Local Government Energy Audit:
Energy Audit Report

Samuel S. Yellin Middle School

Stratford Board of Education

111 Warwick Road

Stratford, NJ 08084

June 5, 2018

Final Report by:

TRC Energy Services

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate saving are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain 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. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Samuel S. Yellin Middle School.

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

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

1.1 Facility Summary

Samuel S. Yellin Middle School is a one-story building totaling 76,682 square feet originally constructed in 1956. The building has a flat roof that is in fair condition and the exterior walls are finished with brick veneer. Interior lighting consists mainly of T8 linear fluorescent fixtures which are mostly controlled with manual wall switches. Heating is provided by three condensing hot water boilers and the cooling system consists of rooftop packaged and split systems air conditioners. The main lobby and the corridors are served by a Greenheck energy recovery ventilation system.

A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated nine measures and recommends seven measures which together represent an opportunity for Samuel S. Yellin Middle School to reduce annual energy costs by $42,479 and annual greenhouse gas emissions by 282,091 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 5.9 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Samuel S. Yellin Middle School's annual energy use by 20%.

Figure 1 – Previous 12 Month Utility Costs

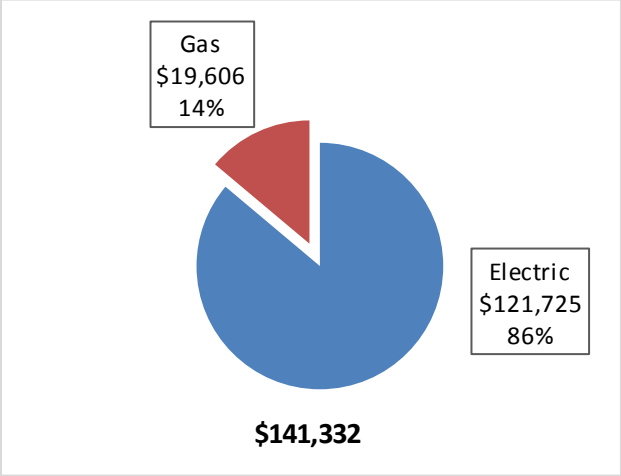
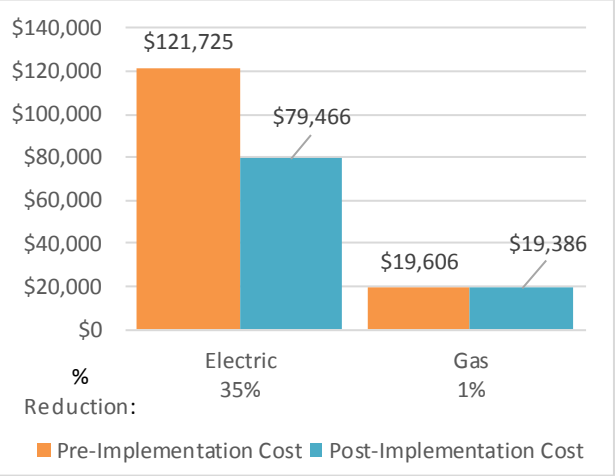


Figure 2 – Potential Post-Implementation Costs



A detailed description of Samuel S. Yellin Middle School's existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**161,245**	**37.3**	**0.0**	**$24,572.30**	**$105,794.92**	**$15,885.00**	**$89,909.92**	**3.7**	**162,373**
ECM 1	Install LED Fixtures	Yes	54,658	9.7	0.0	$8,329.41	$41,170.00	$4,920.00	$36,250.00	4.4	55,040
ECM 2	Retrofit Fixtures with LED Lamps	Yes	106,587	27.6	0.0	$16,242.89	$64,624.92	$10,965.00	$53,659.92	3.3	107,332
Lighting Control Measures			**19,121**	**5.2**	**0.0**	**$2,913.89**	**$20,182.00**	**$3,005.00**	**$17,177.00**	**5.9**	**19,255**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	19,121	5.2	0.0	$2,913.89	$19,256.00	$2,880.00	$16,376.00	5.6	19,255
Variable Frequency Drive (VFD) Measures			**5,713**	**1.0**	**0.0**	**$870.61**	**$13,065.91**	**$0.00**	**$13,065.91**	**15.0**	**5,753**
	Install VFDs on Hot Water Pumps	No	5,713	1.0	0.0	$870.61	$13,065.91	$0.00	$13,065.91	15.0	5,753
Electric Unitary HVAC Measures			**74,925**	**64.4**	**0.0**	**$11,417.83**	**$146,451.15**	**$6,894.00**	**$139,557.15**	**12.2**	**75,449**
ECM 4	Install High Efficiency Electric AC	Yes	74,925	64.4	0.0	$11,417.83	$146,451.15	$6,894.00	$139,557.15	12.2	75,449
HVAC System Improvements			**15,796**	**3.6**	**0.0**	**$2,407.18**	**$5,750.00**	**$2,750.00**	**$3,000.00**	**1.2**	**15,907**
ECM 5	Install Dual Enthalpy Outside Economizer Control	Yes	15,796	3.6	0.0	$2,407.18	$5,750.00	$2,750.00	$3,000.00	1.2	15,907
Domestic Water Heating Upgrade			**2,997**	**0.0**	**40.1**	**$820.13**	**$4,973.94**	**$300.00**	**$4,673.94**	**5.7**	**7,718**
	Install Tankless Water Heater	No	0	0.0	15.9	$143.54	$4,780.35	$300.00	$4,480.35	31.2	1,856
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	2,997	0.0	24.3	$676.59	$193.59	$0.00	$193.59	0.3	5,862
Plug Load Equipment Control - Vending Machine			**3,224**	**0.0**	**0.0**	**$491.26**	**$460.00**	**$0.00**	**$460.00**	**0.9**	**3,246**
ECM 7	Vending Machine Control	Yes	3,224	0.0	0.0	$491.26	$460.00	$0.00	$460.00	0.9	3,246
TOTALS FOR RECOMMENDED MEASURES			**277,308**	**110**	**24**	**$42,479.04**	**$278,831.66**	**$28,534.00**	**$250,297.66**	**5.9**	**282,091**
TOTALS FOR ALL EVALUATED MEASURES			**283,021**	**111.4**	**40.1**	**$43,493.19**	**$296,677.92**	**$28,834.00**	**$267,843.92**	**6.2**	**289,700**

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

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

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

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

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

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

HVAC System Improvements generally involve the installation of automated controls to reduce heating and cooling demand during periods of reduced demand. These measures could encompass changing temperature setpoints, using outside air for free cooling, or limiting excessive outside air during extreme outdoor air temperature conditions. These measures save energy by reducing the demand on HVAC systems and the amount of time systems operate.

Domestic Hot Water upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlets when not in use.

Energy Efficient Practices

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

- Reduce Air Leakage
- Ensure Lighting Controls Are Operating Properly
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Water Conservation

For details on these energy efficient practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Samuel S. Yellin Middle School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	240	kW DC STC
Electric Generation	285,929	kWh/yr
Displaced Cost	$24,880	/yr
Installed Cost	$624,000	

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Pay for Performance - Existing Building (P4P)
- Energy Savings Improvement Program (ESIP)

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

Larger facilities with an interest in a more comprehensive whole building approach to energy conservation should consider participating in the Pay for Performance (P4P) program. Projects eligible for this project program must meet minimum savings requirements. Final incentives are calculated based on actual measured performance achieved at the end of the project. The application process is more involved, and it requires working with a qualified P4P contractor, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located in Section 8 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Denise DiGiandomenico	Business Administrator/Board Secretary	dijohnd@stratford.k12.nj.us	(856) 784-2917 Ext 120
Designated Representative			
Jerry Furman	Supervisor of Operations	furmanj@stratford.k12.nj.us	(609) 868-1167
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On November 9, 2017, TRC performed an energy audit at Samuel S. Yellin Middle School located in Stratford, New Jersey. TRC's auditor met with Jerry Furman to review the facility operations and help focus our investigation on specific energy-using systems.

