtures: Ambient - 2' - Direct Fixture	Wall Switch	15	728	None	No	1	LED - Fixtures: Ambient - 2' - Direct Fixture	Wall Switch	15	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 104	15	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,640	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.39	1,808	0.0	$246.65	$817.73	$185.00	2.57
CR 104	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.02	100	0.0	$13.71	$36.52	$10.00	1.93
CR 104 RR	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	728	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.02	26	0.0	$3.54	$36.52	$10.00	7.49

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
CR 104 Storage Room	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	730	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.02	26	0.0	$3.55	$36.52	$10.00	7.47
CR 107	15	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,818	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.30	1,507	0.0	$205.60	$547.73	$150.00	1.93
CR 107	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,640	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.05	241	0.0	$32.89	$343.03	$55.00	8.76
CR 107 RR	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	728	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.02	26	0.0	$3.54	$36.52	$10.00	7.49
CR 22	14	LED - Fixtures: Ambient - 4' - Direct Fixture	Wall Switch	30	2,640	None	Yes	14	LED - Fixtures: Ambient - 4' - Direct Fixture	Occupancy Sensor	30	1,848	0.08	383	0.0	$52.19	$270.00	$35.00	4.50
CR 22 RR	1	LED - Fixtures: Ambient - 2' - Direct Fixture	Wall Switch	15	728	None	No	1	LED - Fixtures: Ambient - 2' - Direct Fixture	Wall Switch	15	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 47	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.16	760	0.0	$103.63	$489.09	$95.00	3.80
Main Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.16	1,158	0.0	$158.04	$489.09	$95.00	2.49
Main Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.16	1,158	0.0	$158.04	$489.09	$95.00	2.49
Principal's Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.22	1,545	0.0	$210.72	$562.12	$115.00	2.12
Main Office RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	728	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.02	28	0.0	$3.77	$36.52	$10.00	7.03
CR 43	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
Server room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.05	386	0.0	$52.68	$343.03	$55.00	5.47
Custodian Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.03	193	0.0	$26.34	$152.52	$10.00	5.41
CR 34	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.16	760	0.0	$103.63	$489.09	$95.00	3.80
CR 35	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,848	0.15	709	0.0	$96.67	$704.76	$35.00	6.93
CR 31	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
CR 32	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
CR 30	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.57	2,659	0.0	$362.71	$1,306.82	$280.00	2.83
CR 33	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.82	3,798	0.0	$518.15	$1,635.45	$370.00	2.44
Boys RR	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	728	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.09	111	0.0	$15.08	$146.06	$40.00	7.03
Girls RR	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	728	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.09	111	0.0	$15.08	$146.06	$40.00	7.03
CR 29	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
CR 28	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
CR 27	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
Electrical Room/IDF	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.03	193	0.0	$26.34	$152.52	$10.00	5.41
CR 26A	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.44	2,026	0.0	$276.35	$854.24	$195.00	2.39
CR 26A	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 26A Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	730	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	730	0.04	55	0.0	$7.56	$73.03	$20.00	7.02
CR 26B	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
CR 26B	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 25	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.66	3,038	0.0	$414.52	$1,416.36	$310.00	2.67
CR 25	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 25 Storage Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	730	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	511	0.16	210	0.0	$28.66	$489.09	$95.00	13.75
CR 25 Prep Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.05	386	0.0	$52.68	$343.03	$55.00	5.47
CR 23	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.82	3,798	0.0	$518.15	$1,905.45	$405.00	2.90
CR 23	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 23 Prep Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.11	772	0.0	$105.36	$416.06	$75.00	3.24
CR 24	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,640	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,848	0.57	2,659	0.0	$362.71	$1,306.82	$280.00	2.83
Gym	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gym	20	Linear Fluorescent - T5: 4' T5 (28W) - 6L	Wall Switch	168	4,026	Relamp	Yes	20	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	2,818	1.40	9,917	0.0	$1,352.97	$2,730.90	$670.00	1.52
Kitchen	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	4,026	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,818	0.29	2,039	0.0	$278.17	$708.18	$155.00	1.99
Kitchen	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,818	0.05	360	0.0	$49.14	$414.92	$35.00	7.73
WH Room	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	4,026	Relamp	Yes	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Occupancy Sensor	9	2,818	0.04	249	0.0	$33.92	$133.23	$5.00	3.78
Storage Closet	1	Incandescent: Screw-In: (60W) - 1L	Wall Switch	60	730	Relamp	No	1	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	730	0.03	43	0.0	$5.84	$17.23	$5.00	2.09
Electrical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.05	386	0.0	$52.68	$343.03	$55.00	5.47
Sprinkler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,818	0.05	386	0.0	$52.68	$343.03	$55.00	5.47
Door Lights	21	Compact Fluorescent: PL: (26W) - 1L	Wall Switch	26	4,380	Relamp	No	21	LED Screw-In Lamps: LED: PL: (14W) - 1L	Wall Switch	14	4,380	0.17	1,322	0.0	$180.38	$529.62	$0.00	2.94
Door Lights	9	Compact Fluorescent: PL: (26W) - 2L	Wall Switch	52	4,380	Relamp	No	9	LED Screw-In Lamps: LED: PL (20W) - 2L	Wall Switch	40	4,380	0.07	544	0.0	$74.22	$453.96	$0.00	6.12

