Local Government Energy Audit:
Energy Audit Report

Johnson Park Elementary School

285 Rosedale Road

Princeton, New Jersey 08540

Princeton Public Schools

January 24, 2019

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 Johnson Park Elementary School.

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

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey 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

Johnson Park Elementary School is a 62,455 square foot facility comprised of various space types within one building. The school building is one floor and includes classrooms, staff rooms, main office, kitchen, gym, cafeteria and a sub-basement mechanical space.

Lighting at Johnson Park Elementary School consists of aging and inefficient fixtures in need of replacement with LED fixtures, and HVAC equipment in need of more efficient HVAC controls. Heating is supplied by two natural gas boilers. 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 which together represent an opportunity for Johnson Park Elementary School to reduce annual energy costs by $29,743 and annual greenhouse gas emissions by 204,118 lbs. CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 3.2 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 Princeton Public Schools' annual energy use by 20%.

Figure 1 – Previous 12 Month Utility Costs

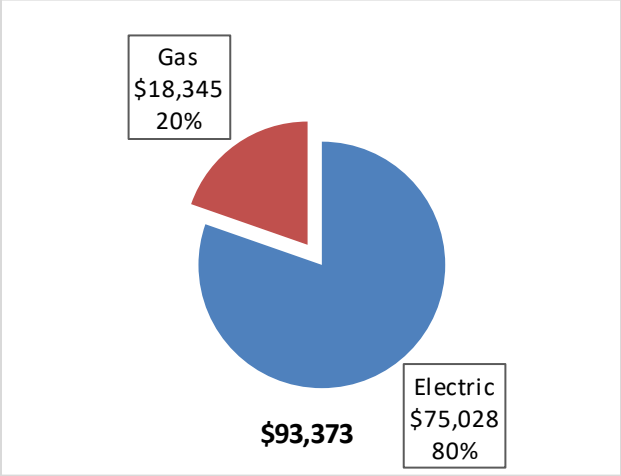
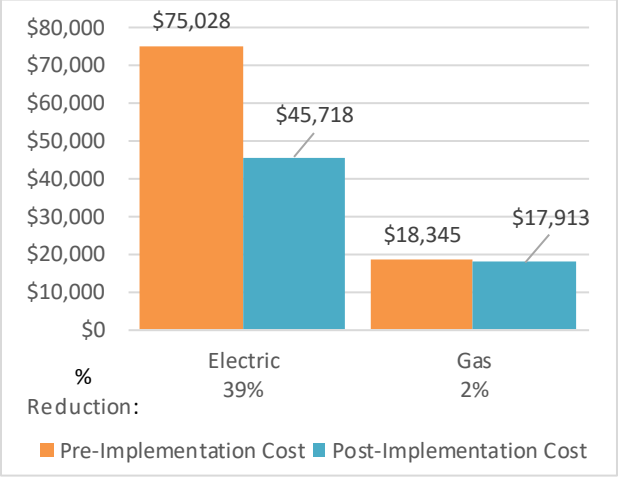


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**120,318**	**26.4**	**0.0**	**$17,861.00**	**$63,716.01**	**$10,390.00**	**$53,326.01**	**3.0**	**121,159**
ECM 1	Install LED Fixtures	Yes	8,339	1.9	0.0	$1,237.95	$13,555.16	$0.00	$13,555.16	10.9	8,398
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	10,499	2.2	0.0	$1,558.59	$9,342.28	$0.00	$9,342.28	6.0	10,573
ECM 3	Retrofit Fixtures with LED Lamps	Yes	101,479	22.2	0.0	$15,064.46	$40,818.56	$10,390.00	$30,428.56	2.0	102,189
Lighting Control Measures			**28,196**	**6.1**	**0.0**	**$4,185.72**	**$20,166.00**	**$2,520.00**	**$17,646.00**	**4.2**	**28,394**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	28,196	6.1	0.0	$4,185.72	$20,166.00	$2,520.00	$17,646.00	4.2	28,394
Motor Upgrades			**1,418**	**0.3**	**0.0**	**$210.56**	**$4,855.68**	**$0.00**	**$4,855.68**	**23.1**	**1,428**
	Premium Efficiency Motors	No	1,418	0.3	0.0	$210.56	$4,855.68	$0.00	$4,855.68	23.1	1,428
Variable Frequency Drive (VFD) Measures			**35,728**	**3.7**	**0.0**	**$5,303.74**	**$10,388.90**	**$0.00**	**$10,388.90**	**2.0**	**35,978**
ECM 5	Install VFDs on Hot Water Pumps	Yes	35,728	3.7	0.0	$5,303.74	$10,388.90	$0.00	$10,388.90	2.0	35,978
Electric Unitary HVAC Measures			**9,792**	**4.9**	**0.0**	**$1,453.61**	**$12,479.28**	**$506.00**	**$11,973.28**	**8.2**	**9,860**
ECM 6	Install High Efficiency Electric AC	Yes	9,792	4.9	0.0	$1,453.61	$12,479.28	$506.00	$11,973.28	8.2	9,860
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**123.6**	**$1,182.59**	**$77,699.73**	**$4,615.20**	**$73,084.53**	**61.8**	**14,476**
	Install High Efficiency Steam Boilers	No	0	0.0	123.6	$1,182.59	$77,699.73	$4,615.20	$73,084.53	61.8	14,476
HVAC System Improvements			**1,798**	**0.4**	**0.0**	**$266.87**	**$1,000.00**	**$500.00**	**$500.00**	**1.9**	**1,810**
ECM 7	Install Dual Enthalpy Outside Economizer Control	Yes	1,798	0.4	0.0	$266.87	$1,000.00	$500.00	$500.00	1.9	1,810
Domestic Water Heating Upgrade			**0**	**0.0**	**45.2**	**$432.47**	**$207.93**	**$0.00**	**$207.93**	**0.5**	**5,294**
ECM 8	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	45.2	$432.47	$207.93	$0.00	$207.93	0.5	5,294
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$239.28**	**$230.00**	**$0.00**	**$230.00**	**1.0**	**1,623**
ECM 9	Vending Machine Control	Yes	1,612	0.0	0.0	$239.28	$230.00	$0.00	$230.00	1.0	1,623
TOTALS FOR HIGH PRIORITY MEASURES			**197,443**	**41.4**	**45.2**	**$29,742.68**	**$108,188.12**	**$13,916.00**	**$94,272.12**	**3.2**	**204,118**
TOTALS FOR ALL EVALUATED MEASURES			**198,862**	**41.7**	**168.8**	**$31,135.83**	**$190,743.53**	**$18,531.20**	**$172,212.33**	**5.5**	**220,022**

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

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

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

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

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

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

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

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer 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 outlet when not in use.