The 76,682 square foot building is a one-story facility and is comprised of classrooms, conference room, multipurpose room, kitchen, gymnasium, locker rooms, media center, storage rooms and mechanical spaces. The original building was constructed in 1956 with additions and upgrades in 1990, 2000, and 2010 to accommodate additional classrooms and other spaces. It has student enrollment from 4th to 8th grade.

2.3 Building Occupancy

The school operates on a 10 month schedule and is open Monday through Friday. The typical schedule is presented in the table below. During a typical day, the school is occupied by approximately 605 students and staff.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Samuel S. Yellin Middle School	Weekday	7:00 AM - 8:00 PM
Samuel S. Yellin Middle School	Weekend	Closed

2.4 Building Envelope

The one-story building has a concrete foundation, a flat, built up roof. The roof is in fair condition and the site contact noted that it has passed its warranty. Exterior walls for the building are constructed of brick veneer. The windows throughout the facility are in good condition and appear to be well maintained. Typical windows are double pane, clear and tinted glass with aluminum frames. Exterior doors are constructed of metal and glass with aluminum frames. They are in good condition and well maintained.

Image 1: Building Wall & Roof

2.5 On-Site Generation

Samuel S. Yellin Middle School does not have any on-site electric generation capacity. There is one diesel backup generator located outside rear of the building that is used to power emergency lighting in case of a major power outage.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting is provided mainly by 32-Watt T8 linear fluorescent lamps with electronic ballasts. Most of the fixtures are 2 or 3-lamp, 4-foot long troffers. The gymnasium is illuminated with 400-Watt metal halide lamps while the multipurpose room is using high output, linear fluorescent T5 lamps. A very small number of 60-Watt incandescent lights were found in the facility. Interior lighting control is provided mainly by manual wall switches except for the corridors in which the lighting systems are controlled by the building management system. Exit signs throughout the facility are primarily LED. The facility exterior lighting system is comprised of 34-Watt recessed compact fluorescent lamps, 150-Watt high pressure sodium outdoor wall mounted fixtures, and 400-Watt metal halide pole lighting. Exterior fixtures are controlled by timers.

Image 2: Interior & Exterior Lighting

Hot Water Heating System

Heating hot water for the building is provided by three Centauri Plus condensing hot water boilers. Each boiler has an output capacity of 1,920 MBh and a nominal combustion efficiency of 96%. There are several heating loops serving the various additions.

For the main building, two variable speed 10 hp hot water pumps and two 3 hp constant speed hot water pumps distribute the heating hot water to point of distribution heating devices. The larger pumps operate in lead/lag configuration. The boilers and the four pumps serving the main building are all located in Room C6.

The 1990 and 2000 sections of the facility are served respectively by two 1.5 hp and two 2.0 hp constant speed hot water pumps. These pumps are located in room D6.

The point of distribution heating devices includes fan coil units, cabinet heaters, heating coils in air handling units and perimeter fin tube radiation.

The boilers are controlled by the OnTrac® Boiler Management System that is designed to perform all of the function of a typical Boiler Management System BMS (BMS). The system works in concert with the individual boiler controls to maintain optimum load matching and balance boiler run time. The hot water system is enable based upon outside air temperature. Boilers are automatically rotated based on run time. The boiler with the least amount of run time will become the lead boiler and the boiler that logs more run time than the others will be the last boiler fired. The boilers are seven years old are well maintained.

Image 3: Heating Hot Water System

Direct Expansion Air Conditioning System (DX)

The cooling system consists of 20 Daikin variable refrigerant flow heat pumps, nine split system air conditioners, and 12 packaged ACs all located on the rooftop. The units utilize scroll compressors and direct-expansion coils. Refer to the table below for the observed condition of the units. The packaged ACs are controlled via a Johnson Controls Energy Management System while the split systems are controlled with programmable thermostats.

System Type	Quantity	Capacity (Ton)	Areas Served	Manufacturer	Age (Years)	Condition
Split System Heat Pump	9	10	Classrooms, Corridors	Daikin	9	Good
Split System Heat Pump	6	6	Main Office, Main Lobby, Classrooms	Daikin	9	Good
Split System Heat Pump	5	8	Classrooms	Daikin	7	Good
Package AC	1	20	Multipurpose Room	AAON	7	Good
Packaged AC	2	4	Rooms F1, F3	Lux Aire	17	Fair
Packaged AC	1	10	Media Center	Lux Aire	17	Fair
Packaged AC	6	4	Faculty & Child Study Rooms, Classrooms	Trane	16	Fair
Packaged AC	1	5	Room E5, RTU3	Trane	16	Fair
Packaged AC	1	2.5	Room E7, RTU1	Trane	16	Fair
Split System AC	4	16	Gymnasiums	McQuay	27	Poor
Split System AC	1	5	Stage	Unknown	27	Poor
Split System AC	1	0.75	Custodian Office	Sanyo	3	Good

Image 4: Cooling System

Ventilation System

The corridors and some common areas of the facility are ventilated by seven rooftop Greenheck energy recovery ventilation units. The units provide fresh outdoor air to meet ASHRAE 62 ventilation rates while recovering energy from the exhaust air stream. The benefits include improved indoor humidity levels, reduced energy costs and lower first cost for air conditioning (due to reduction in outdoor air load). Each unit has one supply and one exhaust fan. They are controlled via a Johnson Controls Energy Management System. The units are five years old and all appear in good condition. Air is exhausted from the toilets and corridors through roof mounted exhaust fans.

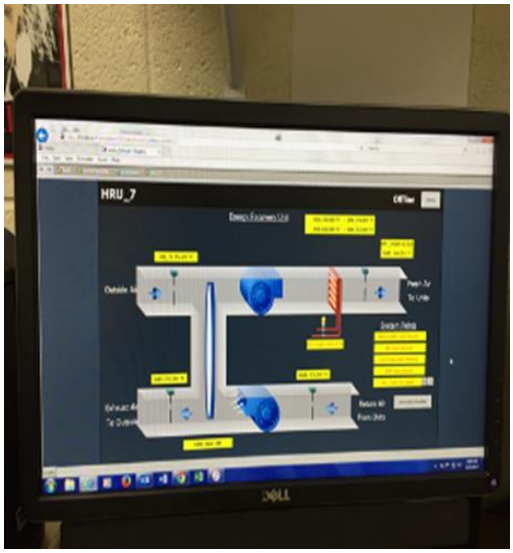


Image 5: Energy Recovery Ventilation System

Building Energy Management System (BEMS)

Most of the facility HVAC is controlled with a Johnson Controls building energy management system (BEMS). The BEMS aggregates the direct digital control (DDC) points from throughout the building and makes instant adjustments to maintain comfort while lowering energy usage. The boilers and the packaged rooftop units are all controlled by the BEMS system, which is capable of providing trends for individual DDC points for up to one-year of historical data. Also, the corridor lighting system is controlled by the BEMS system.

