Local Government Energy Audit Report

Toussaint l'Ouverture-Marques de Lafayette Middle School

July 31, 2019

Prepared for:

Elizabeth Public Schools
1071 Julia Street
Elizabeth, NJ 07021

Prepared by:

TRC Energy Services
900 Route 9 North
Woodbridge, NJ 07095

Disclaimer

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

TRC 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 to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

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

Table of Contents

1 Executive Summary 1

1.1 Planning Your Project 4

Pick Your Installation Approach 4
More Options from Around the State 6

2 Existing Conditions 7

2.1 Site Overview 7
2.2 Building Occupancy 7
2.3 Building Envelope 8
2.4 Lighting Systems 8
2.5 Air Handling Systems 9

Unit Ventilators and Air Handlers 9
Packaged and Split-System Units 10
Air Conditioners 10

2.6 Heating Hot Water Systems 11
2.7 Building Energy Management Systems (EMS) 11
2.8 Domestic Hot Water 12
2.9 Food Service Equipment 12
2.10 Refrigeration 13
2.11 Plug Load & Vending Machines 14
2.12 Water-Using Systems 14

3 Energy Use and Costs 15

3.1 Electricity 17
3.2 Natural Gas 18
3.3 Benchmarking 19

Tracking Your Energy Performance 20

4 Energy Conservation Measures 21

4.1 Lighting 24

ECM 1: Install LED Fixtures 24
ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers 24
ECM 3: Retrofit Fixtures with LED Lamps 25

4.2 Lighting Controls 25

ECM 4: Install Occupancy Sensor Lighting Controls 25
ECM 5: Install High/Low Lighting Controls 26

4.3 Motors 26

ECM 6: Premium Efficiency Motors 26

4.4 Variable Frequency Drives (VFD) 27

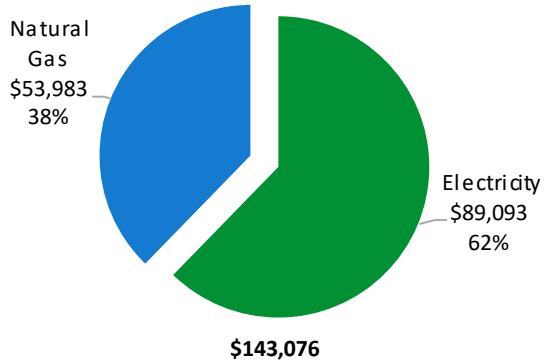
ECM 7: Install VFDs on Constant Volume (CV) Fans 28
ECM 8: Install VFDs on Heating Water Pumps 28

4.5 Electric Unitary HVAC 28
ECM 9: Install High Efficiency Air Conditioning Units 29
ECM 10: Install High Efficiency PTAC 29
4.6 Gas-Fired Heating 29
ECM 11: Install High Efficiency Hot Water Boilers 29
ECM 12: Install High Efficiency Furnaces 30
4.7 HVAC 30
ECM 13: Implement Demand Control Ventilation (DCV) 30
ECM 14: Install Pipe Insulation 31
4.8 Domestic Water Heating 31
ECM 15: Install Low-Flow DHW Devices 31
4.9 Food Service & Refrigeration Measures 32
ECM 16: Dishwasher Replacement 32
ECM 17: Refrigerator/Freezer Case Electrically Commutated Motors 32
ECM 18: Refrigeration Controls 32
5 Energy Efficient Best Practices 33
Energy Tracking with ENERGY STAR® Portfolio Manager® 33
Lighting Maintenance 33
Motor Maintenance 33
AC System Evaporator/Condenser Coil Cleaning 33
HVAC Filter Cleaning and Replacement 34
Boiler Maintenance 34
Furnace Maintenance 34
Water Heater Maintenance 34
Water Conservation 35
Procurement Strategies 35
6 On-site Generation 36
6.1 Solar Photovoltaic 36
6.2 Combined Heat and Power 38
7 Project Funding and Incentives 39
7.1 SmartStart 40
7.2 Direct Install 41
7.3 Pay for Performance - Existing Buildings 42
7.4 Energy Savings Improvement Program 43
7.5 SREC Registration Program 44
8 Energy Purchasing and Procurement Strategies 45
8.1 Retail Electric Supply Options 45
8.2 Retail Natural Gas Supply Options 45
Appendix A: Equipment Inventory & Recommendations A-1
Appendix B: ENERGY STAR® Statement of Energy Performance B-1
Appendix C: Glossary C-1

1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $143,076 Electricity: 722,046 kWh Natural Gas: 70,663 Therms	
ENERGY STAR® Benchmarking Score	33 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

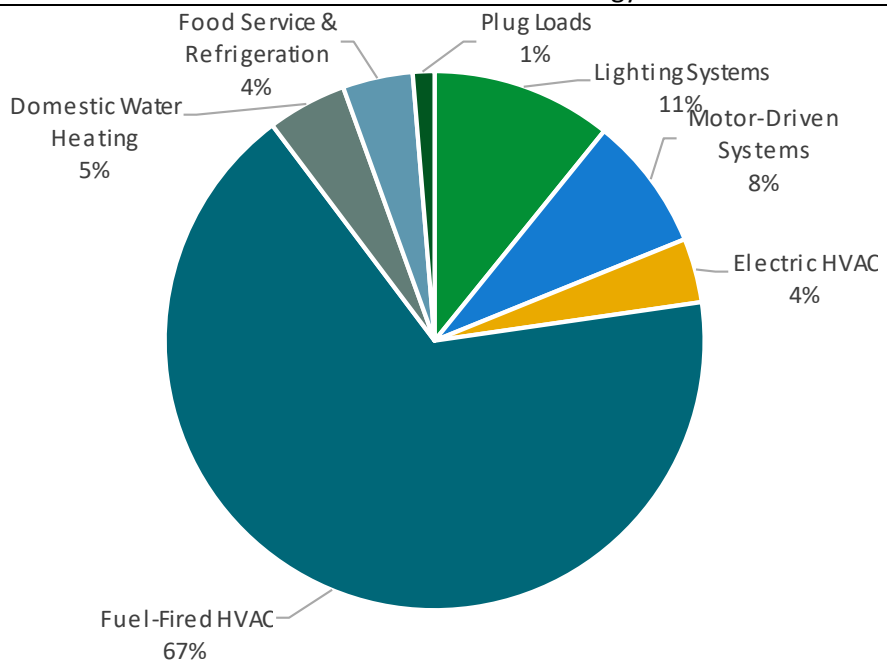


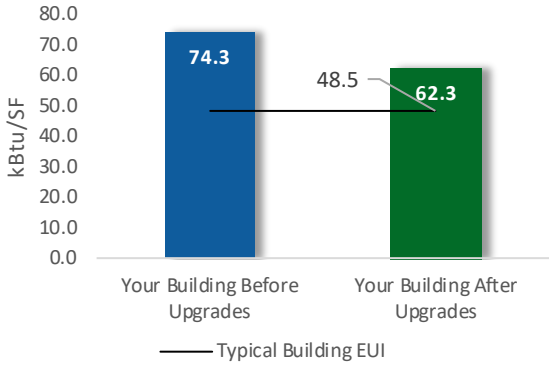
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

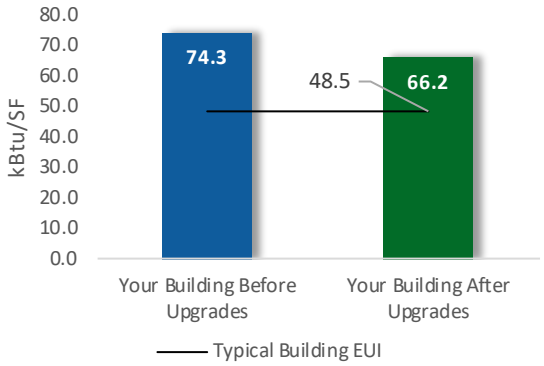
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$501,279
Potential Rebates & Incentives[1]	$34,473
Annual Cost Savings	$43,421
Annual Energy Savings	Electricity: 325,850 kWh Natural Gas: 4,208 Therms
Greenhouse Gas Emission Savings	189 Tons
Simple Payback	10.8 Years
Site Energy Savings (all utilities)	16%



Scenario 2: Cost Effective Package[2]