Energy Efficient Practices

TRC also identified eight 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 Johnson Park Elementary School include:

- Close Doors and Windows
- Use Window Treatments/Coverings
- Ensure Lighting Controls Are Operating Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Johnson Park Elementary 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	151	kW DC STC
Electric Generation	179,897	kWh/yr
Displaced Cost	$15,650	/yr
Installed Cost	$392,600	

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

1.3 Implementation Planning

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

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

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

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

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

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Gary Weisman	Director of Plant Operations	GaryWeisman@princetonk12.org	(609) 203-4534
Peter Vazquez	Operations Manager	PeterVazquez@princetonk12.org	(609) 751-3916
Stephanie Kennedy	Business Administrator	stephaniekennedy@princetonk12.org	(609) 806-4204
TRC Energy Services			
Yagna Otia	Auditor	Yotia@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On July 27, 2018, TRC performed an energy audit at Johnson Park Elementary School located in Princeton, New Jersey. TRC's team met with Jim Abbott to review the facility operations and help focus our investigation on specific energy-using systems.

Johnson is a 62,455 square foot facility comprised of various space types within one building. The School building is one floor and includes classrooms, staff rooms, main office, kitchen, gym, cafeteria and a sub-basement mechanical space.

The building was constructed in 1959. Over the last several years the facility has replaced all of its existing T12 fluorescent fixtures with T8 fluorescent fixtures.

2.3 Building Occupancy

The school building is open Monday through Friday. The school building is open on Saturdays for music activity and during summer. The typical schedule is presented in the table below. The entire facility is used year-round by the community and camps are run throughout the summer. During a typical day, the facility is occupied by 50 staff and 250 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Johnson Park Elementary School	Weekday	7AM - 6PM
Johnson Park Elementary School	Weekend	8AM - 3PM

2.4 Building Envelope

The school building is constructed of concrete block and structural steel with a stone facade. The building has flat roofs covered with both white and black membrane equally that are in good condition. The building has double-pane windows which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of wood with aluminum frames and in good condition.

Image 1 Building Roof

2.5 On-Site Generation

Johnson Park elementary school does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Lighting at the facility is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL). Most of the fixtures are 2-lamp or 3-lamp, 4-foot long troffers with diffusers.

Lighting control in most spaces is provided by wall switches and very few areas are utilized with occupancy sensors. The occupancy sensors are either wall or ceiling mounted depending on the space layout. Stairwells, elevator lobbies and main lobby areas do not contain any occupancy sensors and are on 24 hours per day throughout the year.

The building's exterior lighting consists of two inefficient Metal Halide fixtures and 41 CFL fixtures that are controlled by photocells, though seven wall mounted fixtures are retrofitted with highly efficient LED fixtures.

Image 2 School Building Exterior Fixtures

Hot Water Heating System

The hot water system consists of two Smith cast iron 1923 kBtu/hr output, natural draft boilers (B1 & 2) with a heat exchanger. The boilers have a nominal combustion efficiency of 73%. The boilers are configured in a constant flow primary short loop distribution with two 0.8 hp heating hot water pumps (HHWP1 & 2) along with secondary loop with two 15 hp heating hot water pumps (HHWP3 & 4) goes to the building.

The boilers operate in a lead/lag configuration. Only a single boiler is required to meet the facility heating demand. Boiler operation is rotated weekly. Hot water is supplied directly to Heating Ventilator 1 & 2 radiators in the lobby and classrooms.

Image 3 Boiler Plant

Direct Expansion Air Conditioning System (DX)

Four 2.5-ton Snyder General roof top packaged AC units, one 3-ton Trane packaged AC (poor condition), one 5-ton Trane split system unit (poor condition) are located on the roof. There are also 32 window AC units installed in the building. The 3-ton constant air volume RTU unit is equipped with a single 0.3 hp supply fan and a 0.2 hp return fan. The units have outside air economizers to utilize free cooling when the outside air temperature is lower than the return air temperature. There are two heating ventilator units (HV 1&2) used to provide fresh air for the school building.

Image 4 HVAC Units on Roof

Image 5 RTU in Poor Condition (right)

The units are controlled by individual thermostats located in zones.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of one A.O. Smith 100-gallon gas-fired hot water heater with an input rating of 199 kBtu/hr each and a nominal efficiency of 80% and one 40-gallon electric powered hot water heater. The recirculation pumps operate continuously.

Image 6 DHW Heater

Food Service Equipment

The school has a moderate sized kitchen that is used to prepare 200 lunches per day for the students. Most of the cooking is done using the one full sized convection oven and a single large griddle. The school has one half sized food holding cabinet and one full sized food holding cabinet to keep food warm. One single tank conveyor type Hobart dishwater is present to clean dishes.

Image 7 Kitchen Equipment

Refrigeration

The kitchen has two stand-up refrigerators with 46 cu. ft. capacity and one stand-up solid door freezer with 49 cu. ft. capacity. There is a chest freezer for cold beverage storage. One ice-making machine is used to produce ice with a capacity of 265 lbs per day.

Image 8 Refrigeration Equipment

Building Plug Load

There are 30 computer work stations throughout the facility. Sixty percent of the computers are desktop units with LCD monitors and remaining 40% are notebooks with a moving storage cart which can charge notebooks at once. There is no centralized PC power management software installed. There are total of 32 audio systems in classrooms which can be used by teachers for special needs of students.

There are three server closets scattered throughout the facility.

The facility has one refrigerated beverage vending machines in staff room.

2.7 Water-Using Systems

There are five restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf.

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

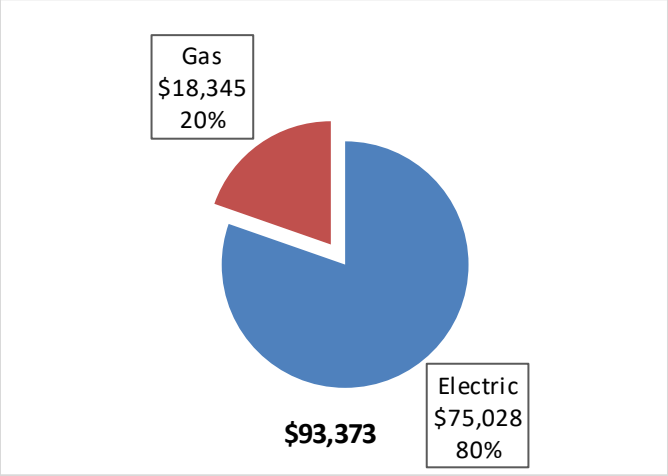
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Princeton Public Schools		
Fuel	**Usage**	**Cost**
Electricity	505,416 kWh	$75,028
Natural Gas	19,179 Therms	$18,345
Total		**$93,373**

The current annual energy cost for this facility is $93,373 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.148/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