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	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
Building Lights	10	Incandescent: Screw-In: (100W) - 1L	Wall Switch	100	4,380	Relamp	No	10	LED Screw-In Lamps: Screw-In: (9W) - 1L	Wall Switch	9	4,380	0.60	4,584	0.0	$625.33	$172.25	$50.00	0.20
Building Lights	4	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	4,380	0.58	4,433	0.0	$604.72	$3,863.86	$400.00	5.73
Building Lights	1	Metal Halide: (1) 100W Lamp	Wall Switch	128	4,380	None	No	1	Metal Halide: (1) 100W Lamp	Wall Switch	128	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallways: Exit 5 to 10	34	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,026	Relamp	Yes	34	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,818	0.93	6,564	0.0	$895.54	$1,841.51	$340.00	1.68
Hallways: Exit 5 to 10	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallways: CST to Room 14	17	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	4,026	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,818	0.44	3,125	0.0	$426.29	$1,020.76	$170.00	2.00
Hallways: CST to Room 14	1	Exit Signs: Fluorescent	None	18	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	121	0.0	$16.49	$72.42	$0.00	4.39
Hallways: CST to Room 14	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallways: CR 15 to Main Office	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,696	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,587	0.46	3,013	0.0	$411.07	$1,020.76	$170.00	2.07
Hallways: CR 15 to Main Office	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Faculty Room Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	4,026	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,818	0.10	680	0.0	$92.72	$346.06	$40.00	3.30
Faculty Room Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway: Connector Hall	12	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	4,026	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,818	0.31	2,206	0.0	$300.91	$638.18	$120.00	1.72
Hallway: Connector 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	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway: CR 8 to Exit 3	20	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	3,696	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,587	0.52	3,375	0.0	$460.41	$1,130.30	$200.00	2.02
Hallway: CR 8 to Exit 3	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway: CR 8 to Exit 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,696	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,587	0.03	177	0.0	$24.18	$236.52	$10.00	9.37
Hallway: CR 36 to Gym	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,696	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,587	0.33	2,127	0.0	$290.17	$638.18	$120.00	1.79
Hallway: CR 36 to Gym	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway: Exit 14 to CR 20	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,696	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	2,587	0.25	1,595	0.0	$217.62	$528.64	$90.00	2.02
Hallway: Exit 14 to CR 20	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway: Exit 14 to CR 20	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,696	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,587	0.48	3,120	0.0	$425.62	$930.30	$200.00	1.72
Hallway: Exit 14 to CR 20	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway: Exit 14 to CR 20	8	LED - Fixtures: Ambient - 4' - Indirect/Direct Fixture	Wall Switch	30	3,696	None	Yes	8	LED - Fixtures: Ambient - 4' - Indirect/Direct Fixture	High/Low Control	30	2,587	0.05	306	0.0	$41.75	$200.00	$0.00	4.79
Hallway: Exit 14 to CR 20	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	3,696	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,587	0.10	675	0.0	$92.08	$346.06	$40.00	3.32