Installation Cost	$195,966
Potential Rebates & Incentives	$29,484
Annual Cost Savings	$37,655
Annual Energy Savings	Electricity: 305,921 kWh
Greenhouse Gas Emission Savings	153 Tons
Simple Payback	4.4 Years
Site Energy Savings (all utilities)	11%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**173,847**	**45.4**	**-35**	**$21,181**	**$317,722**	**$80,971**	**$20,050**	**$60,921**	**2.9**	**170,932**
ECM 1	Install LED Fixtures	5,867	0.8	0	$723	$10,842	$9,963	$1,010	$8,953	12.4	5,890
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	162	0.0	0	$20	$296	$69	$10	$59	3.0	159
ECM 3	Retrofit Fixtures with LED Lamps	167,818	44.6	-35	$20,439	$306,584	$70,939	$19,030	$51,909	2.5	164,882
Lighting Control Measures		**43,621**	**11.5**	**-9**	**$5,313**	**$42,502**	**$48,280**	**$4,060**	**$44,220**	**8.3**	**42,858**
ECM 4	Install Occupancy Sensor Lighting Controls	33,017	8.7	-7	$4,021	$32,170	$33,480	$4,060	$29,420	7.3	32,439
ECM 5	Install High/Low Lighting Controls	10,604	2.8	-2	$1,292	$10,332	$14,800	$0	$14,800	11.5	10,419
Motor Upgrades		**360**	**0.1**	**0**	**$44**	**$666**	**$9,701**	**$0**	**$9,701**	**218.6**	**362**
ECM 6	Premium Efficiency Motors	360	0.1	0	$44	$666	$9,701	$0	$9,701	218.6	362
Variable Frequency Drive (VFD) Measures		**79,704**	**21.2**	**0**	**$9,835**	**$147,519**	**$62,001**	**$5,224**	**$56,777**	**5.8**	**80,261**
ECM 7	Install VFDs on Constant Volume (CV) Fans	57,590	19.1	0	$7,106	$106,590	$51,251	$5,224	$46,027	6.5	57,993
ECM 8	Install VFDs on Heating Water Pumps	22,114	2.1	0	$2,729	$40,929	$10,750	$0	$10,750	3.9	22,269
Electric Unitary HVAC Measures		**4,937**	**4.1**	**0**	**$609**	**$9,138**	**$72,385**	**$2,689**	**$69,696**	**114.4**	**4,972**
ECM 9	Install High Efficiency Air Conditioning Units	3,497	2.9	0	$432	$6,473	$49,407	$1,909	$47,498	110.1	3,522
ECM 10	Install High Efficiency PTAC/PTHP	1,440	1.2	0	$178	$2,665	$22,978	$780	$22,198	124.9	1,450
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**381**	**$2,912**	**$58,242**	**$193,492**	**$1,600**	**$191,892**	**65.9**	**44,633**
ECM 11	Install High Efficiency Hot Water Boilers	0	0.0	349	$2,669	$53,386	$185,061	$0	$185,061	69.3	40,912
ECM 12	Install High Efficiency Furnaces	0	0.0	32	$243	$4,856	$8,431	$1,600	$6,831	28.1	3,721
HVAC System Improvements		**1,754**	**0.0**	**58**	**$663**	**$9,736**	**$10,963**	**$0**	**$10,963**	**16.5**	**8,606**
ECM 13	Implement Demand Control Ventilation (DCV)	1,754	0.0	52	$612	$9,174	$10,875	$0	$10,875	17.8	7,823
ECM 14	Install Pipe Insulation	0	0.0	7	$51	$562	$88	$0	$88	1.7	783
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$196**	**$1,957**	**$65**	**$0**	**$65**	**0.3**	**3,000**
ECM 15	Install Low-Flow DHW Devices	0	0.0	26	$196	$1,957	$65	$0	$65	0.3	3,000
Food Service & Refrigeration Measures		**21,627**	**2.2**	**0**	**$2,669**	**$40,569**	**$23,421**	**$850**	**$22,571**	**8.5**	**21,778**
ECM 16	Dishwasher Replacement	12,878	1.5	0	$1,589	$23,835	$18,859	$700	$18,159	11.4	12,968
ECM 17	Refrigerator/Freezer Case Electrically Commutated Motors	4,364	0.5	0	$538	$8,077	$1,213	$0	$1,213	2.3	4,395
ECM 18	Refrigeration Controls	4,385	0.2	0	$541	$8,657	$3,348	$150	$3,198	5.9	4,416
TOTALS (COST EFFECTIVE MEASURES)		**305,921**	**78.8**	**-12**	**$37,655**	**$526,997**	**$195,966**	**$29,484**	**$166,482**	**4.4**	**306,645**
TOTALS (ALL MEASURES)		**325,850**	**84.5**	**421**	**$43,421**	**$628,051**	**$501,279**	**$34,473**	**$466,806**	**10.8**	**377,402**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

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

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X		X
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X		X
ECM 3	Retrofit Fixtures with LED Lamps	X		X
ECM 4	Install Occupancy Sensor Lighting Controls	X		X
ECM 5	Install High/Low Lighting Controls			X
ECM 6	Premium Efficiency Motors			X
ECM 7	Install VFDs on Constant Volume (CV) HVAC	X		X
ECM 8	Install VFDs on Hot Water Pumps			X
ECM 9	Install High Efficiency Electric AC	X		X
ECM 10	Install High Efficiency Packaged Terminal AC/HP	X		X
ECM 11	Install High Efficiency Hot Water Boilers			X
ECM 12	Install High Efficiency Furnaces	X		X
ECM 13	Implement Demand Control Ventilation			X
ECM 14	Install Pipe Insulation			X
ECM 15	Install Low-Flow Domestic Hot Water Devices			X
ECM 16	Dishwasher Replacement	X		X
ECM 17	Refrigerator/Freezer Case Electrically Commutated Motors			X
ECM 18	Refrigeration Controls	X		X

Figure 3 – Funding Options

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

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

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

Individual Measures with SmartStart

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

Turnkey Installation with Direct Install

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

Whole Building Approach with Pay for Performance

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

More Options from Around the State

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

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

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

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

Ongoing Electric Savings with Demand Response

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

2 EXISTING CONDITIONS

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

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

2.1 Site Overview

On February 6, 2019, TRC performed an energy audit at Toussaint l'Ouverture-Marques de Lafayette Middle School located in Elizabeth, New Jersey. TRC met with Eugenio Blanco to review the facility operations and help focus our investigation on specific energy-using systems.

Toussaint l'Ouverture-Marques de Lafayette Middle School is a three-story, 128,333 square foot building built in 1926. Spaces include: classrooms, gymnasium, temporary classroom units (TCU), auditorium, offices, cafeteria, corridors, stairwells, restrooms, lockers, kitchen and mechanical and electrical spaces.

2.2 Building Occupancy

The facility is occupied ten months of the year. Typical weekday occupancy is 137 staff and 1,043 students.

There are also limited weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
Toussaint l'Ouverture-Marques de Lafayette Middle School	Weekday	5:30 AM - 11:00 PM
	Weekend	6:00 AM - 4:00 PM (Saturday Only)

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

In both the new and old sections of the building walls are brick masonry over structural steel; the roof is flat and covered with asphalt strips and is in fair to good condition; and interior walls are brick veneer and/or gypsum drywall interior finish. TCUs have aluminum siding walls over wood frames. The roofs are pitched slightly with corrugated aluminum coverings and are in fair condition.

Most of the windows are double glazed and have aluminum frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. Degraded window and door seals increase drafts and outside air infiltration.

Original Building

Roof of Original Building

Temporary Classroom Unit

New Section

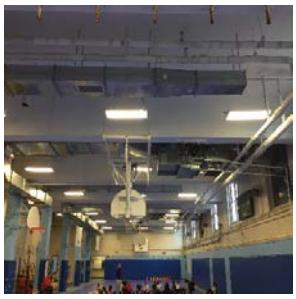
2.4 Lighting Systems

The primary interior lighting systems use fixtures with 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), incandescent, metal halide general purpose lamps as well as one T12 linear fluorescent fixture in the kitchen. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2-lamp or 4-lamp, 4-foot long troffers or surface mounted fixtures. Most fixtures are in good condition.

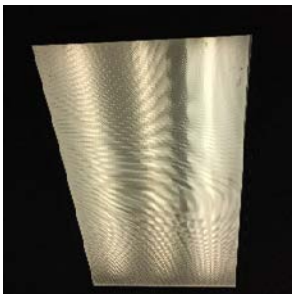
Gymnasium fixtures have high bay linear fluorescent lamps and are controlled with occupancy sensors.

All exit signs are LED units.

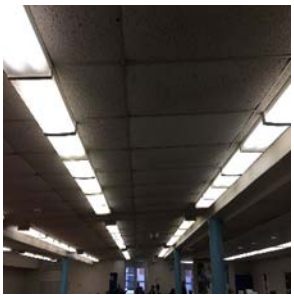
Interior lighting levels were generally sufficient.



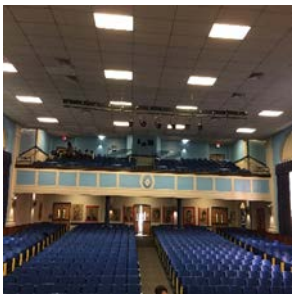
Gym Lighting



Classroom and Office Lights



Cafeteria Lighting



Auditorium Lighting

Most lighting fixtures are controlled manually and the remainder by occupancy sensors.

Occupancy Sensor

Occupancy Sensor

Exterior fixtures include wall packs and canopy lights with high intensity discharge (HID) or LED lamps.

Exterior light fixtures are controlled by a time clock or photocells, depending on the fixture.

TCU Porch Lights

Main Entry Porch Lights

Wall-packs

2.5 Air Handling Systems

Unit Ventilators and Air Handlers

Unit ventilators in each classroom have supply fan motors, outside air dampers and electrically actuated fan coil valves that operate with a manual control system. These units appear to be in fair operating condition.

There are three air-handlers, two of which provide the gym with heating and cooling, and one over the stage in the auditorium which is used for air circulation. Gym air handlers receive hot water from the boiler system and have direct exchange (DX) cooling coils from the 10 ton rooftop Lennox split-system AC units. All air handlers are connected and monitored and/or controlled the EMS.

Packaged and Split-System Units

Temporary classroom units (TCU) are served with packaged terminal air conditioning (PTAC) units controlled by room thermostats. These 10 EER units have a 4-ton cooling capacity and 15 kW electric resistance heating capacity.

The original building section is served by multiple packaged and split-system roof top units, including:

Unit	Quantity	Area Served	Size (tons)	Efficiency (EER or SEER)
Ductless Mini-Split AC	1	Server Room	2.00	19.00
Packaged AC	2	Room 229 and 320	10.00	10.30
Packaged AC	2	Auditorium	17.00	11.00
Packaged AC	1	ERU3	6.00	11.60
Split-System AC	2	Gymnasium	10.00	11.20
Packaged AC	1	Classrooms	8.50	9.00
Split-System AC	1	Classroom	1.00	10.00
Ductless Mini-Split AC	1	Small Gym	1.00	10.00
Packaged AC	2	Room 120, 121	5.00	11.50
Packaged AC	1	Room 124A/B	3.00	11.50

Refer to Appendix A for detailed information about each unit.

Air Conditioners

The newer section of the facility uses window air conditioning (AC) units. These vary in capacity between 3/4 ton and 1.5 tons. The units are in fair or good condition. They range in efficiency between 10 EER to 10.7 EER and are not ENERGY STAR® labeled.