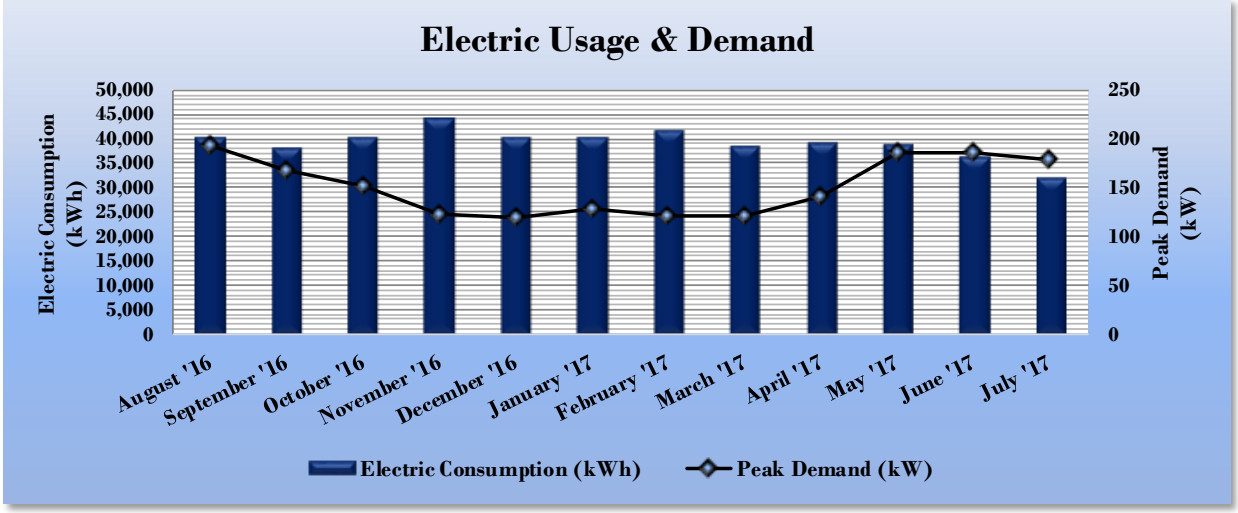


Figure 10 - Electric Usage & Demand

Electric Billing Data for Princeton Public Schools					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/9/16	28	40,487	192		$7,474
10/10/16	30	38,328	168		$5,423
11/8/16	27	40,230	151		$5,513
12/9/16	30	44,361	123		$5,904
1/11/17	29	40,407	120		$5,478
2/9/17	27	40,412	128		$5,509
3/13/17	27	41,657	121		$5,728
4/11/17	27	38,569	121		$5,370
5/12/17	30	39,246	141		$5,520
6/13/17	30	38,770	186		$6,335
7/12/17	28	36,245	186		$6,103
8/10/17	27	32,086	179		$5,532
Totals	**340**	**470,798**	**192.2**	**$0**	**$69,889**
Annual	**365**	**505,416**	**192.2**	**$0**	**$75,028**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $0.957/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. The natural gas usage is higher in winter months due to excessive use of boiler plant to provide heat requirement of the school.

Figure 11 - Natural Gas Usage

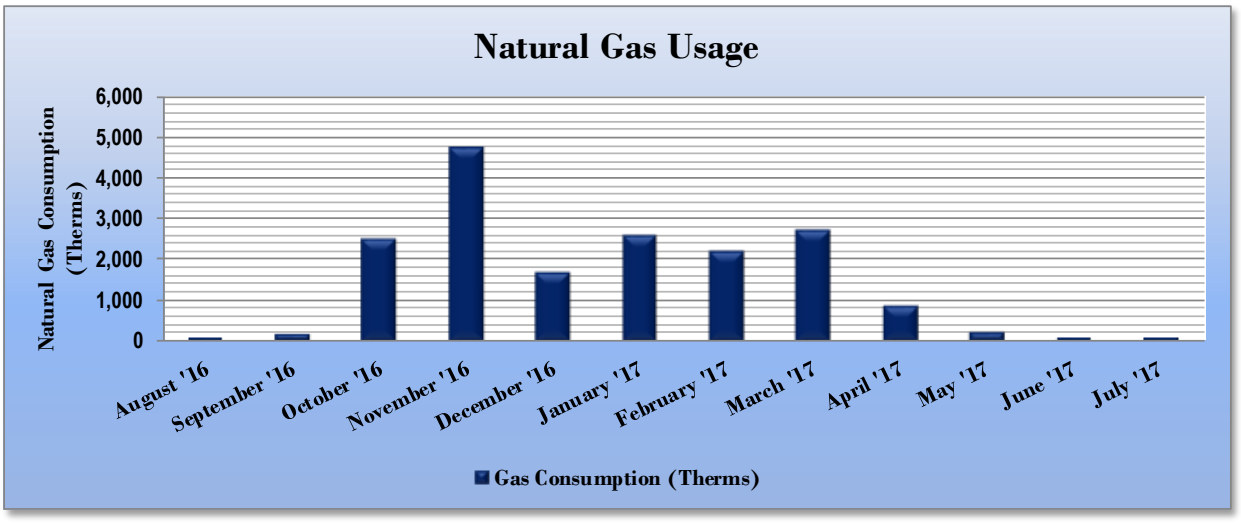


Figure 12 - Natural Gas Usage

Gas Billing Data for Princeton Public Schools			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
9/12/16	30	109	$167
10/10/16	28	172	$201
11/8/16	27	2,500	$2,090
12/9/16	30	4,768	$3,805
1/11/17	31	1,689	$2,007
2/10/17	28	2,584	$2,662
3/13/17	28	2,195	$2,313
4/11/17	27	2,752	$2,835
5/11/17	29	894	$680
6/12/17	30	227	$238
7/12/17	29	94	$139
8/10/17	27	90	$154
Totals	**344**	**18,075**	**$17,290**
Annual	**365**	**19,179**	**$18,345**

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		
	Princeton Public Schools	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	118.9	141.4
Site Energy Use Intensity (kBtu/ft^2)	58.3	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		
	Princeton Public Schools	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	84.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	46.8	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 47.