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	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
Boiler Room	HW Heating Supply	1	Heating Hot Water Pump	7.5	88.5%	No	2,261	Yes	91.7%	Yes	1	1.03	6,337	0.0	$864.50	$4,760.59	$0.00	5.51
Boiler Room	HW Heating Supply	1	Heating Hot Water Pump	7.5	88.5%	No	2,261	Yes	91.7%	Yes	1	1.03	6,338	0.0	$864.62	$4,760.59	$0.00	5.51
Water Heater closets	DHW distribution	5	Water Supply Pump	0.3	82.0%	No	2,745	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Library RTU	1	Supply Fan	7.5	91.7%	No	3,391	No	91.7%	Yes	1	0.99	3,724	0.0	$508.08	$3,606.80	$600.00	5.92
Roof	Library RTU	1	Exhaust Fan	3.0	89.5%	No	3,391	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Office RTU	1	Supply Fan	2.0	86.5%	No	3,391	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Office RTU	1	Exhaust Fan	1.0	84.0%	No	3,391	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	CR 34 & CR 35 RTU	1	Supply Fan	0.5	81.1%	Yes	3,391	No	81.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gym RTUs	2	Supply Fan	7.5	91.7%	No	3,391	No	91.7%	Yes	2	1.98	7,448	0.0	$1,016.15	$7,213.60	$1,200.00	5.92
Roof	Gym RTUs	2	Exhaust Fan	5.0	89.5%	No	3,391	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom Ceilings	Split AC supply fans	6	Supply Fan	0.8	81.0%	No	2,745	No	81.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Whole Building	Electrical/Mechanical Rooms & Hallway Ceilings	7	Supply Fan	0.3	78.0%	No	2,745	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Whole Building	Unit Ventilators	46	Supply Fan	0.3	78.0%	No	3,391	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Whole Building	Roof Exhaust fans	12	Exhaust Fan	0.3	81.1%	No	2,745	No	81.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	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
Hallway Ceilings	Hallways	7	Electric Resistance Heat		12.80	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Library, Faculty Room, CR 43	1	Packaged AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Server Room	1	Ductless Mini-Split HP	0.75	10.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Main Office	1	Packaged AC	6.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	CR 10	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.64	1,077	0.0	$146.95	$2,992.44	$184.00	19.11
Roof	Special Services Suite	1	Split-System AC	3.50		Yes	1	Split-System AC	3.50		14.00		No	1.12	1,885	0.0	$257.16	$5,236.77	$322.00	19.11
Roof	CR 34, CR 35	1	Packaged AC	2.00		Yes	1	Packaged AC	2.00		14.00		No	0.46	776	0.0	$105.80	$4,537.92	$184.00	41.15
Roof	CR 33	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.64	1,077	0.0	$146.95	$2,992.44	$184.00	19.11
Ground	CR 26A	2	Ductless Mini-Split HP	0.75	10.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	CR 26B	1	Ductless Mini-Split HP	1.50	10.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	CR 107	1	Split-System AC	3.00		Yes	1	Split-System AC	3.00		14.00		No	0.29	485	0.0	$66.13	$4,488.66	$276.00	63.70
Ground	CR 22	1	Ductless Mini-Split AC	0.75		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	CR 21	1	Ductless Mini-Split AC	0.75		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ground	Nurse's Office	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.46	776	0.0	$105.80	$2,992.44	$184.00	26.54
Courtyard	CR 15	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.46	776	0.0	$105.80	$2,992.44	$184.00	26.54
Classroom/Office Windows	Classrooms/Offices	4	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
1st Grage Wing	Classrooms	9	Electric Resistance Heat		10.24	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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)	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	Whole Building except 1st Grade Wing	1	Condensing Hot Water Boiler	1,850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building except 1st Grade Wing	1	Condensing Hot Water Boiler	1,850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Whole Building except 1st Grade Wing	1	Condensing Hot Water Boiler	1,850.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Whole Building except Kitchen, 1st Grage Wing, CR 21	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 17	1st Grage Section	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 21	CR 21	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR 104	CR 104	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	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	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Freezer Chest	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	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	2	Gas Steamer	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Whole Building	130	Desktop Computers	150.0	Yes
Whole Building	180	Chromebooks	40.0	Yes
Whole Building	13	Desk Printers	40.0	Yes
Whole Building	13	Projectors	200.0	Yes
Whole Building	30	Smartboards w/ Projectors	250.0	Yes
Whole Building	11	Microwave	1,000.0	No
Faculty Room	1	Top Freezer Refrigerator	172.0	Yes
Whole Building	10	Mini Fridge	153.0	Yes
Whole Building	20	LCD TVs	119.0	Yes
Faculty Room	1	Coffee Maker	900.0	No
Whole Building	3	Photocopier	600.0	Yes
Whole Building	36	Fans	100.0	No
Hallway	1	Chair Lift	580.0	No
Hallways	12	Water fountains	78.0	No
Classrooms	2	Laptops	45.0	Yes
Copy Room	1	Laminator	800.0	Yes
Restrooms	11	Electric Hand Dryers	500.0	No
Kitchen	1	Top Freezer Refrigerator	172.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

13

ENERGY STAR® Score[1]

Campbell School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 57,768
Built: 1950

For Year Ending: July 31, 2017
Date Generated: October 30, 2018

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Campbell School 24 Durham Avenue Metuchen, New Jersey 08840	Metuchen Board of Education 16 Simpson Place Metuchen, NJ 08840 (____)___-_____	Michael Harvier 16 Simpson Place Metuchen, NJ 08840 732-321-8700 ext. 1011 maharvier@metboe.k12.nj.us

Property ID: 6399370

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
107.2 kBtu/ft²

Source EUI
183.9 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	3,834,847 (52%)
Electric - Grid (kBtu)	2,355,772 (38%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	70.7
National Median Source EUI (kBtu/ft²)	121.3
% Diff from National Median Source EUI	52%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	442

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)