The HVAC system uses pneumatic controls. A 6 hp (two 3 hp compressors) air compressor located in the boiler room serves the pneumatic system. No air leaks were observed during the inspection.

Ductless Mini-Split System

Packaged AC

Energy Recovery Units

Window AC

2.6 Heating Hot Water Systems

Two Smith 5,400 MBh output hot water boilers serve the heating load of the old and new sections of the building, but not the TCUs. The burners are non-modulating with a nominal efficiency of 80%. The boilers are configured in an automated control scheme. Both boilers may be required under high load conditions.

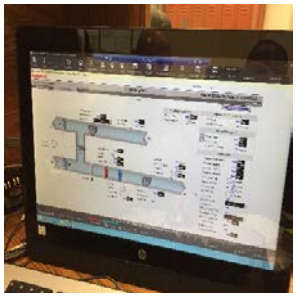
The boilers are configured in a constant flow primary distribution with two 10 hp constant speed hot water pumps operating with an automated control scheme. The boilers provide hot water to unit ventilators, air-handlers, and energy recovery units throughout the building.

Hot Water Boilers

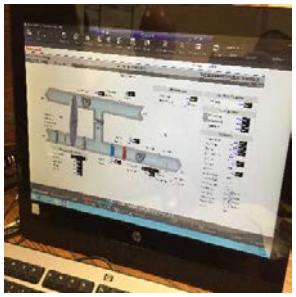
Hot Water Pumps

2.7 Building Energy Management Systems (EMS)

A Honeywell Building Solutions EMS controls the boilers, the air handlers, and energy recovery units in the old section of the building. The EMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, and heating water loop temperatures. The new section and TCUs are controlled manually.



AHU Dashboard



ERU Dashboard

2.8 Domestic Hot Water

Hot water for most of the facility is produced with an 82 gallon, 500 MBh gas-fired storage water heater with an 80% efficiency and a 19 gallon, 4.5 kW electric storage water heater which serves the new section of the school.

One 1/6 hp circulation pump distributes water to end uses. The circulation pump operates continuously.

The domestic hot water pipes are partially insulated, and the insulation is in fair condition.

Storage Hot Water Heater

Domestic Hot Water Pump

2.9 Food Service Equipment

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

The dishwasher is a non- ENERGY STAR® high temperature, conveyor type unit.

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

Convection Oven

Steamer

Dishwasher

Insulated Food Cabinet

2.10 Refrigeration

The kitchen has several stand-up refrigerators with solid doors. There are three milk cooler chests as well. All equipment is in fair condition.

The walk-in refrigerator has an estimated 3/4 ton compressor located in a closet adjacent the kitchen and has a two fan evaporator.

The walk-in medium temperature freezer has a 3/4 ton compressor located in a closet adjacent the kitchen and has a two fan evaporator.

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

Walk-in Cooler/Freezer Compressors

Walk-in Cooler/Freezer Evaporators

Milk Cooler

Commercial Refrigerator

2.11 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 1.29% of total building energy use. This is lower than a typical building.

The staff seems to already be doing a great job managing the electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are approximately 114 computer work stations throughout the facility. Plug loads throughout the building include general classroom and office equipment. Typical loads include appliances such as printers, projectors, microwaves, water coolers, coffee makers, and copiers.

There are several residential style refrigerators throughout the building that are used to store various groceries and beverages. These vary in condition and efficiency.

Copier

Projector

2.12 Water-Using Systems

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

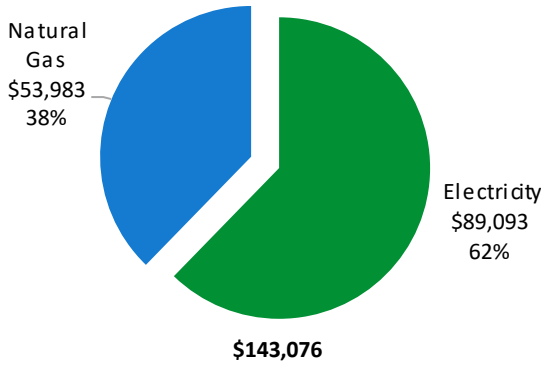
Lavatory Sink

Urinals

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	722,046 kWh	$89,093
Natural Gas	70,663 Therms	$53,983
Total		**$143,076**



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

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

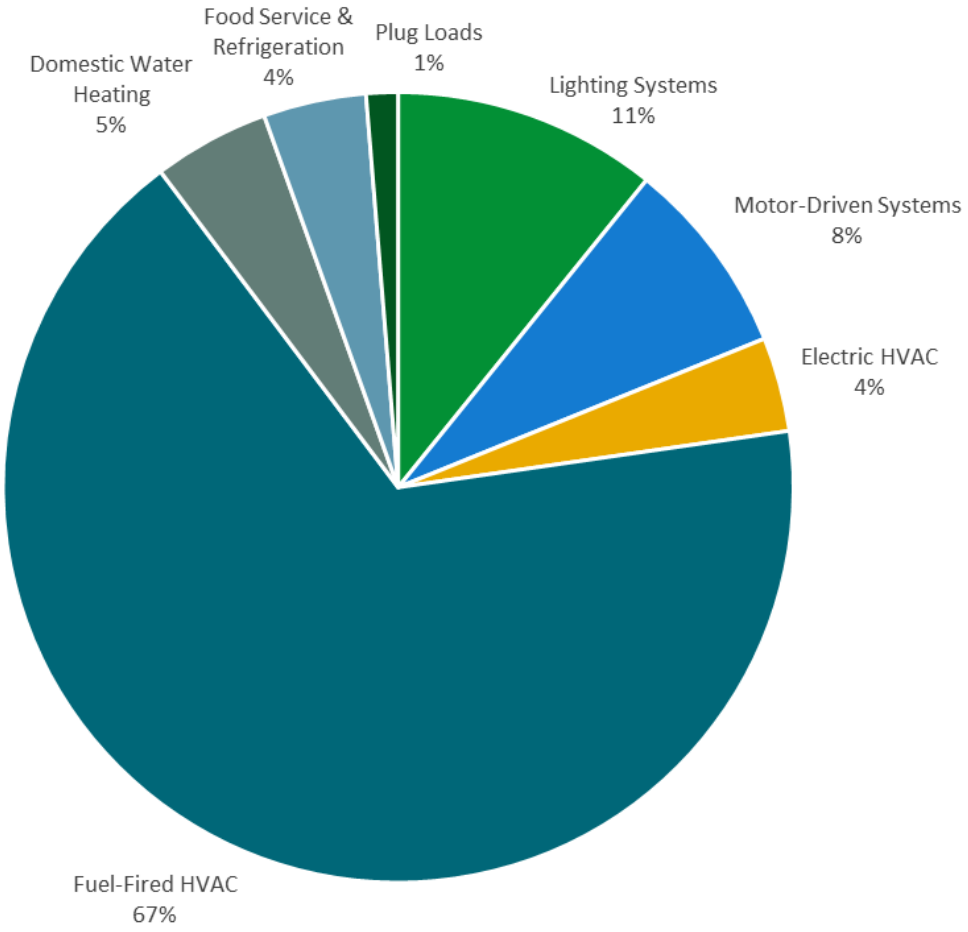
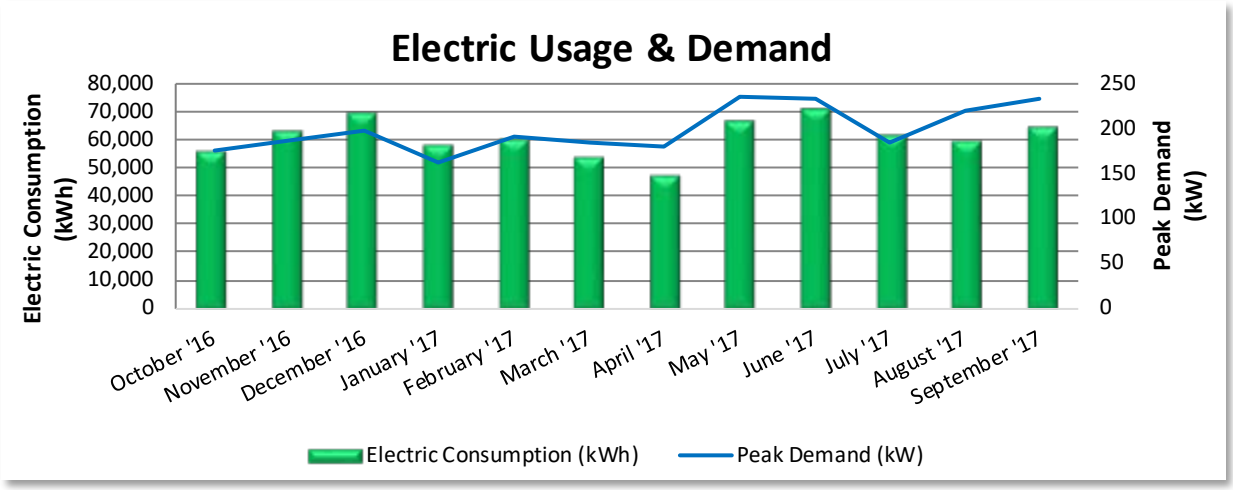


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class General and Large Lighting and Power, with electric production provided by a third-party supplier.