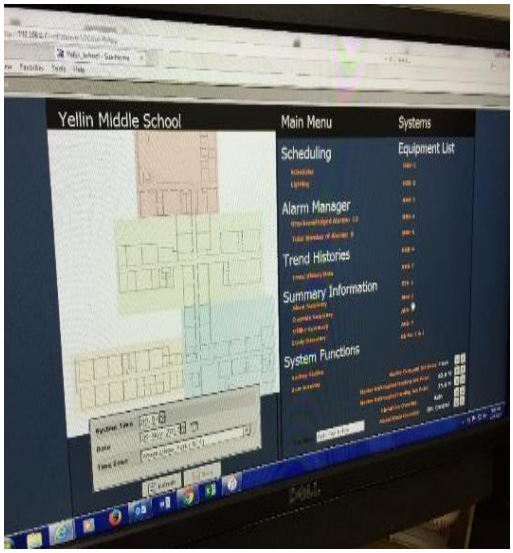


Image 6: Building Energy Management System

Domestic Water Heating System

The facility domestic water heating system consists of two gas fired and one electric Bradford White water heaters. The kitchen, nurse's office and the classrooms are served by one 75 gallon storage tank gas fired water heater located in room C6, which has an input rating of 76 MBh and a nominal efficiency of 80%. It is 12 years old and in good condition. The 1990 addition of facility has a 365.75 MBh domestic water heating boiler with a combustion efficiency of 77%. It has a 300 gallon separate storage tank. One 0.8 hp circulation pump distributes 120°F water to this section of the facility. The boiler is located in Room D6, is 30 years old, and appears to be in poor condition. The E wing of the facility is served by one 50 gallon electric storage tank hot water heater with an input rating of 4.5 kW. The heater is 17 years old.

Image 7: Domestic Hot Water System

Food Service & Refrigeration

The school houses a small institutional kitchen. The kitchen includes an electric cooking oven, insulated food holding cabinet, five standup refrigerators and two standup freezers. The kitchen is well maintained.

Building Plug Load

The building has approximately 57 computers with LCD monitors and 41 laptops that are used daily, plus servers, seven large photocopiers, 31 printers, five water coolers and nine small refrigerators. The computers, monitors, and printers seemed to be all recent models designed with power management software to reduce power when they sit idle for more than a few minutes. The facility has two refrigerated vending machines located in the faculty and multipurpose room.

2.7 Water-Using Systems

There are several restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm), the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf. There is no restroom with showers.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

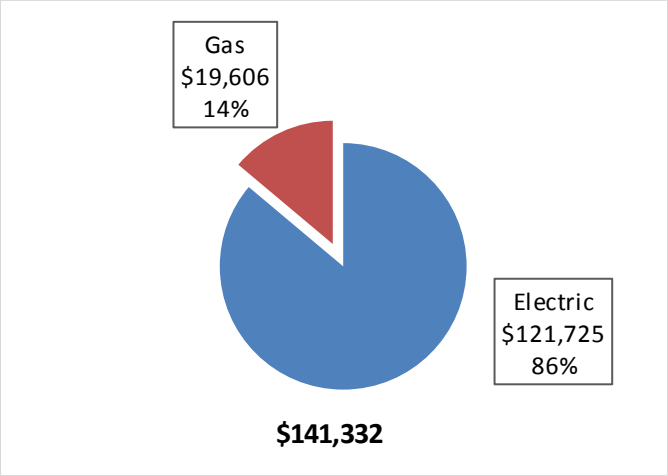
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Samuel S. Yellin Middle School		
Fuel	**Usage**	**Cost**
Electricity	798,772 kWh	$121,725
Natural Gas	21,654 Therms	$19,606
Total		**$141,332**

The current annual energy cost for this facility is $141,332 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.152/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below. The electricity use profile reflects high occupancy in the summer months.

Figure 9 - Electric Usage & Demand

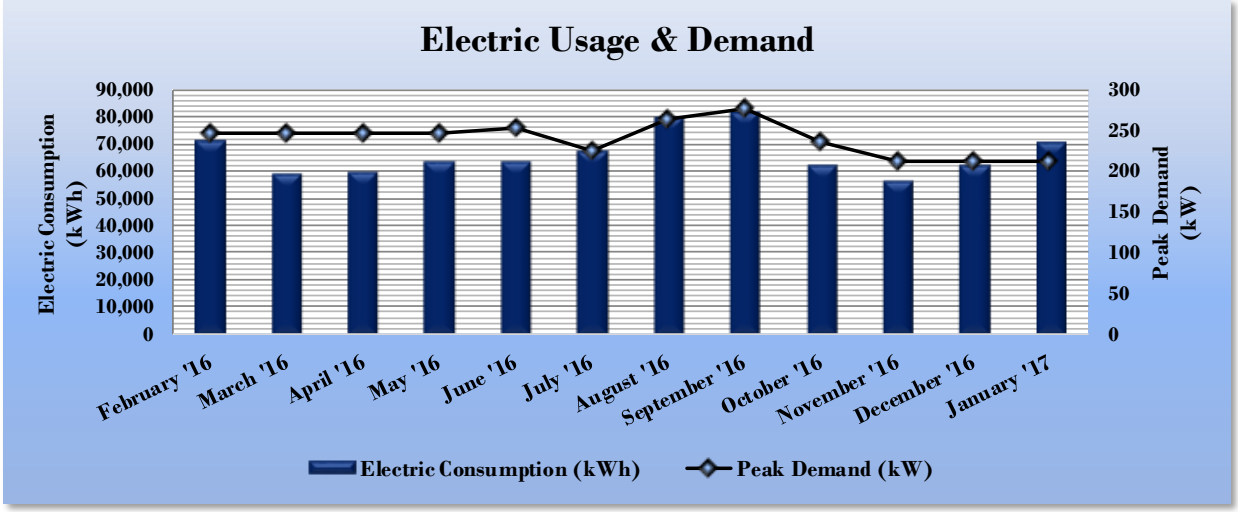


Figure 10 - Electric Usage & Demand

Electric Billing Data for Samuel S. Yellin Middle School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
3/1/16	31	71,276	247	$10,417	No
4/4/16	30	58,878	247	$9,159	No
5/4/16	31	59,888	247	$9,129	No
6/3/16	30	63,845	247	$9,594	No
7/6/16	31	63,878	252	$10,192	No
8/4/16	31	67,790	224	$10,138	No
9/2/16	30	79,985	264	$11,884	No
10/5/16	31	81,565	276	$12,716	No
11/3/16	30	62,419	236	$9,631	No
12/6/16	31	56,589	212	$9,082	No
1/5/17	31	62,190	212	$9,474	No
2/3/17	28	70,469	212	$10,310	No
Totals	**365**	**798,772**	**276.41**	**$121,725**	0
Annual	**365**	**798,772**	**276.41**	**$121,725**	

3.3 Natural Gas Usage

Natural gas is provided by South Jersey Gas. The average gas cost for the past 12 months is $0.905/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. The gas use profile is typical for a facility with a significant heating load relative to other ends.