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

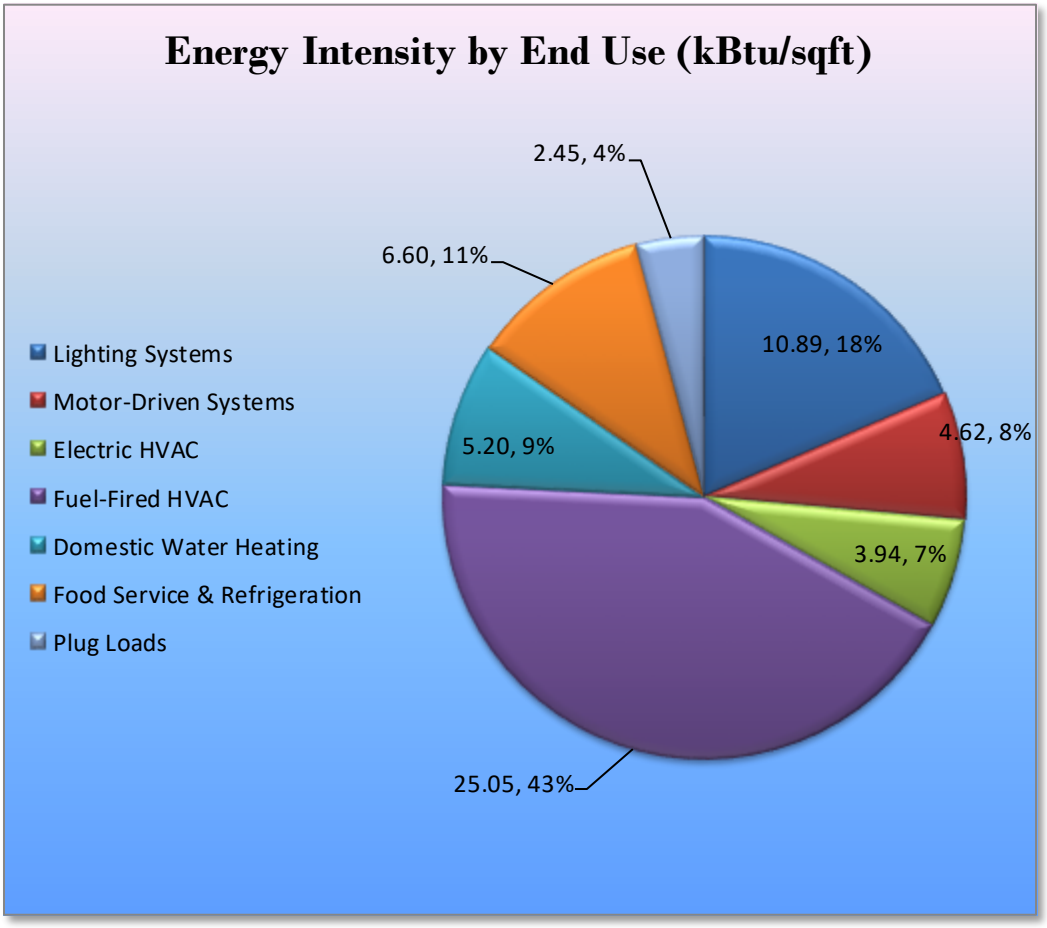
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 15 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 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		**120,318**	**26.4**	**0.0**	**$17,861.00**	**$63,716.01**	**$10,390.00**	**$53,326.01**	**3.0**	**121,159**
ECM 1	Install LED Fixtures	8,339	1.9	0.0	$1,237.95	$13,555.16	$0.00	$13,555.16	10.9	8,398
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	10,499	2.2	0.0	$1,558.59	$9,342.28	$0.00	$9,342.28	6.0	10,573
ECM 3	Retrofit Fixtures with LED Lamps	101,479	22.2	0.0	$15,064.46	$40,818.56	$10,390.00	$30,428.56	2.0	102,189
Lighting Control Measures		**28,196**	**6.1**	**0.0**	**$4,185.72**	**$20,166.00**	**$2,520.00**	**$17,646.00**	**4.2**	**28,394**
ECM 4	Install Occupancy Sensor Lighting Controls	28,196	6.1	0.0	$4,185.72	$20,166.00	$2,520.00	$17,646.00	4.2	28,394
Variable Frequency Drive (VFD) Measures		**35,728**	**3.7**	**0.0**	**$5,303.74**	**$10,388.90**	**$0.00**	**$10,388.90**	**2.0**	**35,978**
ECM 5	Install VFDs on Hot Water Pumps	35,728	3.7	0.0	$5,303.74	$10,388.90	$0.00	$10,388.90	2.0	35,978
Electric Unitary HVAC Measures		**9,792**	**4.9**	**0.0**	**$1,453.61**	**$12,479.28**	**$506.00**	**$11,973.28**	**8.2**	**9,860**
ECM 6	Install High Efficiency Electric AC	9,792	4.9	0.0	$1,453.61	$12,479.28	$506.00	$11,973.28	8.2	9,860
HVAC System Improvements		**1,798**	**0.4**	**0.0**	**$266.87**	**$1,000.00**	**$500.00**	**$500.00**	**1.9**	**1,810**
ECM 7	Install Dual Enthalpy Outside Economizer Control	1,798	0.4	0.0	$266.87	$1,000.00	$500.00	$500.00	1.9	1,810
Domestic Water Heating Upgrade		**0**	**0.0**	**45.2**	**$432.47**	**$207.93**	**$0.00**	**$207.93**	**0.5**	**5,294**
ECM 8	Install Low-Flow Domestic Hot Water Devices	0	0.0	45.2	$432.47	$207.93	$0.00	$207.93	0.5	5,294
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$239.28**	**$230.00**	**$0.00**	**$230.00**	**1.0**	**1,623**
ECM 9	Vending Machine Control	1,612	0.0	0.0	$239.28	$230.00	$0.00	$230.00	1.0	1,623
TOTALS		**197,443**	**41.4**	**45.2**	**$29,742.68**	**$108,188.12**	**$13,916.00**	**$94,272.12**	**3.2**	**204,118**

* - 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		**120,318**	**26.4**	**0.0**	**$17,861.00**	**$63,716.01**	**$10,390.00**	**$53,326.01**	**3.0**	**121,159**
ECM 1	Install LED Fixtures	8,339	1.9	0.0	$1,237.95	$13,555.16	$0.00	$13,555.16	10.9	8,398
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	10,499	2.2	0.0	$1,558.59	$9,342.28	$0.00	$9,342.28	6.0	10,573
ECM 3	Retrofit Fixtures with LED Lamps	101,479	22.2	0.0	$15,064.46	$40,818.56	$10,390.00	$30,428.56	2.0	102,189

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	7,818	1.7	0.0	$1,160.58	$11,623.23	$0.00	$11,623.23	10.0	7,873
Exterior	521	0.2	0.0	$77.37	$1,931.93	$0.00	$1,931.93	25.0	525

Measure Description

We recommend replacing existing fixtures containing fluorescent and incandescent 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 HID sources such as metal Halide and a fluorescent tube.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	10,499	2.2	0.0	$1,558.59	$9,342.28	$0.00	$9,342.28	6.0	10,573
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	101,111	22.1	0.0	$15,009.84	$39,753.56	$10,390.00	$29,363.56	2.0	101,818
Exterior	368	0.2	0.0	$54.62	$1,065.00	$0.00	$1,065.00	19.5	370

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tube and more than 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendation for upgrades to existing lighting fixtures is 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		**28,196**	**6.1**	**0.0**	**$4,185.72**	**$20,166.00**	**$2,520.00**	**$17,646.00**	**4.2**	**28,394**
ECM 4	Install Occupancy Sensor Lighting Controls	28,196	6.1	0.0	$4,185.72	$20,166.00	$2,520.00	$17,646.00	4.2	28,394

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 4: 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)
28,196	6.1	0.0	$4,185.72	$20,166.00	$2,520.00	$17,646.00	4.2	28,394

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in restrooms, storage rooms, classrooms and 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 Variable Frequency Drive Measures

Our recommendation for variable frequency drive (VFD) measures is summarized in Figure 19 below.