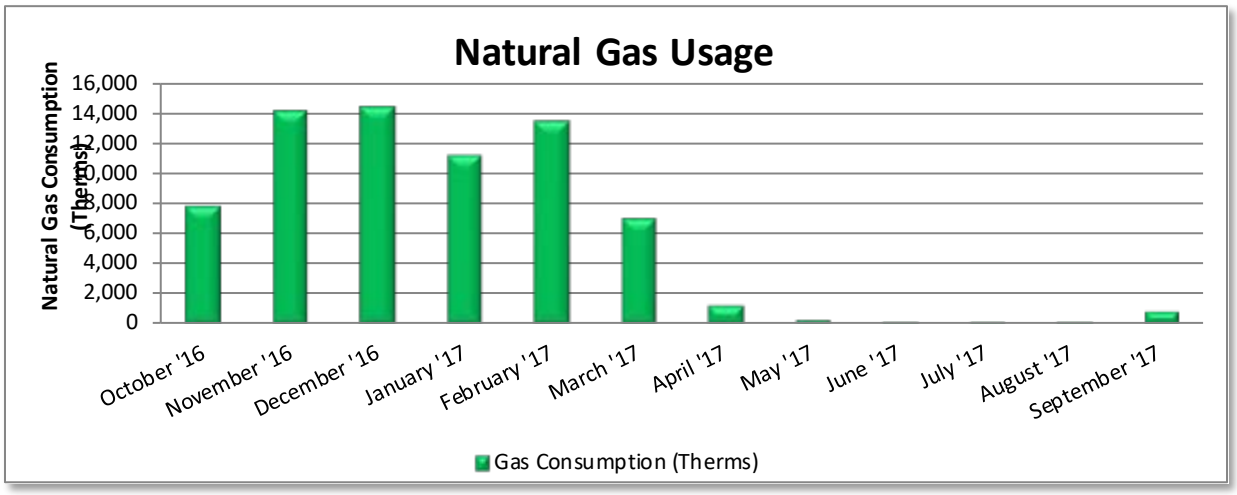
Electric Billing Data						
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**	**TRC Estimated Usage?**
11/14/16	31	55,492	176	$564	$6,428	No
12/15/16	31	62,341	187	$600	$7,169	Yes
1/18/17	34	69,190	198	$735	$7,611	No
2/15/17	28	57,635	161	$600	$6,390	No
3/17/17	30	59,988	191	$716	$6,726	No
4/18/17	32	53,509	185	$594	$6,154	Yes
5/17/17	29	47,030	179	$675	$5,463	No
6/16/17	30	66,194	236	$888	$9,582	No
7/18/17	32	70,584	233	$877	$9,957	No
8/16/17	29	60,877	185	$697	$8,438	No
9/15/17	30	58,982	221	$839	$8,744	No
10/16/17	31	64,180	233	$920	$6,919	No
Totals	**367**	**726,002**	**236**	**$8,705**	**$89,581**	
Annual	**365**	**722,046**	**236**	**$8,657**	**$89,093**	

Notes:

- Peak demand of 236 kW occurred in May 2017.
- The average electric cost over the past 12 months was $0.123/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.
- Electricity consumption and demand are both greatest in the May and June due to increased cooling load served by electric air-conditioning equipment.

3.2 Natural Gas

Elizabethtown Gas delivers natural gas under rate class General Delivery, with natural gas supply provided by UGI Energy Services, a third-party supplier.



Gas Billing Data				
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**	**TRC Estimated Usage?**
11/15/16	29	7,783	$5,245	No
12/15/16	30	14,055	$9,618	Yes
1/16/17	32	14,303	$9,619	Yes
2/15/17	30	11,092	$7,117	Yes
3/16/17	29	13,412	$8,795	No
4/17/17	32	6,990	$7,108	No
5/16/17	29	1,261	$1,268	No
6/15/17	30	336	$1,028	No
7/17/17	32	160	$927	No
8/18/17	32	157	$929	No
9/15/17	28	198	$958	No
10/17/17	32	914	$1,370	Yes
Totals	**365**	**70,663**	**$53,983**	
Annual	**365**	**70,663**	**$53,983**	

Notes:

- The average gas cost for the past 12 months is $0.764/therm, which is the blended rate used throughout the analysis.
- Natural gas consumption is greatest during the winter months when increased heating loads are served by the hot water boiler.

3.3 Benchmarking

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

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

Benchmarking Score	33

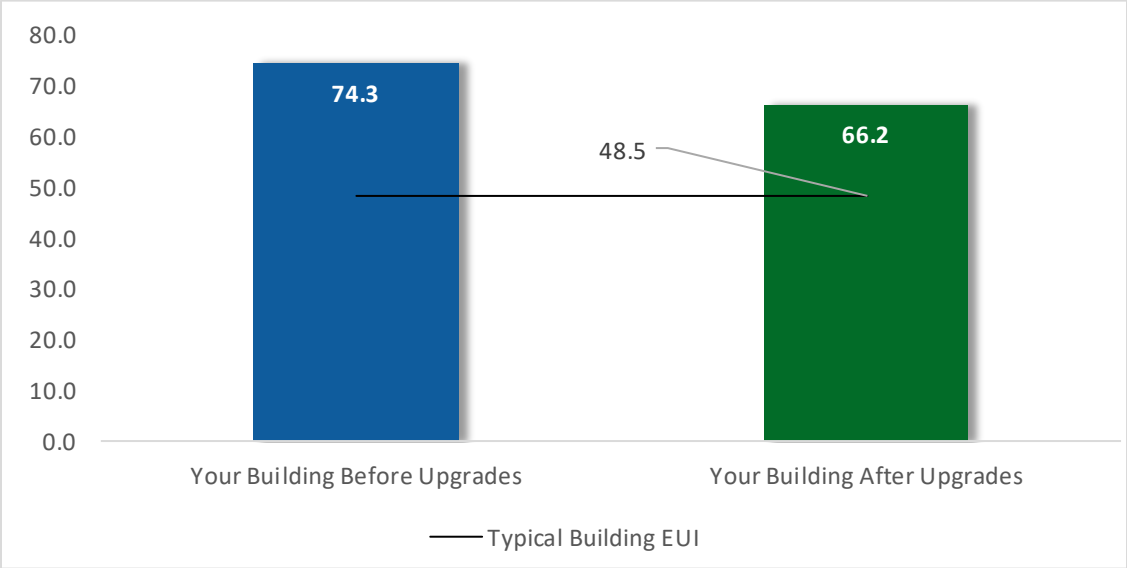


Figure 6 - Energy Use Intensity Comparison

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

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

Tracking Your Energy Performance

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

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

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

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[3].

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

4 ENERGY CONSERVATION MEASURES

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

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

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

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

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

#	Energy Conservation Measure	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		**173,847**	**45.4**	**-35**	**$21,181**	**$80,971**	**$20,050**	**$60,921**	**2.9**	**170,932**
ECM 1	Install LED Fixtures	5,867	0.8	0	$723	$9,963	$1,010	$8,953	12.4	5,890
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	162	0.0	0	$20	$69	$10	$59	3.0	159
ECM 3	Retrofit Fixtures with LED Lamps	167,818	44.6	-35	$20,439	$70,939	$19,030	$51,909	2.5	164,882
Lighting Control Measures		**43,621**	**11.5**	**-9**	**$5,313**	**$48,280**	**$4,060**	**$44,220**	**8.3**	**42,858**
ECM 4	Install Occupancy Sensor Lighting Controls	33,017	8.7	-7	$4,021	$33,480	$4,060	$29,420	7.3	32,439
ECM 5	Install High/Low Lighting Controls	10,604	2.8	-2	$1,292	$14,800	$0	$14,800	11.5	10,419
Motor Upgrades		**360**	**0.1**	**0**	**$44**	**$9,701**	**$0**	**$9,701**	**218.6**	**362**
ECM 6	Premium Efficiency Motors	360	0.1	0	$44	$9,701	$0	$9,701	218.6	362
Variable Frequency Drive (VFD) Measures		**79,704**	**21.2**	**0**	**$9,835**	**$62,001**	**$5,224**	**$56,777**	**5.8**	**80,261**
ECM 7	Install VFDs on Constant Volume (CV) Fans	57,590	19.1	0	$7,106	$51,251	$5,224	$46,027	6.5	57,993
ECM 8	Install VFDs on Heating Water Pumps	22,114	2.1	0	$2,729	$10,750	$0	$10,750	3.9	22,269
Electric Unitary HVAC Measures		**4,937**	**4.1**	**0**	**$609**	**$72,385**	**$2,689**	**$69,696**	**114.4**	**4,972**
ECM 9	Install High Efficiency Air Conditioning Units	3,497	2.9	0	$432	$49,407	$1,909	$47,498	110.1	3,522
ECM 10	Install High Efficiency PTAC/PTHP	1,440	1.2	0	$178	$22,978	$780	$22,198	124.9	1,450
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**381**	**$2,912**	**$193,492**	**$1,600**	**$191,892**	**65.9**	**44,633**
ECM 11	Install High Efficiency Hot Water Boilers	0	0.0	349	$2,669	$185,061	$0	$185,061	69.3	40,912
ECM 12	Install High Efficiency Furnaces	0	0.0	32	$243	$8,431	$1,600	$6,831	28.1	3,721
HVAC System Improvements		**1,754**	**0.0**	**58**	**$663**	**$10,963**	**$0**	**$10,963**	**16.5**	**8,606**
ECM 13	Implement Demand Control Ventilation (DCV)	1,754	0.0	52	$612	$10,875	$0	$10,875	17.8	7,823
ECM 14	Install Pipe Insulation	0	0.0	7	$51	$88	$0	$88	1.7	783
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$196**	**$65**	**$0**	**$65**	**0.3**	**3,000**
ECM 15	Install Low-Flow DHW Devices	0	0.0	26	$196	$65	$0	$65	0.3	3,000
Food Service & Refrigeration Measures		**21,627**	**2.2**	**0**	**$2,669**	**$23,421**	**$850**	**$22,571**	**8.5**	**21,778**
ECM 16	Dishwasher Replacement	12,878	1.5	0	$1,589	$18,859	$700	$18,159	11.4	12,968
ECM 17	Refrigerator/Freezer Case Electrically Commutated Motors	4,364	0.5	0	$538	$1,213	$0	$1,213	2.3	4,395
ECM 18	Refrigeration Controls	4,385	0.2	0	$541	$3,348	$150	$3,198	5.9	4,416
TOTALS		**325,850**	**84.5**	**421**	**$43,421**	**$501,279**	**$34,473**	**$466,806**	**10.8**	**377,402**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.
** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**173,847**	**45.4**	**-35**	**$21,181**	**$80,971**	**$20,050**	**$60,921**	**2.9**	**170,932**
ECM 1	Install LED Fixtures	5,867	0.8	0	$723	$9,963	$1,010	$8,953	12.4	5,890
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	162	0.0	0	$20	$69	$10	$59	3.0	159
ECM 3	Retrofit Fixtures with LED Lamps	167,818	44.6	-35	$20,439	$70,939	$19,030	$51,909	2.5	164,882
Lighting Control Measures		**43,621**	**11.5**	**-9**	**$5,313**	**$48,280**	**$4,060**	**$44,220**	**8.3**	**42,858**
ECM 4	Install Occupancy Sensor Lighting Controls	33,017	8.7	-7	$4,021	$33,480	$4,060	$29,420	7.3	32,439
ECM 5	Install High/Low Lighting Controls	10,604	2.8	-2	$1,292	$14,800	$0	$14,800	11.5	10,419
Variable Frequency Drive (VFD) Measures		**79,704**	**21.2**	**0**	**$9,835**	**$62,001**	**$5,224**	**$56,777**	**5.8**	**80,261**
ECM 7	Install VFDs on Constant Volume (CV) Fans	57,590	19.1	0	$7,106	$51,251	$5,224	$46,027	6.5	57,993
ECM 8	Install VFDs on Heating Water Pumps	22,114	2.1	0	$2,729	$10,750	$0	$10,750	3.9	22,269
HVAC System Improvements		**0**	**0.0**	**7**	**$51**	**$88**	**$0**	**$88**	**1.7**	**783**
ECM 14	Install Pipe Insulation	0	0.0	7	$51	$88	$0	$88	1.7	783
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$196**	**$65**	**$0**	**$65**	**0.3**	**3,000**
ECM 15	Install Low-Flow DHW Devices	0	0.0	26	$196	$65	$0	$65	0.3	3,000
Food Service & Refrigeration Measures		**8,749**	**0.7**	**0**	**$1,080**	**$4,561**	**$150**	**$4,411**	**4.1**	**8,810**
ECM 17	Refrigerator/Freezer Case Electrically Commutated Motors	4,364	0.5	0	$538	$1,213	$0	$1,213	2.3	4,395
ECM 18	Refrigeration Controls	4,385	0.2	0	$541	$3,348	$150	$3,198	5.9	4,416
TOTALS		**305,921**	**78.8**	**-12**	**$37,655**	**$195,966**	**$29,484**	**$166,482**	**4.4**	**306,645**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.
** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**173,847**	**45.4**	**-35**	**$21,181**	**$80,971**	**$20,050**	**$60,921**	**2.9**	**170,932**
ECM 1	Install LED Fixtures	5,867	0.8	0	$723	$9,963	$1,010	$8,953	12.4	5,890
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	162	0.0	0	$20	$69	$10	$59	3.0	159
ECM 3	Retrofit Fixtures with LED Lamps	167,818	44.6	-35	$20,439	$70,939	$19,030	$51,909	2.5	164,882