Figure 11 - Natural Gas Usage

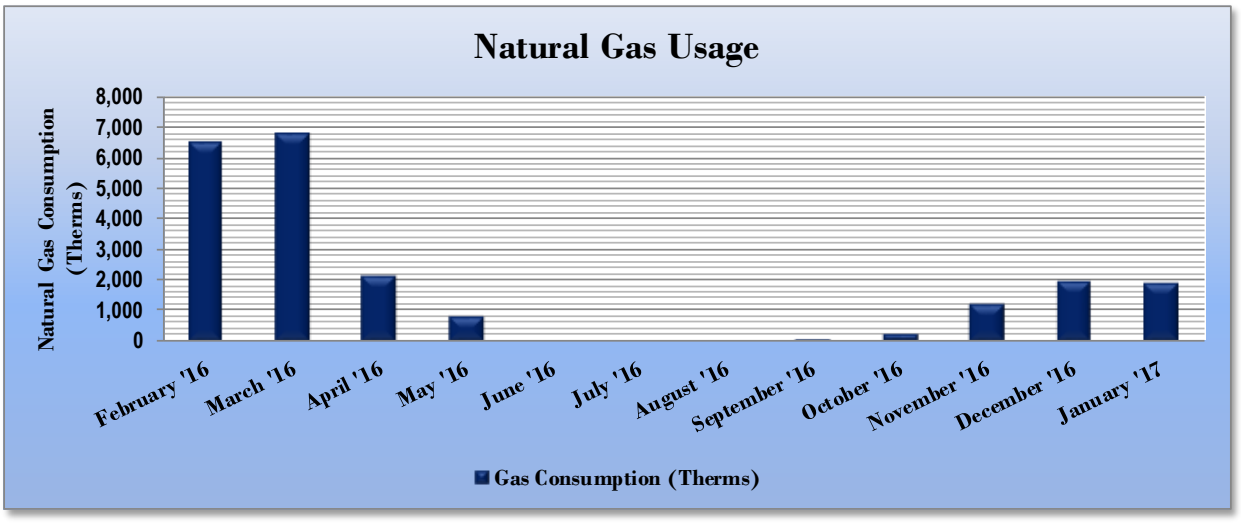


Figure 12 - Natural Gas Usage

Gas Billing Data for Samuel S. Yellin Middle School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
3/4/16	31	6,517	$5,694
4/6/16	30	6,823	$5,945
5/5/16	31	2,167	$1,881
6/6/16	30	809	$718
7/6/16	31	0	$20
8/4/16	31	0	$28
9/2/16	30	0	$28
10/5/16	31	21	$50
11/3/16	30	228	$245
12/6/16	31	1,204	$1,177
1/5/17	31	1,982	$1,949
2/3/17	28	1,903	$1,870
Totals	**365**	**21,654**	**$19,606**
Annual	**365**	**21,654**	**$19,606**

3.4 Benchmarking

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

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of "site energy" and "source energy." Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Samuel S. Yellin Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	141.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	63.8	58.2

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

Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Samuel S. Yellin Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	102.2	141.4
Site Energy Use Intensity (kBtu/ft^2)	51.1	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 40.

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

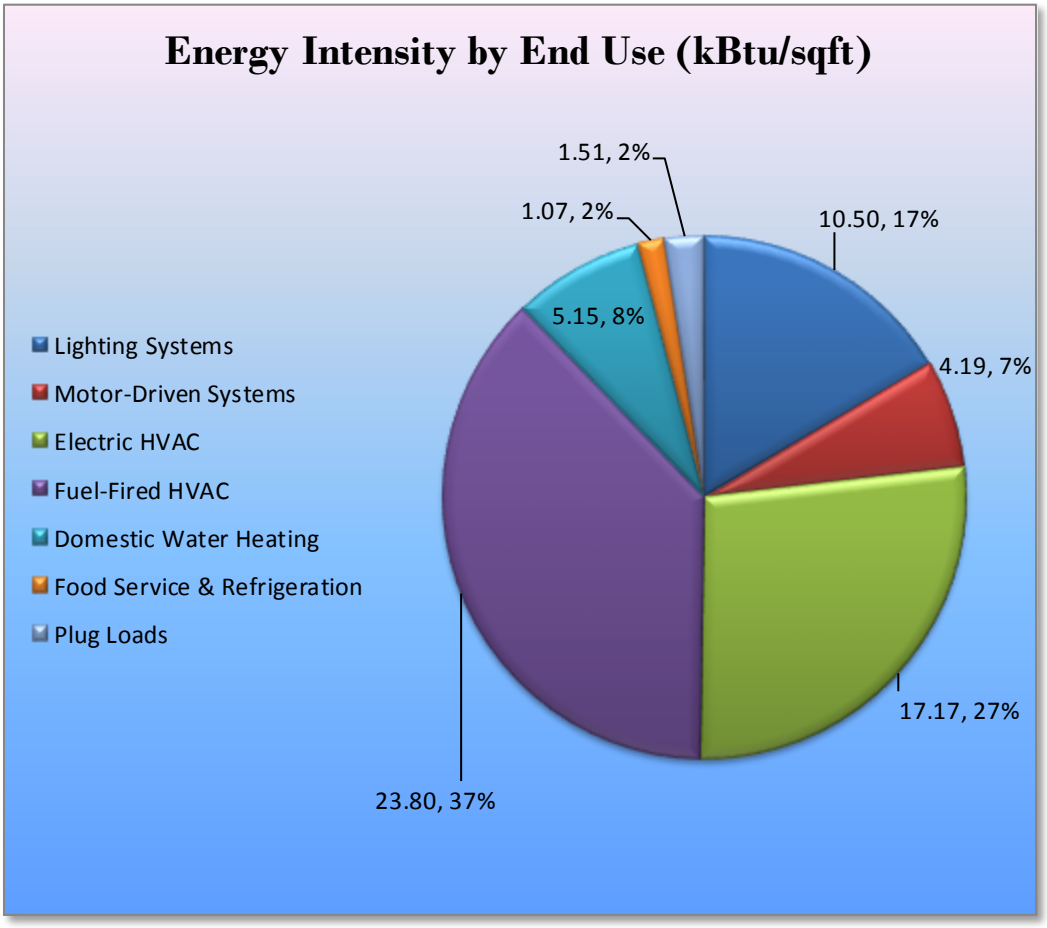
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 15 - Energy Balance (kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**161,245**	**37.3**	**0.0**	**$24,572.30**	**$105,794.92**	**$15,885.00**	**$89,909.92**	**3.7**	**162,373**
ECM 1	Install LED Fixtures	54,658	9.7	0.0	$8,329.41	$41,170.00	$4,920.00	$36,250.00	4.4	55,040
ECM 2	Retrofit Fixtures with LED Lamps	106,587	27.6	0.0	$16,242.89	$64,624.92	$10,965.00	$53,659.92	3.3	107,332
Lighting Control Measures		**19,121**	**5.2**	**0.0**	**$2,913.89**	**$19,256.00**	**$2,880.00**	**$16,376.00**	**5.6**	**19,255**
ECM 3	Install Occupancy Sensor Lighting Controls	19,121	5.2	0.0	$2,913.89	$19,256.00	$2,880.00	$16,376.00	5.6	19,255
Electric Unitary HVAC Measures		**74,925**	**64.4**	**0.0**	**$11,417.83**	**$146,451.15**	**$6,894.00**	**$139,557.15**	**12.2**	**75,449**
ECM 4	Install High Efficiency Electric AC	74,925	64.4	0.0	$11,417.83	$146,451.15	$6,894.00	$139,557.15	12.2	75,449
HVAC System Improvements		**15,796**	**3.6**	**0.0**	**$2,407.18**	**$5,750.00**	**$2,750.00**	**$3,000.00**	**1.2**	**15,907**
ECM 5	Install Dual Enthalpy Outside Economizer Control	15,796	3.6	0.0	$2,407.18	$5,750.00	$2,750.00	$3,000.00	1.2	15,907
Domestic Water Heating Upgrade		**2,997**	**0.0**	**24.3**	**$676.59**	**$193.59**	**$0.00**	**$193.59**	**0.3**	**5,862**
ECM 6	Install Low-Flow Domestic Hot Water Devices	2,997	0.0	24.3	$676.59	$193.59	$0.00	$193.59	0.3	5,862
Plug Load Equipment Control - Vending Machine		**3,224**	**0.0**	**0.0**	**$491.26**	**$460.00**	**$0.00**	**$460.00**	**0.9**	**3,246**
ECM 7	Vending Machine Control	3,224	0.0	0.0	$491.26	$460.00	$0.00	$460.00	0.9	3,246
TOTALS		**277,308**	**110.5**	**24.3**	**$42,479.04**	**$277,905.66**	**$28,409.00**	**$249,496.66**	**5.9**	**282,091**