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**35,728**	**3.7**	**0.0**	**$5,303.74**	**$10,388.90**	**$0.00**	**$10,388.90**	**2.0**	**35,978**
ECM 5	Install VFDs on Hot Water Pumps	35,728	3.7	0.0	$5,303.74	$10,388.90	$0.00	$10,388.90	2.0	35,978

ECM 5: 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)
35,728	3.7	0.0	$5,303.74	$10,388.90	$0.00	$10,388.90	2.0	35,978

Measure Description

We recommend installing a 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.

4.1.4 Electric Unitary HVAC Measures

Our recommendation for upgrades for unitary HVAC measures is summarized in Figure 20 below.

Figure 20 - 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		**9,792**	**4.9**	**0.0**	**$1,453.61**	**$12,479.28**	**$506.00**	**$11,973.28**	**8.2**	**9,860**
ECM 6	Install High Efficiency Electric AC	9,792	4.9	0.0	$1,453.61	$12,479.28	$506.00	$11,973.28	8.2	9,860

ECM 6: 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)
9,792	4.9	0.0	$1,453.61	$12,479.28	$506.00	$11,973.28	8.2	9,860

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.

4.1.5 HVAC System Upgrades

Our recommendation for HVAC system improvement is summarized in Figure 21 below.

Figure 21 - 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		**1,798**	**0.4**	**0.0**	**$266.87**	**$1,000.00**	**$500.00**	**$500.00**	**1.9**	**1,810**
ECM 7	Install Dual Enthalpy Outside Economizer Control	1,798	0.4	0.0	$266.87	$1,000.00	$500.00	$500.00	1.9	1,810

ECM 7: 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)
1,798	0.4	0.0	$266.87	$1,000.00	$500.00	$500.00	1.9	1,810

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.

4.1.6 Domestic Hot Water Heating System Upgrades

Our recommendation for domestic water heating system improvements is summarized in Figure 22 below.

Figure 22 - 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		**0**	**0.0**	**45.2**	**$432.47**	**$207.93**	**$0.00**	**$207.93**	**0.5**	**5,294**
ECM 8	Install Low-Flow Domestic Hot Water Devices	0	0.0	45.2	$432.47	$207.93	$0.00	$207.93	0.5	5,294

ECM 8: 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)
0	0.0	45.2	$432.47	$207.93	$0.00	$207.93	0.5	5,294

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.

4.1.7 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure 23 below.

Figure 23 - Summary of Plug Load Equipment 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)
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$239.28**	**$230.00**	**$0.00**	**$230.00**	**1.0**	**1,623**
ECM 9	Vending Machine Control	1,612	0.0	0.0	$239.28	$230.00	$0.00	$230.00	1.0	1,623

ECM 9: 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)
1,612	0.0	0.0	$239.28	$230.00	$0.00	$230.00	1.0	1,623

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 area 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 24 – 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)
Motor Upgrades	**1,418**	**0.3**	**0.0**	**$210.56**	**$4,855.68**	**$0.00**	**$4,855.68**	**23.1**	**1,428**
Premium Efficiency Motors	1,418	0.3	0.0	$210.56	$4,855.68	$0.00	$4,855.68	23.1	1,428
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**123.6**	**$1,182.59**	**$77,699.73**	**$4,615.20**	**$73,084.53**	**61.8**	**14,476**
Install High Efficiency Steam Boilers	0	0.0	123.6	$1,182.59	$77,699.73	$4,615.20	$73,084.53	61.8	14,476
TOTALS	**1,418**	**0.3**	**123.6**	**$1,393.15**	**$82,555.41**	**$4,615.20**	**$77,940.21**	**55.9**	**15,904**

* - 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).

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,418	0.3	0.0	$210.56	$4,855.68	$0.00	$4,855.68	23.1	1,428

Measure Description

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

Reasons for not Recommending

Replacing existing motors with efficient NEMA Premium ® motors will result in energy savings, however, the cost of installation will outweigh the energy saving advantages resulting in a very long payback. This makes the measure financially not viable therefore not recommended based on energy savings alone.

Install High Efficiency Hot Water Boilers

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	123.6	$1,182.59	$77,699.73	$4,615.20	$73,084.53	61.8	14,476

Measure Description

We recommend replacing older inefficient hot water boilers with high efficiency boilers. Significant improvements have been made in combustion technology resulting in increases in overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

Reasons for not Recommending

Replacing existing boilers with high efficiency boilers will result in energy savings, however, the cost of installation will outweigh the energy saving advantages resulting in a very long payback. This makes the measure financially not viable 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.

Close Doors and Windows

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

Use Window Treatments/Coverings

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

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.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Check for and Seal Duct Leakage

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

Plug Load Controls

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

Water Conservation

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

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

Refer to Section 4.1.6 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.

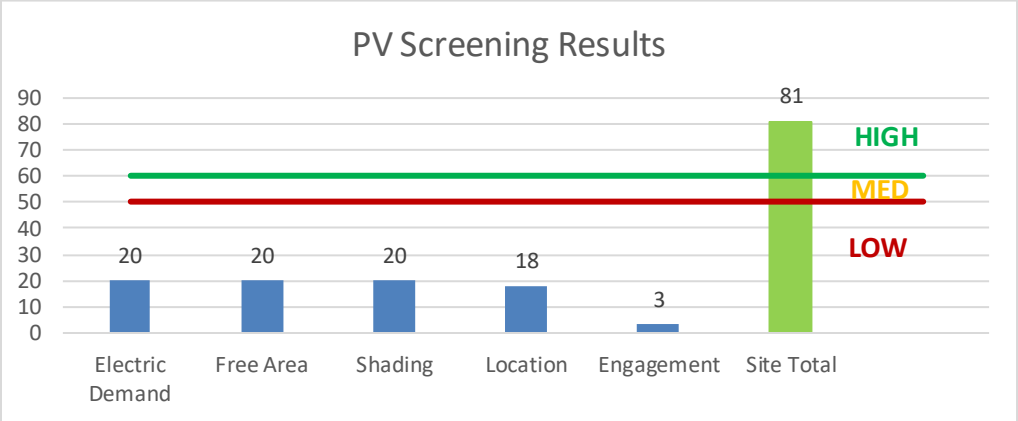
6.1 Photovoltaic

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.

There is 31,050 square feet of free area, ease of installation (roof), and the lack of shading elements contribute to the high potential for PV at this site. A PV array located on the roof of the main building/ground next to the building/over the main parking lot may be feasible. If Princeton Public Schools is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 25 - Photovoltaic Screening



Potential	High	
System Potential	151	kW DC STC
Electric Generation	179,897	kWh/yr
Displaced Cost	$15,650	/yr
Installed Cost	$392,600	

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.