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

ECM 1: Install LED Fixtures

Replace existing fixtures containing HID (specifically metal halide and high-pressure sodium) lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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

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

Affected building areas: front entryway and exterior fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent fixtures T12 by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

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

Affected building areas: kitchen.

ECM 3: Retrofit Fixtures with LED Lamps

Replace linear fluorescent T8, T5, compact fluorescent and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

Affected building areas: all areas with fluorescent fixtures with T8 tubes; restrooms and girls lockers with incandescent lamps; closets, restrooms, offices, and auditorium with compact fluorescent lamps (CFL); main gym with T5 fluorescent tubes.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**43,621**	**11.5**	**-9**	**$5,313**	**$48,280**	**$4,060**	**$44,220**	**8.3**	**42,858**
ECM 4	Install Occupancy Sensor Lighting Controls	33,017	8.7	-7	$4,021	$33,480	$4,060	$29,420	7.3	32,439
ECM 5	Install High/Low Lighting Controls	10,604	2.8	-2	$1,292	$14,800	$0	$14,800	11.5	10,419

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

ECM 4: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, conference rooms, classrooms, cafeteria, lockers, restrooms, auditorium, and certain storage areas.

ECM 5: Install High/Low Lighting Controls

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

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

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

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

Affected building areas: hallways and front entryway.

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

4.3 Motors

#	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		**360**	**0.1**	**0**	**$44**	**$9,701**	**$0**	**$9,701**	**218.6**	**362**
ECM 6	Premium Efficiency Motors	360	0.1	0	$44	$9,701	$0	$9,701	218.6	362

ECM 6: Premium Efficiency Motors

Replacing the existing motors has a long payback period and may not be justifiable based simply on energy considerations. However, most of the motors at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a premium efficiency motor can be justified by the marginal savings from the improved efficiency. When a fan or pump motor is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Replace standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Affected motors are on the next page:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor
Boiler Room	Boilers	2	Combustion Air Fan	5.0
Roof	Building Exhaust	20	Exhaust Fan	0.3

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**79,704**	**21.2**	**0**	**$9,835**	**$62,001**	**$5,224**	**$56,777**	**5.8**	**80,261**
ECM 7	Install VFDs on Constant Volume (CV) Fans	57,590	19.1	0	$7,106	$51,251	$5,224	$46,027	6.5	57,993
ECM 8	Install VFDs on Heating Water Pumps	22,114	2.1	0	$2,729	$10,750	$0	$10,750	3.9	22,269

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

ECM 7: Install VFDs on Constant Volume (CV) Fans

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

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

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

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

Affected air handlers: main gym and stage air-handlers and energy recovery units.

ECM 8: Install VFDs on Heating Water Pumps

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

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

4.5 Electric Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**4,937**	**4.1**	**0**	**$609**	**$72,385**	**$2,689**	**$69,696**	**114.4**	**4,972**
ECM 9	Install High Efficiency Air Conditioning Units	3,497	2.9	0	$432	$49,407	$1,909	$47,498	110.1	3,522
ECM 10	Install High Efficiency PTAC/PTHP	1,440	1.2	0	$178	$22,978	$780	$22,198	124.9	1,450

Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When a window, packaged, split-system, or packaged terminal AC units is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Install High Efficiency Air Conditioning Units

Replace standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

ECM 10: Install High Efficiency PTAC

Replace packaged terminal air conditioners and heat pumps (PTAC and PTHP) with high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours.

4.6 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**381**	**$2,912**	**$193,492**	**$1,600**	**$191,892**	**65.9**	**44,633**
ECM 11	Install High Efficiency Hot Water Boilers	0	0.0	349	$2,669	$185,061	$0	$185,061	69.3	40,912
ECM 12	Install High Efficiency Furnaces	0	0.0	32	$243	$8,431	$1,600	$6,831	28.1	3,721

ECM 11: Install High Efficiency Hot Water Boilers

Replace older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

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

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

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

ECM 12: Install High Efficiency Furnaces

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

Note: these units produce acidic condensate that requires proper drainage.

This measure is part of a measure to replace package units at this site and as such must be considered in combination with ECM 9.

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

4.7 HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**1,754**	**0.0**	**58**	**$663**	**$10,963**	**$0**	**$10,963**	**16.5**	**8,606**
ECM 13	Implement Demand Control Ventilation (DCV)	1,754	0.0	52	$612	$10,875	$0	$10,875	17.8	7,823
ECM 14	Install Pipe Insulation	0	0.0	7	$51	$88	$0	$88	1.7	783

ECM 13: Implement Demand Control Ventilation (DCV)

Demand control ventilation (DCV) monitors the indoor air's carbon dioxide (CO_2) content to measure room occupancy. This data is used to regulate the amount of outdoor air provided to the space for ventilation.

Standard ventilation systems often provide outside air based on a space's estimated maximum occupancy but not actual occupancy. During low occupancy periods, the space may then be over ventilated. This wastes energy through heating and cooling the excess outside air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels. DCV is most suited for facilities where occupancy levels vary significantly from hour to hour and day to day.

Energy savings associated with DCV are based on hours of operation, space occupancy, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

Affected building areas: gymnasium and auditorium.

DCV has a long payback and may not be justifiable based simply on energy considerations. However, most of the units at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing adding DCV can be justified by the marginal savings from the improved efficiency. When gymnasium or auditorium units are eventually replaced, consider integrating DCV.

ECM 14: Install Pipe Insulation

Install insulation on heating water system piping. Distribution system losses are dependent on water system temperature, the size of the distribution system, and the level of insulation of the piping. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is exposed to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

4.8 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**26**	**$196**	**$65**	**$0**	**$65**	**0.3**	**3,000**
ECM 15	Install Low-Flow DHW Devices	0	0.0	26	$196	$65	$0	$65	0.3	3,000

ECM 15: Install Low-Flow DHW Devices

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

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm

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

Additional cost savings may result from reduced water usage.

4.9 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**21,627**	**2.2**	**0**	**$2,669**	**$23,421**	**$850**	**$22,571**	**8.5**	**21,778**
ECM 16	Dishwasher Replacement	12,878	1.5	0	$1,589	$18,859	$700	$18,159	11.4	12,968
ECM 17	Refrigerator/Freezer Case Electrically Commutated Motors	4,364	0.5	0	$538	$1,213	$0	$1,213	2.3	4,395
ECM 18	Refrigeration Controls	4,385	0.2	0	$541	$3,348	$150	$3,198	5.9	4,416

ECM 16: Dishwasher Replacement

Replace existing dishwashers with new energy efficient single-rack conveyor dishwashers. New high efficiency models often use an average of 40% less energy and water, compared to current standard efficiency equipment.

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

ECM 17: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in the walk-in cooler and freezer. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 18: Refrigeration Controls

Install additional controls to optimize the operation of the walk-in cooler and freezer.