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

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

4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**161,245**	**37.3**	**0.0**	**$24,572.30**	**$105,794.92**	**$15,885.00**	**$89,909.92**	**3.7**	**162,373**
ECM 1	Install LED Fixtures	54,658	9.7	0.0	$8,329.41	$41,170.00	$4,920.00	$36,250.00	4.4	55,040
ECM 2	Retrofit Fixtures with LED Lamps	106,587	27.6	0.0	$16,242.89	$64,624.92	$10,965.00	$53,659.92	3.3	107,332

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	17,969	4.9	0.0	$2,738.26	$14,605.92	$120.00	$14,485.92	5.3	18,094
Exterior	36,690	4.8	0.0	$5,591.14	$26,564.08	$4,800.00	$21,764.08	3.9	36,946

Measure Description

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

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

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	100,654	26.8	0.0	$15,338.67	$61,298.62	$10,965.00	$50,333.62	3.3	101,357
Exterior	5,934	0.8	0.0	$904.22	$3,326.30	$0.00	$3,326.30	3.7	5,975

Measure Description

We recommend retrofitting existing linear fluorescent lamps, incandescent and compact fluorescent lamps with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

Our recommendation for lighting control measures are summarized in Figure 18 below.

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**19,121**	**5.2**	**0.0**	**$2,913.89**	**$19,256.00**	**$2,880.00**	**$16,376.00**	**5.6**	**19,255**
ECM 3	Install Occupancy Sensor Lighting Controls	19,121	5.2	0.0	$2,913.89	$19,256.00	$2,880.00	$16,376.00	5.6	19,255

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
19,121	5.2	0.0	$2,913.89	$19,256.00	$2,880.00	$16,376.00	5.6	19,255

Measure Description

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

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

4.1.3 Electric Unitary HVAC Measures

Our recommendation for unitary HVAC measures are summarized in Figure 19 below.

Figure 19 - Summary of Unitary HVAC 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)
Electric Unitary HVAC Measures		**74,925**	**64.4**	**0.0**	**$11,417.83**	**$146,451.15**	**$6,894.00**	**$139,557.15**	**12.2**	**75,449**
ECM 4	Install High Efficiency Electric AC	74,925	64.4	0.0	$11,417.83	$146,451.15	$6,894.00	$139,557.15	12.2	75,449

ECM 4: Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
74,925	64.4	0.0	$11,417.83	$146,451.15	$6,894.00	$139,557.15	12.2	75,449

Measure Description

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

4.1.4 HVAC System Upgrades

Our recommendation for HVAC system improvements are summarized in Figure 20 below.

Figure 20 - Summary of HVAC System Improvement 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)
HVAC System Improvements		**15,796**	**3.6**	**0.0**	**$2,407.18**	**$5,750.00**	**$2,750.00**	**$3,000.00**	**1.2**	**15,907**
ECM 5	Install Dual Enthalpy Outside Economizer Control	15,796	3.6	0.0	$2,407.18	$5,750.00	$2,750.00	$3,000.00	1.2	15,907

ECM 5: Install Dual-Enthalpy Economizers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
15,796	3.6	0.0	$2,407.18	$5,750.00	$2,750.00	$3,000.00	1.2	15,907

Measure Description

Dual enthalpy economizers are used to control a ventilation system's outside air intake in order to reduce a facility's total cooling load. A dual-enthalpy economizer monitors the air temperature and humidity of both the outside and return air. The control supplies the lowest energy (temperature and humidity) air to the air handling system. When outside air conditions allow, outside air can be used for cooling instead of running the air handling system's compressor. This reduces the demand on the cooling system, lowering its usage hours and saving energy.

Savings result from using outside air instead of mechanical cooling when outside air conditions permit.

4.1.5 Domestic Hot Water Heating System Upgrades

Our recommendation for domestic water heating system improvements are summarized in Figure 21 below.

Figure 21 - Summary of Domestic Water Heating 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)
Domestic Water Heating Upgrade		**2,997**	**0.0**	**24.3**	**$676.59**	**$193.59**	**$0.00**	**$193.59**	**0.3**	**5,862**
ECM 6	Install Low-Flow Domestic Hot Water Devices	2,997	0.0	24.3	$676.59	$193.59	$0.00	$193.59	0.3	5,862

ECM 6: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,997	0.0	24.3	$676.59	$193.59	$0.00	$193.59	0.3	5,862

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy. Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.1.6 Plug Load Equipment Control - Vending Machines

Our recommendation for plug load equipment controls are summarized in Figure 22 below.

Figure 22 - Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	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)
Plug Load Equipment Control - Vending Machine		3,224	0.0	0.0	0.0	$491.26	$460.00	$0.00	$460.00	0.9	3,246
ECM 7	Vending Machine Control	3,224	0.0	0.0	0.0	$491.26	$460.00	$0.00	$460.00	0.9	3,246

ECM 7: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
3,224	0.0	0.0	$491.26	$460.00	$0.00	$460.00	0.9	3,246

Measure Description

Vending machines operate continuously, even during non-business hours. We recommend installing occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the ac rea surrounding the machines.

4.2 ECMs Evaluated but Not Recommended

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

Figure 23 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures	**5,713**	**1.0**	**0.0**	**$870.61**	**$13,065.91**	**$0.00**	**$13,065.91**	**15.0**	**5,753**
Install VFDs on Hot Water Pumps	5,713	1.0	0.0	$870.61	$13,065.91	$0.00	$13,065.91	15.0	5,753
Domestic Water Heating Upgrade	**0**	**0.0**	**15.9**	**$143.54**	**$4,780.35**	**$300.00**	**$4,480.35**	**31.2**	**1,856**
Install Tankless Water Heater	0	0.0	15.9	$143.54	$4,780.35	$300.00	$4,480.35	31.2	1,856
TOTALS	**5,713**	**1.0**	**15.9**	**$1,014.15**	**$17,846.26**	**$300.00**	**$17,546.26**	**17.3**	**7,609**

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

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

Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
5,713	1.0	0.0	$870.61	$13,065.91	$0.00	$13,065.91	15.0	5,753

Measure Description

We evaluated installing variable frequency drives (VFD) to control a hot water pumps. This measure requires that a majority of the hot water coils be served by 2-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

Reasons for not Recommending

The simple payback of this measure exceeds the expected useful life of the equipment and is therefore not recommended based on energy savings alone.

Install Tankless Water Heater

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	15.9	$143.54	$4,780.35	$300.00	$4,480.35	31.2	1,856

Measure Description

We evaluated replacing the existing tank water heater with a tankless water heating system. Tankless water heaters (a.k.a. on-demand water heaters) only heat water when hot water is needed. Water is heated as it flows through the pipe to the hot water tap. Energy savings from a tankless water heater is based from eliminating heat losses associated with maintaining unnecessary standby hot water capacity.