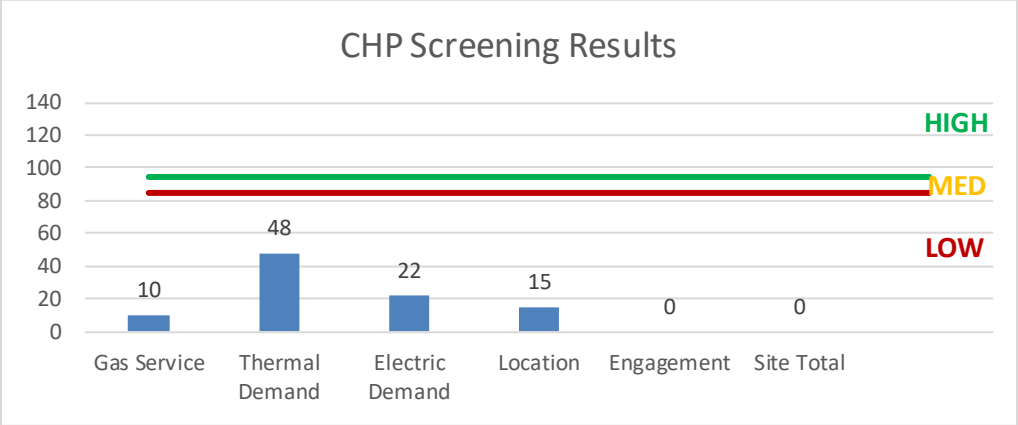
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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.

The magnitude, type, and duration of the thermal demand, the coincident electric load, and the ease of interconnection contribute to the potential for CHP at the site. If Princeton Public Schools is interested in pursuing the installation of CHP, we recommended a more detailed feasibility study be conducted.

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 26 - 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, due to reduced summer operation hours this facility is not a good candidate for DR.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund, your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 27 for a list of the eligible programs identified for each recommended ECM.

Figure 27 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	X		X			
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X		X			
ECM 3	Retrofit Fixtures with LED Lamps	X		X			
ECM 4	Install Occupancy Sensor Lighting Controls	X		X			
ECM 5	Install VFDs on Hot Water Pumps	X		X			
ECM 6	Install High Efficiency Electric AC	X		X			
ECM 7	Install Dual Enthalpy Outside Economizer Control	X		X			
ECM 8	Install Low-Flow Domestic Hot Water Devices			X			
ECM 9	Vending Machine Control	X		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 Direct Install

Overview

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

Incentives

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

How to Participate

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

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

8.3 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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
B3 STORAGE	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,666	0.02	89	0.0	$13.20	$72.46	$0.00	5.49
210A	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,666	0.02	89	0.0	$13.20	$72.46	$0.00	5.49
209A	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,666	0.02	89	0.0	$13.20	$72.46	$0.00	5.49
208A	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,666	0.02	89	0.0	$13.20	$72.46	$0.00	5.49
206A	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,666	0.02	89	0.0	$13.20	$72.46	$0.00	5.49
ROOM A5	1	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	No	1	LED - Linear Tubes: (3) U-Lamp	Wall Switch	50	2,666	0.04	170	0.0	$25.26	$151.44	$0.00	6.00
ROOM 207	1	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	No	1	LED - Linear Tubes: (3) U-Lamp	Wall Switch	50	2,666	0.04	170	0.0	$25.26	$151.44	$0.00	6.00
ROOM 207	1	U-Bend Fluorescent - T12: U T12 (34W) - 2L	Wall Switch	72	2,666	Relamp & Reballast	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,666	0.03	120	0.0	$17.75	$104.72	$0.00	5.90
ROOM B1A	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,666	0.04	172	0.0	$25.49	$73.03	$20.00	2.08
ROOM 121	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,666	0.04	172	0.0	$25.49	$73.03	$20.00	2.08
301E	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,666	0.04	172	0.0	$25.49	$73.03	$20.00	2.08
301D	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,666	0.04	172	0.0	$25.49	$73.03	$20.00	2.08
301C	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,666	0.04	172	0.0	$25.49	$73.03	$20.00	2.08
301B	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,666	0.04	172	0.0	$25.49	$73.03	$20.00	2.08
ROOM 129	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,666	0.03	152	0.0	$22.53	$54.77	$15.00	1.77
ROOM 128	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,666	0.03	152	0.0	$22.53	$54.77	$15.00	1.77
ROOM 127	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,666	0.03	152	0.0	$22.53	$54.77	$15.00	1.77
ROOM 120	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,666	0.03	152	0.0	$22.53	$54.77	$15.00	1.77
ROOM 108	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,666	0.03	152	0.0	$22.53	$54.77	$15.00	1.77
ROOM 107	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,666	0.03	152	0.0	$22.53	$54.77	$15.00	1.77
ROOM A5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.02	101	0.0	$15.02	$36.52	$10.00	1.77
ROOM 9	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.02	101	0.0	$15.02	$36.52	$10.00	1.77
ROOM 131	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.02	101	0.0	$15.02	$36.52	$10.00	1.77
ROOM 125	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.02	101	0.0	$15.02	$36.52	$10.00	1.77
ROOM 124	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.02	101	0.0	$15.02	$36.52	$10.00	1.77

	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
200 STORAGE	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.02	101	0.0	$15.02	$36.52	$10.00	1.77
KITCHEN STORAGE	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,666	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,666	0.01	54	0.0	$7.96	$18.26	$5.00	1.66
B3 RESTROOM	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,666	Relamp	Yes	1	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,866	0.01	49	0.0	$7.30	$286.26	$40.00	33.71
ROOM B1B	1	Incandescent: BULB	Wall Switch	90	2,666	Relamp	No	1	LED Screw-In Lamps: LED Bulb (9W) - 1L	Wall Switch	9	2,666	0.05	248	0.0	$36.87	$17.23	$5.00	0.33
ROOM 123	1	Incandescent: BULB	Wall Switch	90	2,666	Relamp	No	1	LED Screw-In Lamps: LED Bulb (9W) - 1L	Wall Switch	9	2,666	0.05	248	0.0	$36.87	$17.23	$5.00	0.33
ROOM 113	1	Incandescent: BULB	Wall Switch	90	2,666	Relamp	No	1	LED Screw-In Lamps: LED Bulb (9W) - 1L	Wall Switch	9	2,666	0.05	248	0.0	$36.87	$17.23	$5.00	0.33
202 LIBRARY	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ROOM 106	1	Compact Fluorescent: SPIRAL BULB	Wall Switch	19	2,666	Relamp	No	1	LED Screw-In Lamps: LED Bulb (9W) - 1L	Wall Switch	9	2,666	0.01	31	0.0	$4.55	$17.23	$5.00	2.69
B8 MAINTENANCE	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,866	0.05	239	0.0	$35.41	$260.92	$20.00	6.80
B7 OFFICE	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,866	0.05	239	0.0	$35.41	$260.92	$20.00	6.80
EXTERIOR	2	Metal Halide: (1) 175W Lamp	Daylight Dimming	215	1,333	Fixture Replacement	Yes	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Occupancy Sensor	45	933	0.24	563	0.0	$83.52	$2,151.93	$35.00	25.35
ROOM 302A	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	High/Low Control	114	1,866	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,306	0.10	315	0.0	$46.77	$416.06	$75.00	7.29
ROOM 301A	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	High/Low Control	114	1,866	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,306	0.10	315	0.0	$46.77	$416.06	$75.00	7.29
ROOM 303E	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
ROOM 303D	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
ROOM 303C	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
ROOM 303B	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
ROOM 303A	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
ROOM 135	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
205 BOYS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
204 GIRLS	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.08	384	0.0	$56.94	$379.55	$65.00	5.52
ROOM A5	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.05	256	0.0	$37.96	$189.03	$40.00	3.93
ROOM 101	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.05	256	0.0	$37.96	$189.03	$40.00	3.93
ROOM 100	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.05	256	0.0	$37.96	$189.03	$40.00	3.93
HALLWAY	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.05	256	0.0	$37.96	$189.03	$20.00	4.45