Many walk-in coolers and freezers have evaporator fans that run continuously. The measure adds a control system feature to automatically shut off evaporator fans when not needed.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

5 ENERGY EFFICIENT BEST PRACTICES

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

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[4]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Lighting Maintenance

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

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

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

AC System Evaporator/Condenser Coil Cleaning

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

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

HVAC Filter Cleaning and Replacement

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

Boiler Maintenance

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

Furnace Maintenance

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

Water Heater Maintenance

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

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

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense™ website[5] or download a copy of EPA's "WaterSense™ at Work: Best Management Practices for Commercial and Institutional Facilities"[6] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

Procurement Strategies

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

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

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

6 On-site Generation

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

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

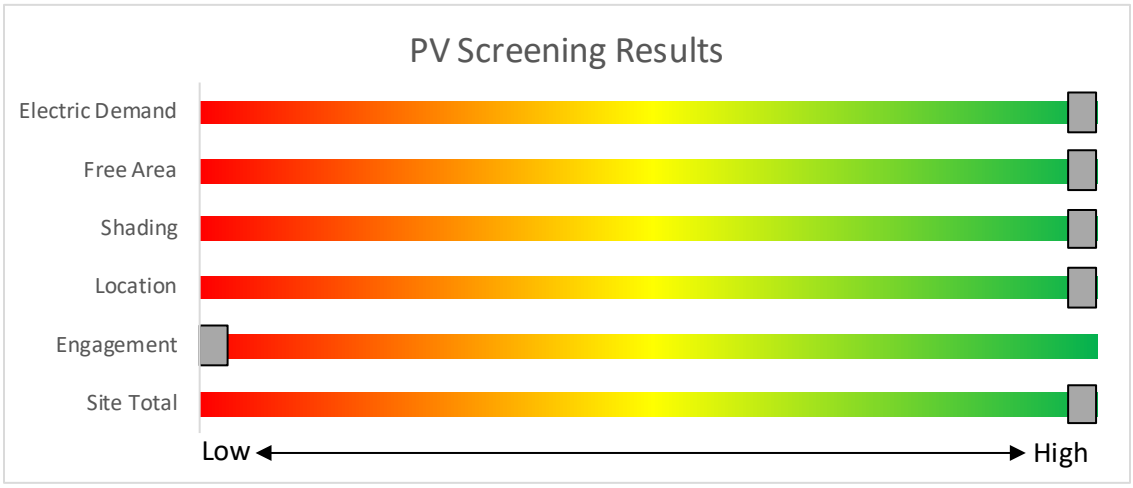
6.1 Solar Photovoltaic

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

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

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

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



Potential	High	
System Potential	275	kW DC STC
Electric Generation	327,627	kWh/yr
Displaced Cost	$40,430	/yr
Installed Cost	$715,000	

Figure 9 - Photovoltaic Screening

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

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

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

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

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

6.2 Combined Heat and Power

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

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

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

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

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

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

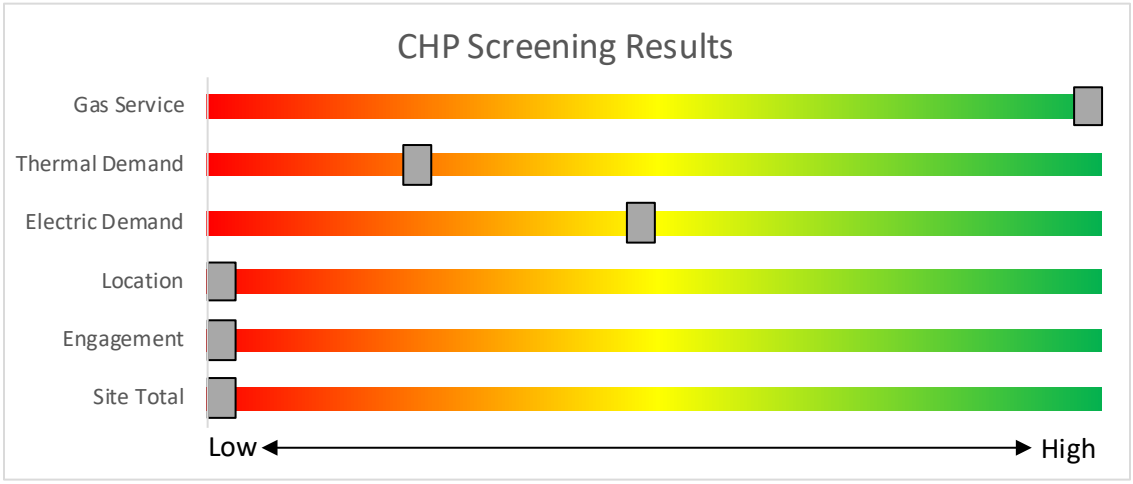


Figure 10 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

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

7.1 SmartStart

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

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

Equipment with Prescriptive Incentives Currently Available:

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

Incentives

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

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

How to Participate

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

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

7.2 Direct Install

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

Incentives

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

How to Participate

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

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

7.3 Pay for Performance - Existing Buildings

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

Incentives

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

How to Participate

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

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

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

7.4 Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

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

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

7.5 SREC Registration Program

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

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey SRECs. 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 Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

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

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

A list of licensed third-party electric suppliers is available at the NJBPU website[7].