Reasons for not Recommending

The simple payback of this measure exceeds the expected useful life of the equipment and is therefore not recommended based on energy savings alone.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Ensure Lighting Controls Are Operating Properly

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

Use Fans to Reduce Cooling Load

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5°F -10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

Refer to Section 4.1.5 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

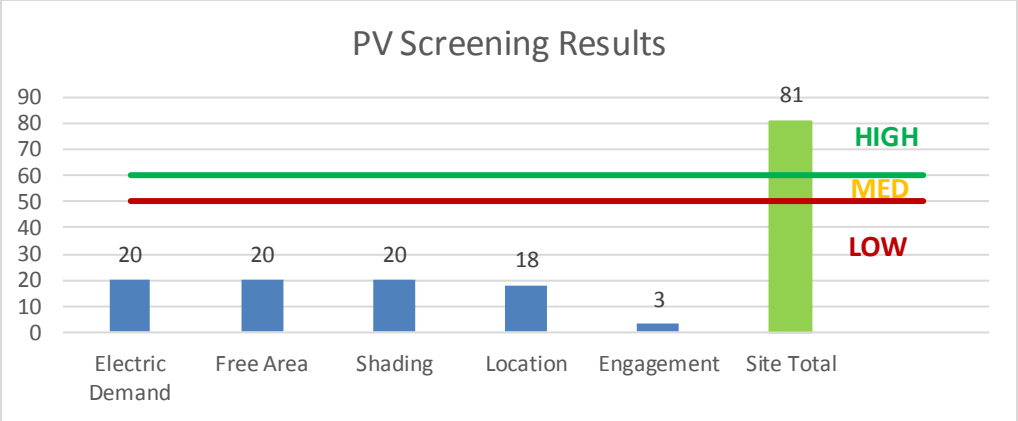
6.1 Photovoltaic

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

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

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear meet these minimum criteria for cost-effective PV installation. The school needs to evaluate the roof condition before considering any solar PV array installation.

Figure 24 - Photovoltaic Screening



Potential	High	
System Potential	240	kW DC STC
Electric Generation	285,929	kWh/yr
Displaced Cost	$24,880	/yr
Installed Cost	$624,000	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

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

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

6.2 Combined Heat and Power

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

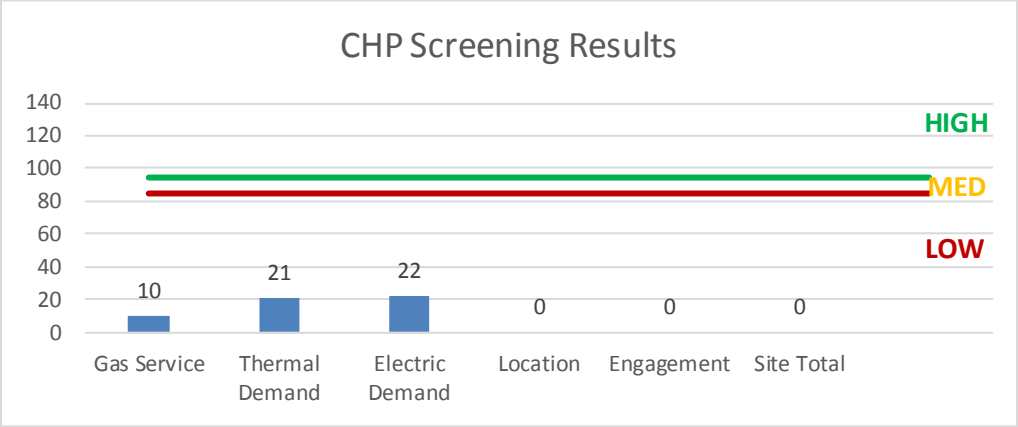
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has a low potential for installing a cost-effective CHP system.

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

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

Figure 25 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

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

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

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

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

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

In our opinion, the facility has moderate potential for DR curtailment.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and, therefore, a contributor to the fund, your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 26 for a list of the eligible programs identified for each recommended ECM.

Figure 26 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	X			X		
ECM 2	Retrofit Fixtures with LED Lamps	X			X		
ECM 3	Install Occupancy Sensor Lighting Controls	X			X		
ECM 4	Install High Efficiency Electric AC	X			X		
ECM 5	Install Dual Enthalpy Outside Economizer Control	X			X		
ECM 6	Install Low-Flow Domestic Hot Water Devices				X		
ECM 7	Vending Machine Control				X		

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

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

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

8.2 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program 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. 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 in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also utilize the P4P program.

Incentives

Incentives are calculated 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

To participate in the P4B EB program you will need to contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

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

8.3 SREC Registration Program

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

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

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

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

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

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

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

(1) Use an Energy Services Company or "ESCO."
(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
(3) Use a hybrid approach of the two options described above where the ESCO is utilized for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

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

9.2 Retail Natural Gas Supply Options

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

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

If your facility is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room C6 - Mechanical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,496	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,496	0.06	284	0.0	$43.30	$175.50	$30.00	3.36
Room C6 - Mechanical Room	1	Compact Fluorescent: Screw in Lamp	Wall Switch	26	2,080	Relamp	No	1	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.01	41	0.0	$6.20	$53.65	$0.00	8.66
Room D6 - Mechanical Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.17	631	0.0	$96.23	$468.00	$80.00	4.03
Room D6 - Mechanical Room	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Corridor D	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,610	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,610	0.28	1,288	0.0	$196.22	$760.50	$130.00	3.21
Corridor D	3	Exit Signs: LED - 2 W Lamp	None	6	2,610	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	2,610	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gymnasium	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gymnasium	24	Metal Halide: (1) 400W Lamp	Wall Switch	458	2,080	Fixture Replacement	Yes	24	LED - Fixtures: Downlight Pendant	Occupancy Sensor	145	1,456	5.61	20,466	0.0	$3,118.82	$19,885.92	$960.00	6.07
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Gymnasium Stage	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.43	1,579	0.0	$240.58	$1,170.00	$200.00	4.03
Back Stage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	79	0.0	$12.03	$58.50	$10.00	4.03
Back Stage	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room D1 - Music Room	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.82	2,992	0.0	$456.01	$2,044.00	$370.00	3.67
Room D4	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.16	598	0.0	$91.20	$416.80	$80.00	3.69
Room D3	4	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	Yes	4	LED Screw-In Lamps: Downlight Solid State Retrofit	Occupancy Sensor	9	1,456	0.14	514	0.0	$78.30	$331.01	$40.00	3.72
Room D5	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.62	2,244	0.0	$342.01	$1,398.00	$260.00	3.33
Room D5	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Girls Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Girls Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,080	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,080	0.01	38	0.0	$5.83	$48.20	$10.00	6.55
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Boys Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,080	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,080	0.01	38	0.0	$5.83	$48.20	$10.00	6.55
Room D8 - Girls Locker Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.36	1,297	0.0	$197.61	$876.50	$150.00	3.68
Room D8 - Girls Locker Room	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room D7 - Boys Locker Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.36	1,297	0.0	$197.61	$876.50	$150.00	3.68