	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
B9 ELECTRICAL ROOM	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,666	0.04	202	0.0	$30.04	$73.03	$20.00	1.77
201 ROOM	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.05	256	0.0	$37.96	$189.03	$40.00	3.93
ROOM 301	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
BOILER 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
ROOM 207	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.14	675	0.0	$100.22	$489.09	$95.00	3.93
ROOM 130	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.14	675	0.0	$100.22	$489.09	$95.00	3.93
ROOM 126	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.14	675	0.0	$100.22	$489.09	$95.00	3.93
202A	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.14	675	0.0	$100.22	$489.09	$95.00	3.93
B4 STORAGE	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,666	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,666	0.03	161	0.0	$23.89	$54.77	$15.00	1.66
EXTERIOR	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	1,333	None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	1,333	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
KITCHEN STORAGE	3	Incandescent: BULB	Wall Switch	90	2,666	Relamp	Yes	3	LED Screw-In Lamps: LED Bulb (9W) - 1L	Occupancy Sensor	9	1,866	0.16	770	0.0	$114.28	$425.03	$80.00	3.02
B1 CAFETERIA	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
EXTERIOR	3	Compact Fluorescent: Rab Box CFL	Daylight Dimming	42	1,333	Relamp	Yes	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Occupancy Sensor	25	933	0.05	113	0.0	$16.73	$206.00	$20.00	11.12
ROOM A3	4	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	1,866	0.18	863	0.0	$128.07	$875.74	$35.00	6.56
ROOM A5	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.16	767	0.0	$113.87	$489.09	$95.00	3.46
ROOM 303	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.16	767	0.0	$113.87	$489.09	$95.00	3.46
ROOM 200	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.11	511	0.0	$75.92	$416.06	$75.00	4.49
ROOM 116	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.11	511	0.0	$75.92	$416.06	$75.00	4.49
GIRLS RESTROOM	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.11	511	0.0	$75.92	$262.06	$40.00	2.93
BOYS RESTROOM	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.11	511	0.0	$75.92	$416.06	$75.00	4.49
BOILER ROOM	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.11	511	0.0	$75.92	$416.06	$75.00	4.49
B8 GARAGE	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.11	511	0.0	$75.92	$416.06	$75.00	4.49
EXTERIOR	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	18	1,333	None	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	18	1,333	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
EXTERIOR	4	Compact Fluorescent: 2 PIN CFL 13W -2L	Daylight Dimming	26	1,333	Relamp	No	4	LED - Fixtures: Ceiling Mount	Daylight Dimming	18	1,333	0.02	49	0.0	$7.28	$100.00	$0.00	13.73
ROOM A4	5	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	Yes	5	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	1,866	0.23	1,078	0.0	$160.09	$1,027.18	$35.00	6.20

	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	5	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	Yes	5	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	1,866	0.23	1,078	0.0	$160.09	$1,027.18	$35.00	6.20
EXTERIOR	5	Compact Fluorescent: 2 PIN CFL 13W -3L	Daylight Dimming	39	1,333	Relamp	Yes	5	LED - Fixtures: Ceiling Mount	Occupancy Sensor	25	933	0.07	165	0.0	$24.46	$420.00	$35.00	15.74
201 ROOM	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,866	0.15	716	0.0	$106.23	$704.76	$35.00	6.30
ROOM 302	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	High/Low Control	114	1,866	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,866	0.22	721	0.0	$107.05	$438.18	$120.00	2.97
ROOM 215B	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.25	1,151	0.0	$170.81	$598.64	$125.00	2.77
ROO 133	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.25	1,151	0.0	$170.81	$598.64	$125.00	2.77
ROOM 215A	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.16	767	0.0	$113.87	$489.09	$95.00	3.46
GIRLS ROOM/CLOSET	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.16	767	0.0	$113.87	$335.09	$60.00	2.42
BOYS ROOM	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.16	767	0.0	$113.87	$489.09	$95.00	3.46
ROOM 111	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.33	1,534	0.0	$227.75	$708.18	$155.00	2.43
HALLWAY	8	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,666	Relamp	Yes	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,866	0.11	518	0.0	$76.83	$376.12	$80.00	3.85
ROOM 125	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 124	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 119	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 118	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 110	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 109	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 105	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 104	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.48	2,250	0.0	$334.06	$1,000.30	$235.00	2.29
ROOM 117	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.41	1,918	0.0	$284.68	$817.73	$185.00	2.22
ROOM 115	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.41	1,918	0.0	$284.68	$817.73	$185.00	2.22
ROOM 137	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.45	2,109	0.0	$313.15	$872.50	$200.00	2.15
ROOM 134	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.45	2,109	0.0	$313.15	$872.50	$200.00	2.15
ROOM 132	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.45	2,109	0.0	$313.15	$872.50	$200.00	2.15
ROOM 114	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.58	2,700	0.0	$400.88	$1,146.36	$275.00	2.17

	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 112	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,666	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.58	2,700	0.0	$400.88	$1,146.36	$275.00	2.17
ROOM 103	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.49	2,301	0.0	$341.62	$927.27	$215.00	2.08
B1 CAFETERIA	12	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Occupancy Sensor	120	1,866	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.49	1,597	0.0	$237.03	$876.36	$240.00	2.68
HALLWAY	12	LED - Fixtures: Close to Ceiling Mount	Wall Switch	50	2,666	None	Yes	12	LED - Fixtures: Close to Ceiling Mount	Occupancy Sensor	50	1,866	0.12	552	0.0	$81.92	$116.00	$0.00	1.42
ROOM 221	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 220	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 219	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 218	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 217	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 216	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 214	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 212	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.57	2,685	0.0	$398.56	$1,036.82	$245.00	1.99
ROOM 1	15	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	Yes	15	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	1,866	0.69	3,235	0.0	$480.28	$2,541.53	$35.00	5.22
HALLWAY	15	Metal Halide: (1) 175W Lamp	Wall Switch	215	2,666	Fixture Replacement	Yes	15	LED - Fixtures: High-Bay	Occupancy Sensor	45	1,866	1.80	8,439	0.0	$1,252.74	$11,739.23	$0.00	9.37
ROOM 301	15	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Occupancy Sensor	120	1,866	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,866	0.61	1,996	0.0	$296.29	$1,095.45	$300.00	2.68
ROOM 210	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.66	3,068	0.0	$455.49	$1,146.36	$275.00	1.91
ROOM 209	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.66	3,068	0.0	$455.49	$1,146.36	$275.00	1.91
ROOM 208	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.66	3,068	0.0	$455.49	$1,146.36	$275.00	1.91
ROOM 206	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.66	3,068	0.0	$455.49	$1,146.36	$275.00	1.91
ROOM 200	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.66	3,068	0.0	$455.49	$1,146.36	$275.00	1.91
201 ROOM	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	0.74	3,452	0.0	$512.43	$1,255.91	$305.00	1.86
B2 KITCHEN	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.49	2,301	0.0	$341.62	$927.27	$215.00	2.08
HALLWAY	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,666	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,866	0.52	2,429	0.0	$360.60	$809.79	$190.00	1.72
HALLWAY	19	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	19	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
EXTERIOR	29	Compact Fluorescent: 4 PIN 9W CFL - 2L	Daylight Dimming	18	1,333	Relamp	Yes	29	LED - Fixtures: Ceiling Mount	Occupancy Sensor	15	933	0.14	333	0.0	$49.50	$995.00	$35.00	19.40