8.2 Retail Natural Gas Supply Options

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

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

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

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

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

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

APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Wall Pack	2	High-Pressure Sodium: (1) 100W Lamp	Timeclock		138	4,400	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	41	4,400	0.1	850	0	$105	$1,932	$200	16.5
Wall Pack	1	Metal Halide: (1) 400W Lamp	Timeclock		458	4,400	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	137	4,400	0.2	1,411	0	$174	$966	$100	5.0
Wall Pack	3	Metal Halide: (1) 100W Lamp	Timeclock		128	4,400	1	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	38	4,400	0.1	1,183	0	$146	$2,898	$300	17.8
Wall Pack	4	LED Lamps: One Lamp Screw-in	Timeclock		11	4,400		None	No	4	LED Lamps: One Lamp Screw-in	Timeclock	11	4,400	0.0	0	0	$0	$0	$0	0.0
Front Entry	1	LED Lamps: One Lamp Screw-in	Photocell		13	4,380		None	No	1	LED Lamps: One Lamp Screw-in	Photocell	13	4,380	0.0	0	0	$0	$0	$0	0.0
Front Entry	2	Metal Halide: (1) 150W Lamp	Wall Switch	S	190	2,500	1, 5	Fixture Replacement	Yes	2	LED - Fixtures: Downlight Recessed	High/Low Control	57	1,725	0.2	829	0	$101	$504	$10	4.9
Boiler Room	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3	Relamp	No	19	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.5	1,379	0	$168	$694	$190	3.0
Boiler Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Boiler Storage	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.5	1,663	0	$203	$1,197	$180	5.0
Boiler Storage	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Main Gym	24	Linear Fluorescent - T5: 4' T5 (28W) - 3L	Occupancy Sensor	S	90	2,826	3	Relamp	No	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,826	0.8	3,469	-1	$422	$1,315	$360	2.3
Main Gym	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Gym Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,400	3	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.2	407	0	$50	$292	$80	4.3
Boys Lockers	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	693	0	$84	$489	$95	4.7
Boys Lockers	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.0	173	0	$21	$55	$15	1.9
Boys Lockers	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Boys Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,725	0.0	173	0	$21	$55	$15	1.9
Boys Restroom	8	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,500	3, 4	Relamp	Yes	8	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.0	159	0	$19	$408	$43	18.8
Girls Lockers	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	693	0	$84	$489	$95	4.7
Girls Lockers	12	Incandescent: One Lamp Screw-in	Wall Switch	S	65	2,500	3, 4	Relamp	Yes	12	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.5	1,923	0	$234	$477	$47	1.8
Girls Lockers	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Small Gym	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,155	0	$141	$635	$135	3.6
Small Gym	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.1	407	0	$50	$146	$40	2.1
Auditorium	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	346	0	$42	$380	$65	7.5
Auditorium	18	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	18	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Auditorium	12	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,500	3, 4	Relamp	Yes	12	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.1	239	0	$29	$477	$47	14.8
Auditorium	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	1.3	4,883	-1	$595	$2,293	$550	2.9
Stage	16	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3, 4	Relamp	Yes	16	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,725	0.3	968	0	$118	$562	$115	3.8
Closet	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	739	0	$90	$562	$80	5.4
1st Flr Hallway	110	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 5	Relamp	Yes	110	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,725	3.3	12,702	-3	$1,547	$7,817	$1,100	4.3
1st Flr Hallway	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
New Section Hallway	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 5	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,725	0.3	1,155	0	$141	$765	$100	4.7
New Section Hallway	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 121	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.8	3,052	-1	$372	$1,365	$335	2.8
Room 121 Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	91	0	$11	$37	$10	2.4
Room 121 Closet	1	Compact Fluorescent: (2) 13W Plug-In Lamps	Wall Switch	S	26	2,000	3	Relamp	No	1	LED Lamps: (2) 5W Plug-In Lamps	Wall Switch	10	2,000	0.0	35	0	$4	$50	$2	11.3
Room 120	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.8	3,052	-1	$372	$1,365	$335	2.8
Room 120 Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	91	0	$11	$37	$10	2.4
Room 120 Closet	1	Compact Fluorescent: (2) 13W Plug-In Lamps	Wall Switch	S	26	2,000	3	Relamp	No	1	LED Lamps: (2) 5W Plug-In Lamps	Wall Switch	10	2,000	0.0	35	0	$4	$50	$2	11.3
Closet	1	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	1	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	9	0	$1	$17	$1	14.4
Room 124A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	182	0	$22	$73	$20	2.4
Room 124B	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,750	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.0	127	0	$15	$73	$20	3.4
Room 127	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,750	3	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.2	445	0	$54	$256	$70	3.4
Closet	1	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	1	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	9	0	$1	$17	$1	14.4
Staff Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	462	0	$56	$416	$75	6.1
Room 130	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.4	1,628	0	$198	$854	$195	3.3
Room 130 Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	182	0	$22	$73	$20	2.4
Room 129	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.4	1,628	0	$198	$854	$195	3.3
Storage Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.1	370	0	$45	$416	$40	8.4
Room 132	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 134	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Custodian Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.2	814	0	$99	$562	$115	4.5
Janitorial	1	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	1	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	9	0	$1	$17	$1	14.4
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	346	0	$42	$380	$65	7.5
Room 136	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Cafeteria	95	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	95	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	2.9	10,970	-2	$1,336	$5,089	$1,160	2.9
Cafeteria	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	8	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	23	2,500	3, 4	Relamp	Yes	8	LED Lamps: One Lamp Screw-in	Occupancy Sensor	16	1,725	0.1	262	0	$32	$408	$43	11.4
Storage Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.1	277	0	$34	$380	$30	10.4
Loading Dock	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,750	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.1	381	0	$46	$219	$60	3.4
Kitchen Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	554	0	$68	$489	$60	6.4
Storage Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,400	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.1	152	0	$19	$110	$30	4.3
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	91	0	$11	$37	$10	2.4
Teachers Room	20	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	23	2,500	3, 4	Relamp	Yes	20	LED Lamps: One Lamp Screw-in	Occupancy Sensor	16	1,725	0.2	654	0	$80	$885	$90	10.0
Room 113	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.5	1,963	0	$239	$1,161	$240	3.9
Room 108	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,155	0	$141	$635	$135	3.6
Room 108	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,500	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,725	0.0	117	0	$14	$65	$12	3.7
Closet	2	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	2	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	18	0	$2	$34	$2	14.4
Room 110	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	182	0	$22	$73	$20	2.4
Room 111	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,155	0	$141	$635	$135	3.6
Room 112	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Janitorial	2	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	23	2,000	3	Relamp	No	2	LED Lamps: One Lamp Screw-in	Wall Switch	16	2,000	0.0	30	0	$4	$34	$2	8.8
Room 114	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.6	2,194	0	$267	$1,234	$260	3.6
Room 103	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,500	0.1	193	0	$23	$73	$20	2.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Cloest	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,000	3	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,000	0.0	77	0	$9	$37	$10	2.8
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Room 115	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,270	0	$155	$672	$145	3.4
Room 116	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.5	1,732	0	$211	$818	$185	3.0
Kitchen	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3, 4	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,725	0.3	1,270	0	$155	$923	$175	4.8
Kitchen	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	808	0	$98	$256	$70	1.9
Kitchen	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	2,500	2, 4	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.0	187	0	$23	$69	$10	2.6
Kitchen	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Kitchen Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	91	0	$11	$37	$10	2.4
Stairwell	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.1	545	0	$66	$219	$60	2.4
Stairwell	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Floor Hallway	152	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 5	Relamp	Yes	152	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,725	4.6	17,552	-4	$2,138	$10,750	$1,520	4.3
2nd Floor Hallway	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 210	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Room 205	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,501	0	$183	$745	$165	3.2
Boys Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Room 213	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	462	0	$56	$416	$75	6.1
Room 215	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,750	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.1	381	0	$46	$219	$60	3.4
Room 217	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 217 Restroom	12	Incandescent: One Lamp Screw-in	Wall Switch	S	65	2,500	3, 4	Relamp	Yes	12	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.5	1,923	0	$234	$477	$47	1.8
Room 214	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 216	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Book Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,750	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.1	318	0	$39	$183	$50	3.4
Room 218	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 221	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 220	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 222	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 224	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Girls Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Book Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Room 226	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 227	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Room 228	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 230	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Room 232	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 229	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	182	0	$22	$73	$20	2.4
Room 231	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.6	2,441	-1	$297	$1,146	$275	2.9
Room 234	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.6	2,441	-1	$297	$1,146	$275	2.9
Room 231B	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.3	1,221	0	$149	$708	$155	3.7
Room 236	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Room 238	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Room 240B	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.2	814	0	$99	$562	$115	4.5
Room 240	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Room 241A	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3	Relamp	No	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,500	0.1	241	0	$29	$91	$25	2.3
Janitorial	2	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	2	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	18	0	$2	$34	$2	14.4
Girsl Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	346	0	$42	$380	$65	7.5
Room 242	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Nurses Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,155	0	$141	$635	$135	3.6
Nurses Office	2	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,500	3, 4	Relamp	Yes	2	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.0	40	0	$5	$34	$2	6.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Main Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Main Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,725	0.0	60	0	$7	$18	$5	1.8
Main Office	1	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,500	3, 4	Relamp	Yes	1	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.0	20	0	$2	$17	$1	6.7
Main Office Restroom	4	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,500	3	Relamp	No	4	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,500	0.0	46	0	$6	$69	$4	11.5
Conference Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
Conference Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,725	0.0	60	0	$7	$18	$5	1.8
Room 203	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Closet	2	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	2	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	18	0	$2	$34	$2	14.4
3rd Flr Hallway	153	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 5	Relamp	Yes	153	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,725	4.6	17,667	-4	$2,152	$10,787	$1,530	4.3
3rd Flr Hallway	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 316	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Closet	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	462	0	$56	$453	$50	7.2
Room 318	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 319	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	693	0	$84	$489	$95	4.7
Room 320	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 321	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 322	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Closet	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,000	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,380	0.2	739	0	$90	$562	$80	5.4
Room 324	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Girsl Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	462	0	$56	$416	$75	6.1
Room 327	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.1	462	0	$56	$416	$75	6.1
Room 327	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,500	3, 4	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,725	0.0	60	0	$7	$18	$5	1.8
Room 329	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.5	1,732	0	$211	$818	$185	3.0
Room 326	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 328	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 320	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Stairwell 3	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.1	545	0	$66	$219	$60	2.4
Stairwell 3	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 332	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 334	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Room 335	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.2	610	0	$74	$489	$95	5.3
Room 336	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Stairwell 4	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.1	545	0	$66	$219	$60	2.4
Stairwell 4	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 338	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Room 340	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
VP Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.2	577	0	$70	$453	$85	5.2
VP Office	1	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,500	3, 4	Relamp	Yes	1	LED Lamps: One Lamp Screw-in	Occupancy Sensor	10	1,725	0.0	20	0	$2	$17	$1	6.7
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	182	0	$22	$73	$20	2.4
Closet	1	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	1	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	9	0	$1	$17	$1	14.4
Girls Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.0	182	0	$22	$73	$20	2.4
Room 342	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,725	0.5	1,831	0	$223	$927	$215	3.2
Room 302	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.5	1,732	0	$211	$818	$185	3.0
Stairwell 5	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.1	545	0	$66	$219	$60	2.4
Stairwell 5	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 304	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3
Room 303	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,039	0	$127	$599	$125	3.7
Room 305	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.3	1,270	0	$155	$672	$145	3.4
Closet	2	Compact Fluorescent: One Lamp Screw-in	Wall Switch	S	14	2,000	3	Relamp	No	2	LED Lamps: One Lamp Screw-in	Wall Switch	10	2,000	0.0	18	0	$2	$34	$2	14.4
Room 306	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,500	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,725	0.4	1,386	0	$169	$708	$155	3.3

Motor Inventory & Recommendations

		Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Remaining Useful Life	Annual Operating Hours	ECM #	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	MPS010 Units	2	Supply Fan	3.0	89.5%	No	W	2,745	7	No	89.5%	Yes	2	1.7	5,148	0	$635	$7,768	$480	11.5
Roof	ERU1 and 2	2	Supply Fan	10.0	91.7%	No	W	2,800	7	No	91.7%	Yes	2	5.7	17,084	0	$2,108	$10,303	$1,600	4.1
Roof	ERU1 and 2	2	Return Fan	4.0	89.5%	No	W	2,745	7	No	89.5%	Yes	2	2.4	6,864	0	$847	$7,768	$640	8.4
Roof	ERU3	1	Supply Fan	4.0	89.5%	No	W	2,745	7	No	89.5%	Yes	1	1.1	3,432	0	$423	$3,884	$320	8.4
Roof	ERU3	1	Return Fan	1.3	86.5%	No	W	2,745	7	No	86.5%	Yes	1	0.4	1,154	0	$142	$3,010	$104	20.4
Boiler Room	DHW System	1	Heating Hot Water Pump	0.2	68.5%	No	W	2,745		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Hot Water Heating	1	Heating Hot Water Pump	10.0	89.5%	No	W	3,391	8	No	91.7%	Yes	1	1.1	11,057	0	$1,364	$5,375	$0	3.9
Boiler Room	Hot Water Heating	1	Heating Hot Water Pump	10.0	89.5%	No	B	3,391	8	No	91.7%	Yes	1	1.1	11,057	0	$1,364	$5,375	$0	3.9
Boiler Room	Pneumatic valves	2	Air Compressor	3.0	86.5%	No	W	1,460		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	York DCUC unit	1	Supply Fan	3.0	86.5%	No	B	2,745	7	No	89.5%	Yes	1	0.9	2,824	0	$348	$3,884	$240	10.5
Roof	Room 120, 121	2	Supply Fan	0.8	81.8%	No	B	2,745		No	81.8%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Room 124A/B	1	Supply Fan	0.5	76.2%	No	B	2,745		No	76.2%	No		0.0	0	0	$0	$0	$0	0.0
Portable Classrooms	Portable Classrooms	3	Supply Fan	0.5	76.2%	No	B	2,745		No	76.2%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Boilers	2	Combustion Air Fan	5.0	87.5%	No	B	2,745	6	Yes	88.5%	No		0.1	198	0	$24	$1,708	$0	69.8
Classrooms	Classrooms	76	Supply Fan	0.2	68.5%	No	B	2,745		No	68.5%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Stage	1	Supply Fan	3.0	86.5%	No	W	2,745	7	No	89.5%	Yes	1	0.9	2,824	0	$348	$3,884	$240	10.5
Main Gym	Main Gym	2	Supply Fan	10.0	89.5%	No	W	2,800	7	No	91.7%	Yes	2	5.9	18,260	0	$2,253	$10,750	$1,600	4.1
Roof	Building Exhaust	20	Exhaust Fan	0.3	68.5%	No	W	2,745	6	Yes	69.5%	No		0.0	161	0	$20	$7,993	$0	401.6