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room D7 - Boys Locker Room	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Storage Room	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.27	997	0.0	$152.00	$701.00	$120.00	3.82
Custodial Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	79	0.0	$12.03	$58.50	$10.00	4.03
Corridor B	3	Exit Signs: LED - 2 W Lamp	None	6	2,610	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	2,610	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Corridor B	22	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,610	Relamp	No	22	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,610	0.71	3,269	0.0	$498.11	$1,654.40	$330.00	2.66
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room B3 - Custodial	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	79	0.0	$12.03	$58.50	$10.00	4.03
Room B2 - Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Girls Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room B7	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B4	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B9	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B6	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B11	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B8	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B10	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room B13	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Storage Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Custodian Office	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	2,080	None	No	2	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	40	2,080	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room B5	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.55	1,995	0.0	$304.01	$1,710.00	$270.00	4.74
Room B14	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.55	1,995	0.0	$304.01	$1,710.00	$270.00	4.74
Room B17	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.55	1,995	0.0	$304.01	$1,710.00	$270.00	4.74
Room B16	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.55	1,995	0.0	$304.01	$1,710.00	$270.00	4.74
Corridor E	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,610	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,610	0.26	1,189	0.0	$181.13	$601.60	$120.00	2.66

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Corridor E	2	Exit Signs: LED - 2 W Lamp	None	6	2,610	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	2,610	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room E7	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.25	898	0.0	$136.80	$567.20	$110.00	3.34
Room E5	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.45	1,646	0.0	$250.81	$943.20	$185.00	3.02
Room E5	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room E6	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.25	898	0.0	$136.80	$567.20	$110.00	3.34
Room E8	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.25	898	0.0	$136.80	$567.20	$110.00	3.34
Room E2	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.21	748	0.0	$114.00	$492.00	$95.00	3.48
Room E4	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.45	1,646	0.0	$250.81	$943.20	$185.00	3.02
Room E3	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.45	1,646	0.0	$250.81	$943.20	$185.00	3.02
Room E3	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.08	299	0.0	$45.60	$420.40	$65.00	7.79
Mens Restroom	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	None	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Custodial Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room E1 - Faculty Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.37	1,347	0.0	$205.21	$792.80	$155.00	3.11
Girls Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.08	299	0.0	$45.60	$420.40	$65.00	7.79
Womens Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.12	449	0.0	$68.40	$341.60	$65.00	4.04
Corridor F	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,610	Relamp	No	14	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,610	0.45	2,080	0.0	$316.98	$1,052.80	$210.00	2.66
Corridor F	1	Exit Signs: LED - 2 W Lamp	None	6	2,610	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	2,610	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room F3	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.62	2,244	0.0	$342.01	$1,398.00	$260.00	3.33
Room F2	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.62	2,244	0.0	$342.01	$1,398.00	$260.00	3.33
Room F4	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.12	449	0.0	$68.40	$341.60	$65.00	4.04
Room F1 - Media Center	36	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	36	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.98	3,591	0.0	$547.22	$2,916.00	$465.00	4.48
Room F1 - Media Center	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room F1D	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.08	299	0.0	$45.60	$291.50	$50.00	5.30
Room F1C	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Corridor A	4	Exit Signs: LED - 2 W Lamp	None	6	2,610	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	2,610	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Corridor A	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,610	Relamp	No	24	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,610	0.78	3,566	0.0	$543.39	$1,804.80	$360.00	2.66
Room A25	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A16	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A23	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A14	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A21	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.08	299	0.0	$45.60	$445.50	$65.00	8.34
Custodial Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.08	299	0.0	$45.60	$445.50	$65.00	8.34
Room A10	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A13	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A8	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Conference Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.02	79	0.0	$12.03	$58.50	$10.00	4.03
Room 8.4	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room 8.5	6	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	2,080	None	No	6	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 8.3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room 8.2	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.16	598	0.0	$91.20	$467.00	$80.00	4.24
Room 8.1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room A11	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.41	1,496	0.0	$228.01	$1,147.50	$185.00	4.22
Room A 4	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Room A 9	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.14	499	0.0	$76.00	$408.50	$70.00	4.45
Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,080	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,080	0.02	77	0.0	$11.66	$96.40	$20.00	6.55

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room A2	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room A3	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.08	299	0.0	$45.60	$291.50	$50.00	5.30
Room A1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Main Lobby	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.23	829	0.0	$126.31	$642.40	$125.00	4.10
Main Lobby	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.08	299	0.0	$45.60	$266.40	$50.00	4.75
Vestibule	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Principal Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.16	598	0.0	$91.20	$416.80	$80.00	3.69
Mail Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Corridor C	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,610	Relamp	No	17	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,610	0.37	1,684	0.0	$256.60	$994.50	$170.00	3.21
Corridor C	2	Exit Signs: LED - 2 W Lamp	None	6	2,610	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	2,610	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room C9	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.52	1,895	0.0	$288.81	$1,651.50	$260.00	4.82
Room C9	1	Compact Fluorescent: Screw in Lamp	Wall Switch	23	2,080	Relamp	No	1	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.01	33	0.0	$5.10	$53.65	$0.00	10.51
Room C12	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.41	1,496	0.0	$228.01	$868.00	$170.00	3.06
Room C12	7	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	7	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,456	0.18	651	0.0	$99.26	$558.40	$20.00	5.42
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,456	0.08	299	0.0	$45.60	$420.40	$65.00	7.79
Room C12	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room C12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Room C12	7	Halogen Incandescent: PAR30 Lamp	Wall Switch	90	2,080	Relamp	Yes	7	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	15	1,456	0.36	1,331	0.0	$202.85	$491.55	$20.00	2.32
Room C10	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.38	1,396	0.0	$212.81	$935.00	$160.00	3.64
Room C10	2	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	2	LED Screw-In Lamps: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.07	244	0.0	$37.18	$107.51	$10.00	2.62
Room C7	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.38	1,396	0.0	$212.81	$935.00	$160.00	3.64
Room C7	1	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	1	LED Screw-In Lamps: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.03	122	0.0	$18.59	$53.75	$5.00	2.62
Room C8	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room C8	1	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	1	LED Screw-In Lamps: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.03	122	0.0	$18.59	$53.75	$5.00	2.62
Room C5	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.38	1,396	0.0	$212.81	$935.00	$160.00	3.64
Room C5	1	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	1	LED Screw-In Lamps: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.03	122	0.0	$18.59	$53.75	$5.00	2.62
Room C3	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.33	1,197	0.0	$182.41	$818.00	$140.00	3.72
Room C3	2	Incandescent: Screw in Lamp	Wall Switch	60	2,080	Relamp	No	2	LED Screw-In Lamps: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.07	244	0.0	$37.18	$107.51	$10.00	2.62
Room C1 - Nurse Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,080	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,456	0.29	1,053	0.0	$160.53	$686.80	$140.00	3.41
Room C4 - Multipurpose Room	34	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	2,080	Relamp	Yes	34	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,080	3.92	14,314	0.0	$2,181.28	$4,044.53	$785.00	1.49
Room C4 - Multipurpose Room	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,080	0.04	158	0.0	$24.06	$117.00	$20.00	4.03
Kitchen	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	No	13	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.42	1,539	0.0	$234.57	$977.60	$195.00	3.34
Kitchen	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,080	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,456	0.11	399	0.0	$60.80	$350.00	$60.00	4.77
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,080	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,080	0.03	118	0.0	$18.04	$75.20	$15.00	3.34
Restroom	1	Incandescent: Screw in Lamp	Wall Switch	40	2,080	Relamp	No	1	LED Screw-In Lamps: Downlight Solid State Retrofit	Wall Switch	9	2,080	0.02	74	0.0	$11.30	$53.75	$5.00	4.31
Exterior Perimeter Recessed Lighting	62	Compact Fluorescent: 4-PIN	Daylight Dimming	34	4,380	Relamp	No	62	LED - Fixtures: Downlight Solid State Retrofit	Daylight Dimming	15	4,380	0.77	5,934	0.0	$904.22	$3,326.30	$0.00	3.68
Exterior Wall Pack	43	High-Pressure Sodium: (1) 150W Lamp	Daylight Dimming	188	4,380	Fixture Replacement	No	43	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	55	4,380	3.75	28,807	0.0	$4,389.86	$16,799.11	$4,300.00	2.85
Parking Lot	5	Metal Halide: (1) 400W Lamp	Daylight Dimming	458	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	145	4,380	1.03	7,883	0.0	$1,201.28	$9,764.97	$500.00	7.71