	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
HALLWAY	30	U-Bend Fluorescent - T12: U T12 (34W) - 3L	Wall Switch	105	2,666	Relamp & Reballast	Yes	30	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	1,866	1.38	6,471	0.0	$960.55	$4,659.07	$0.00	4.85
HALLWAY	31	Compact Fluorescent: 4 PIN 9W CFL - 2L	Wall Switch	18	2,666	Relamp	Yes	31	LED - Fixtures: Other	Occupancy Sensor	15	1,866	0.15	713	0.0	$105.82	$891.00	$0.00	8.42
202 LIBRARY	41	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,666	Relamp	Yes	41	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,866	1.68	7,863	0.0	$1,167.20	$2,515.67	$650.00	1.60
HALLWAY	116	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,666	Relamp	No	116	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,666	1.33	6,224	0.0	$923.91	$2,117.87	$580.00	1.66

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Boiler	1	Heating Hot Water Pump	15.0	91.0%	No	3,391	Yes	92.4%	Yes	1	1.92	18,290	0.0	$2,715.18	$7,085.87	$0.00	2.61
Boiler Room	Boiler	1	Heating Hot Water Pump	15.0	91.0%	No	3,391	Yes	92.4%	Yes	1	1.92	18,290	0.0	$2,715.18	$7,085.87	$0.00	2.61
Boiler Room	Air Compressor	1	Air Compressor	0.5	68.0%	No	4,957	No	68.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Boiler	1	Heating Hot Water Pump	0.8	68.0%	No	2,745	Yes	81.1%	No		0.07	274	0.0	$40.62	$536.42	$0.00	13.21
Boiler Room	Boiler	1	Heating Hot Water Pump	0.8	68.0%	No	2,745	Yes	81.1%	No		0.08	292	0.0	$43.33	$536.42	$0.00	12.38
Roof	HV-1,2	2	Supply Fan	1.5	84.0%	Yes	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	HV-1,2	2	Return Fan	1.0	82.5%	Yes	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Unit	1	Other	0.2	69.5%	No	2,745	No	69.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-1	1	Supply Fan	0.3	68.0%	No	2,745	No	68.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-1	1	Return Fan	0.2	69.5%	No	2,745	No	69.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Unit	5	Supply Fan	0.3	68.0%	No	2,745	No	68.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Unit	5	Return Fan	0.3	68.0%	No	2,745	No	68.0%	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
Classrooms	Classrooms	32	Window AC	1.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Outdoor Unit	1	Split-System AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-1	1	Packaged AC	3.00		Yes	1	Packaged AC	3.00		14.00		Yes	0.35	1,246	0.0	$185.03	$7,306.88	$526.00	36.65
Roof	Rooftop Unit	4	Packaged AC	2.50		Yes	1	Packaged AC	2.50		14.00		Yes	4.93	10,343	0.0	$1,535.45	$6,172.40	$480.00	3.71

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
BOILER ROOM	SCHOOL GENERAL	1	Natural Draft Steam Boiler	1,923.00	Yes	1	Forced Draft Steam Boiler	1,923.00	81.00%	Et	0.00	0	61.8	$591.30	$38,849.86	$2,307.60	61.80
BOILER ROOM	SCHOOL GENERAL	1	Natural Draft Steam Boiler	1,923.00	Yes	1	Forced Draft Steam Boiler	1,923.00	81.00%	Et	0.00	0	61.8	$591.30	$38,849.86	$2,307.60	61.80

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
BOILER ROOM	SCHOOL	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
BOILER ROOM	SCHOOL	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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
Restrooms	27	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	39.2	$374.65	$193.59	$0.00	0.52
Restrooms	2	Faucet Aerator (Lavatory)	3.50	1.00	0.00	0	6.0	$57.82	$14.34	$0.00	0.25

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
KITCHEN	2	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	Freezer Chest	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

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker 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	Ice Making Head (<450 lbs/day), Batch	No	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	Insulated Food Holding Cabinet (1/2 Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
KITCHEN	1	Gas Rack Oven (Double)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
KITCHEN	1	Single Tank Conveyor (High Temp)	Natural Gas	N/A	Yes	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?
Classrooms	30	Computers	100.0	No
Classrooms	35	Projetors	200.0	Yes
Classrooms	42	Small Printer	45.0	Yes
Classrooms	32	Audio System	50.0	No
Staffroom	5	Medium Printer	80.0	Yes
Classrooms	49	Ceiling Fan	80.0	No
Staffroom	3	Small Refrigerator	54.0	No
Classrooms	6	Wall/Table Fan	80.0	Yes
Lobby	5	TV	250.0	No
Kitchen	7	Microwave	800.0	No
Kitchen	7	Coffee Maker	800.0	No
Kitchen	3	Large Printer	1,100.0	Yes
Kitchen	3	Big Refrigerator	300.0	Yes

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
Cafeteria	1	Refrigerated	Yes	0.00	1,612	0.0	$239.28	$230.00	$0.00	0.96

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Johnson Park Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 62,455
Built: 1959

For Year Ending: July 31, 2017
Date Generated: October 02, 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
Johnson Park Elementary School 285 Rosedale Road Princeton, New Jersey 08540	_____ . (___)___-_____	____ _____ . (___)___-_____ _____

Property ID: 6554257

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
54.8 kBtu/ft²

Source EUI
102.7 kBtu/ft²

Annual Energy by Fuel		National Median Comparison	
Natural Gas (kBtu)	1,808,644 (53%)	National Median Site EUI (kBtu/ft²)	53.7
Electric - Grid (kBtu)	1,613,139 (47%)	National Median Source EUI (kBtu/ft²)	100.7
		% Diff from National Median Source EUI	2%
		Annual Emissions	
		Greenhouse Gas Emissions (Metric Tons CO2e/year)	260

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)