Electric HVAC Inventory & Recommendations

		Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Server Room	1	Ductless Mini-Split AC	2.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Cooling, Room 229 and 320	2	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Auditorium (ERU1 and 2)	2	Packaged AC	17.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	ERU3	1	Packaged AC	6.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	ACU 1 and 2	2	Split-System AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	Room 217, 221, 231B	3	Window AC	1.50		W		No							0.0	0	0	$0	$0	$0	0.0
Offices	Nurse Office, Main Office	2	Window AC	1.50		B	9	Yes	2	Window AC	1.50		12.00		0.3	360	0	$44	$3,266	$0	73.5
Offices	Main Office	1	Window AC	0.75		W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	Room 327	1	Window AC	0.75		W		No							0.0	0	0	$0	$0	$0	0.0
Offices	VP Office	1	Window AC	1.50		W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	Room 317, Library	3	Window AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Cooling	1	Packaged AC	8.50		B	9	Yes	1	Packaged AC	8.50		11.50		1.2	1,478	0	$182	$15,148	$621	79.6
Roof	Room Cooling	1	Split-System AC	1.00		B	9	Yes	1	Split-System AC	1.00		14.00		0.2	206	0	$25	$1,496	$92	55.3
Gym	Small Gym	1	Ductless Mini-Split AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Room 120, 121	2	Packaged AC	5.00		B	9	Yes	2	Packaged AC	5.00		14.00		0.9	1,118	0	$138	$22,690	$920	157.8
Roof	Room 124A/B	1	Packaged AC	3.00		B	9	Yes	1	Packaged AC	3.00		14.00		0.3	335	0	$41	$6,807	$276	157.8
Temperary Classroom Units	Temperary Classroom Units	3	Packaged Terminal AC	4.00		B	10	Yes	3	Packaged Terminal AC	4.00		12.00		1.2	1,440	0	$178	$22,978	$780	124.9
Temperary Classroom Units	Temperary Classroom Units	3	Electric Resistance Heat		51.18	B		No							0.0	0	0	$0	$0	$0	0.0

Fuel Heating Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	ERU1 and 2	2	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	ERU3	1	Furnace	96.00	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Heating Hot Water	2	Non-Condensing Hot Water Boiler	######	B	11	Yes	2	Non-Condensing Hot Water Boiler	######	85.00%	Ec	0.0	0	349	$2,669	$185,061	$0	69.3
Roof	York DCUC unit	1	Furnace	161.50	B	12	Yes	1	Furnace	161.50	95.00%	AFUE	0.0	0	15	$114	$3,659	$400	28.6
Roof	Room 120, 121	2	Furnace	72.90	B	12	Yes	2	Furnace	72.90	95.00%	AFUE	0.0	0	12	$89	$3,303	$800	28.1
Roof	Room 124A/B	1	Furnace	64.80	B	12	Yes	1	Furnace	64.80	95.00%	AFUE	0.0	0	5	$40	$1,468	$400	27.0

Demand Control Ventilation Recommendations

		Recommendation Inputs					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Number of Zones	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Gym Ceiling	Gym air handlers	13	4.00	20.00		1,497.00	0.0	642	41	$394	$5,438	$0	13.8
Roof	Auditorium ERUs	13	4.00	34.00		384.00	0.0	1,112	11	$218	$5,438	$0	25.0

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	DHW	14	10	1.50	0.0	0	7	$51	$88	$0	1.7

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	Entire Facility	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Closet	New Section	1	Storage Tank Water Heater (≤ 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Multiple Locations	15	9	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	26	$196	$65	$0	0.3

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	17, 18	Yes	No	Yes	0.4	4,375	0	$540	$2,281	$75	4.1
Kitchen	1	Medium Temp Freezer (0F to 30F)	17, 18	Yes	No	Yes	0.4	4,375	0	$540	$2,281	$75	4.1

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Techers Lounge	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	No		No	0.0	0	0	$0	$0	$0	0.0

Novelty Cooler Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Cooler Description	ECM #	Install Automatic Shutoff Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	3	Milk Coolers		No	0.00	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	FALSE	$0	$0	#DIV/0!
Kitchen	1	Gas Convection Oven (Full Size)	Yes		No	0.0	0	0	FALSE	$0	$0	#DIV/0!
Kitchen	1	Gas Steamer	No		No	0.0	0	0	FALSE	$0	$0	#DIV/0!
Kitchen	1	Gas Convection Oven (Full Size)	No		No	0.0	0	0	FALSE	$0	$0	#DIV/0!

Dishwasher Inventory & Recommendations

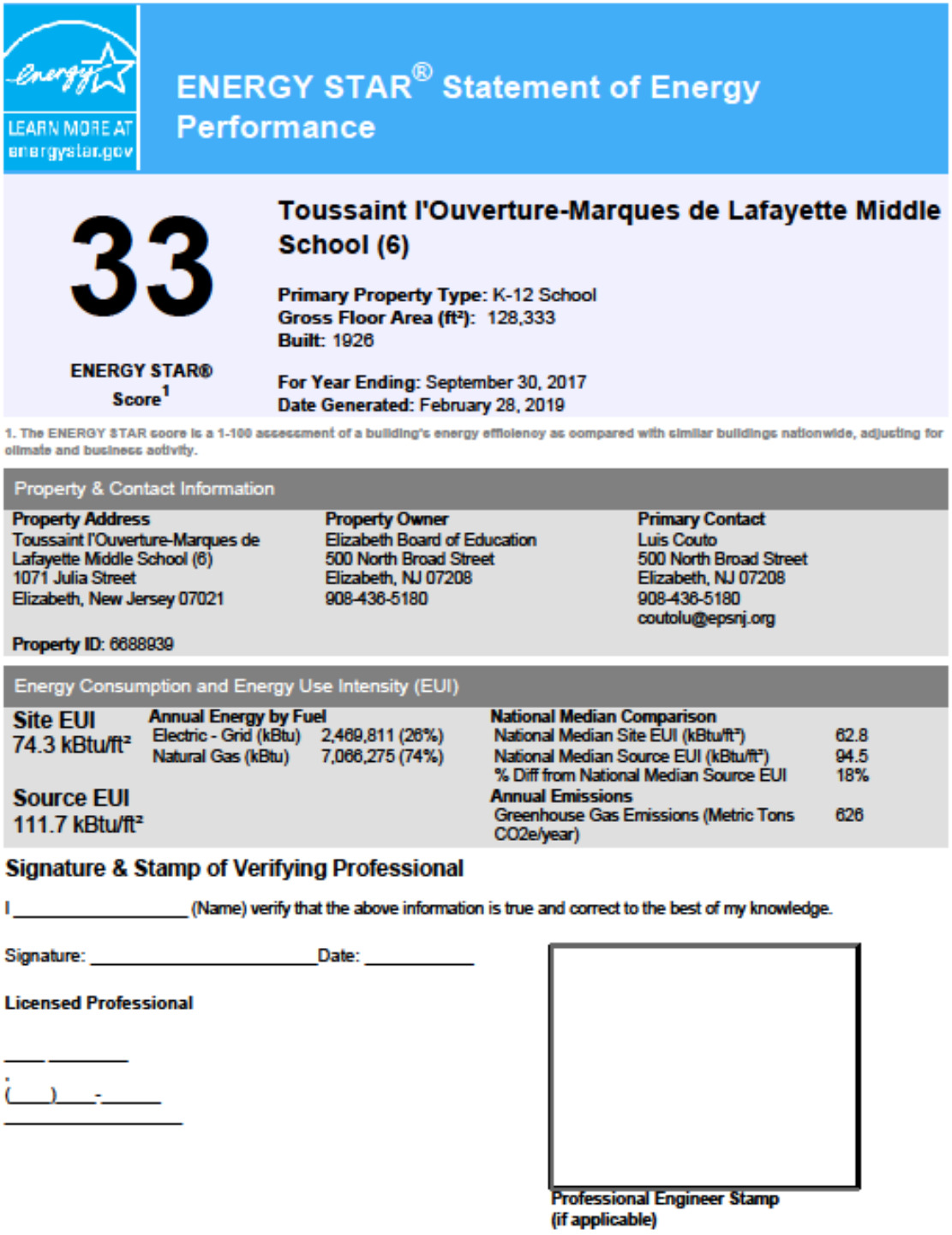
	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	N/A	No	16	Yes	1.5	12,878	0	$1,589	$18,859	$700	11.4

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Multiple Locations	114	Computers	75.0	
Multiple Locations	72	Printers	20.0	
Multiple Locations	13	Microwaves	1,000.0	
Multiple Locations	7	Mini fridge	30.0	
Multiple Locations	5	refrigerator	600.0	
Multiple Locations	5	copier	515.0	
Multiple Locations	2	coffee machine	400.0	
Multiple Locations	2	water cooler	500.0	

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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



ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

33

ENERGY STAR® Score[1]

Toussaint l'Ouverture-Marques de Lafayette Middle School (6)

Primary Property Type: K-12 School
Gross Floor Area (ft²): 128,333
Built: 1926

For Year Ending: September 30, 2017
Date Generated: February 28, 2019

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Toussaint l'Ouverture-Marques de Lafayette Middle School (6) 1071 Julia Street Elizabeth, New Jersey 07021	Elizabeth Board of Education 500 North Broad Street Elizabeth, NJ 07208 908-436-5180	Luis Couto 500 North Broad Street Elizabeth, NJ 07208 908-436-5180 coutolu@epsnj.org

Property ID: 6888939

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
74.3 kBtu/ft²

Source EUI
111.7 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	2,469,811 (26%)
Natural Gas (kBtu)	7,066,275 (74%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	62.8
National Median Source EUI (kBtu/ft²)	94.5
% Diff from National Median Source EUI	18%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	626

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

___ _____
.
(___)___-_____
_____

Professional Engineer Stamp (if applicable)

APPENDIX C: GLOSSARY

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

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

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