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop	Corridor C - ERV 6	1	Supply Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor C - ERV 6	1	Exhaust Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Main Lobby	1	Supply Fan	0.8	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Main Lobby	1	Exhaust Fan	0.8	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor F	1	Supply Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor F	1	Exhaust Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor E	1	Supply Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor E	1	Exhaust Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor A	1	Supply Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor A	1	Exhaust Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor B	1	Supply Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor B	1	Exhaust Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor D	1	Supply Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Corridor D	1	Exhaust Fan	1.5	82.5%	No	2,028	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room C6	Boilers	3	Combustion Air Fan	1.5	80.0%	No	780	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room C6	Heating Hot Water System	2	Heating Hot Water Pump	10.0	91.7%	Yes	2,028	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room C6	Heating Hot Water System	2	Heating Hot Water Pump	3.0	86.5%	No	2,028	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room D6	2002 Addition	2	Heating Hot Water Pump	2.0	80.0%	No	2,028	No	80.0%	Yes	2	0.56	3,291	0.0	$501.45	$5,457.71	$0.00	10.88
Room D6	1990 Addition	2	Heating Hot Water Pump	1.5	81.5%	No	2,028	No	81.5%	Yes	3	0.41	2,422	0.0	$369.16	$7,608.20	$0.00	20.61
Room D6	Domestic Hot Watern Booster Pump	1	Other	0.8	78.0%	No	1,300	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Gymnasium	Air Handlers	5	Supply Fan	1.5	81.5%	No	2,028	No	81.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage Room	Air Compressor	1	Air Compressor	5.0	89.5%	No	1,300	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	School	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Kitchen	1	Kitchen Hood Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Kitchen Storage	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Main Office	2	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Restroom	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Chemistry Lab	2	Exhaust Fan	0.5	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Prep Room	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Closet	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Restroom	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Locker Room	1	Exhaust Fan	0.3	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Dcorridor D	1	Exhaust Fan	0.5	78.0%	No	2,028	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Art Room	1	Exhaust Fan	0.5	178.0%	No	2,028	No	178.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Gymnasium	1	Exhaust Fan	0.5	278.0%	No	2,028	No	278.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Custodian Office	Custodian Office	1	Split-System AC	0.75		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Classrooms	4	Split-System Air-Source HP	10.00	135.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Main Office, Principal Office, Main Lobby	2	Split-System Air-Source HP	6.00	81.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Multipurpose Room	1	Packaged AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Classrooms	5	Split-System Air-Source HP	8.00	108.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Classrooms	3	Split-System Air-Source HP	6.00	81.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Classrooms	4	Split-System Air-Source HP	10.00	135.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Room F3	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Room F1 - Media Center	1	Packaged AC	10.00		Yes	1	Packaged AC	10.00		11.50		Yes	1.95	4,396	0.0	$669.84	$18,571.06	$980.00	26.26
Rooftop	Room F1	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Child Study Room	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Faculty Room - RTU7	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Room E2 - RTU6	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Room E3 - RTU5	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Room E4 - RTU4	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		Yes	1.64	3,116	0.0	$474.88	$11,844.80	$710.00	23.45
Rooftop	Room E5 - RTU3	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Room E6 - RTU2	1	Packaged AC	4.00		Yes	1	Packaged AC	4.00		14.00		Yes	1.31	2,493	0.0	$379.90	$9,575.84	$618.00	23.58
Rooftop	Room E7 - RTU1	1	Packaged AC	2.50		Yes	1	Packaged AC	2.50		14.00		Yes	0.82	1,558	0.0	$237.44	$6,172.40	$480.00	23.97
Rooftop	Rooms B14, B15	1	Split-System Air-Source HP	8.00	108.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Rooms B16, B17	1	Split-System Air-Source HP	6.00	81.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop	Art Room	1	Split-System AC	4.00		Yes	1	Split-System AC	4.00		14.00		No	1.02	1,186	0.0	$180.66	$5,984.88	$368.00	31.09
Rooftop	Music Room & Corridor	1	Split-System AC	6.00		Yes	1	Split-System AC	6.00		11.50		No	0.78	906	0.0	$138.10	$6,982.62	$438.00	47.39
Rooftop	Gymnasium	4	Split-System AC	16.00		Yes	1	Split-System AC	16.00		11.50		No	49.35	57,453	0.0	$8,755.26	$18,557.58	$1,264.00	1.98
Rooftop	Gymnasium Stage	1	Split-System AC	5.00		Yes	1	Split-System AC	5.00		14.00		No	1.86	2,163	0.0	$329.63	$7,481.10	$460.00	21.30

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions					Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room M6	Heating Hot Water System	3	Condensing Hot Water Boiler	1,920.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room C6	Kitchen. Nurse Office, Classrooms	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Corridor E Closet	E Section of the facility	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room D6	1990 Addition - Domestic Hot Water	1	Tankless Water Heater	Yes	1	Tankless Water Heater	Natural Gas	82.00%	EF	0.00	0	15.9	$143.54	$4,780.35	$300.00	31.21

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	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
School	18	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	24.3	$219.93	$129.06	$0.00	0.59
School	9	Faucet Aerator (Lavatory)	2.20	1.00	0.00	2,997	0.0	$456.66	$64.53	$0.00	0.14

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Electric Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Insulated Food Holding Cabinet (3/4 Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
School	57	Desktop with LCD Monitors	191.0	Yes
School	41	Laptop	45.0	Yes
School	31	Printer	125.0	Yes
School	10	Microwave	1,000.0	No
School	3	Coffee Maker	950.0	No
School	9	Refrigerators	175.0	Yes
School	7	Copy Machine	850.0	Yes
School	5	Water Cooler	272.0	Yes
Kitchen	6	Kitchen Equipment	700.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Room	1	Refrigerated	Yes	0.00	1,612	0.0	$245.63	$230.00	$0.00	0.94
Multipurpose Room	1	Refrigerated	Yes	0.00	1,612	0.0	$245.63	$230.00	$0.00	0.94

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Samuel S. Yellin Middle School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 76,682
Built: 1956

For Year Ending: January 31, 2017
Date Generated: January 15, 2018

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Samuel S. Yellin Middle School 111 Warwick Road Stratford, New Jersey 08084	Stratford Board of Education 111 Warwick Road Stratford, NJ 08084 (856) 784-2917	Denise DiGiandomenico 111 Warwick Road Stratford, NJ 08084 (856) 784-2917 ext 120 dijohnd@stratford.k12.nj.us

Property ID: 6194407

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
63.6 kBtu/ft²

Source EUI
140 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	2,687,493 (55%)
Natural Gas (kBtu)	2,187,820 (45%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	58.5
National Median Source EUI (kBtu/ft²)	128.8
% Diff from National Median Source EUI	9%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	414

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)