Local Government Energy Audit:
Energy Audit Report

Wicoff Elementary School

510 Plainsboro Road

Plainsboro, New Jersey 08536

West Windsor-Plainsboro Regional School District

March 22, 2019

Final Report by:

TRC Energy Services

Disclaimer

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

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

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

Table of Contents

1 Executive Summary 1

1.1 Facility Summary 1
1.2 Your Cost Reduction Opportunities 1

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

1.3 Implementation Planning 4

2 Facility Information and Existing Conditions 6

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

Lighting System 7
Hot Water Heating System 8
Direct Expansion Air Conditioning System (DX) 8
Domestic Hot Water Heating System 8
Food Service Equipment 8
Refrigeration 8
Building Plug Load 9

2.7 Water-Using Systems 9

3 Site Energy Use and Costs 10

3.1 Total Cost of Energy 10
3.2 Electricity Usage 11
3.3 Natural Gas Usage 12
3.4 Benchmarking 13
3.5 Energy End-Use Breakdown 14

4 Energy Conservation Measures 15

4.1 Recommended ECMs 15
4.1.1 Lighting Upgrades 16

ECM 1: Install LED Fixtures 16
ECM 2: Retrofit Fixtures with LED Lamps 17

4.1.2 Lighting Control Measures 18

ECM 3: Install Occupancy Sensor Lighting Controls 18
ECM 4: Install High/Low Lighting Controls 19

4.1.3 Electric Unitary HVAC Measures 20

ECM 5: Install High Efficiency Heat Pumps 20

4.1.4 Plug Load Equipment Control - Vending Machines 21

ECM 6: Vending Machine Control 21
4.2 ECM Evaluated But Not Recommended 22
Install High Efficiency Air Conditioning Units 22
5 Energy Efficient Practices 23
Use Window Treatments/Coverings 23
Perform Routine Motor Maintenance 23
Clean Evaporator/Condenser Coils on AC Systems 23
Clean and/or Replace HVAC Filters 23
Perform Proper Boiler Maintenance 23
Water Conservation 24
6 On-Site Generation Measures 25
6.1 Photovoltaic 26
6.2 Combined Heat and Power 27
7 Demand Response 28
8 Project Funding / Incentives 29
8.1 SmartStart 30
8.2 Direct Install 31
8.3 SREC Registration Program 32
8.4 Energy Savings Improvement Program 33
9 Energy Purchasing and Procurement Strategies 34
9.1 Retail Electric Supply Options 34
9.2 Retail Natural Gas Supply Options 34

Appendix A: Equipment Inventory & Recommendations

Appendix B: ENERGY STAR® Statement of Energy Performance

Table of Figures

Figure 1 – Previous 12 Month Utility Costs 2
Figure 2 – Potential Post-Implementation Costs 2
Figure 3 – Summary of Energy Reduction Opportunities 2
Figure 4 – Photovoltaic Potential 3
Figure 5 – Project Contacts 6
Figure 6 - Building Schedule 6
Figure 7 – Building Exterior and Roof 7
Figure 8 - Utility Summary 10
Figure 9 - Energy Cost Breakdown 10
Figure 10 - Electric Usage & Demand 11
Figure 11 - Electric Usage & Demand 11
Figure 12 - Natural Gas Usage 12
Figure 13 - Natural Gas Usage 12
Figure 14 - Energy Use Intensity Comparison – Existing Conditions 13
Figure 15 - Energy Use Intensity Comparison – Following Installation of Recommended Measures 13
Figure 16 - Energy Balance (% and kBtu/SF) 14
Figure 17 – Summary of Recommended ECMs 15
Figure 18 – Summary of Lighting Upgrade ECMs 16
Figure 19 – Summary of Lighting Control ECMs 18
Figure 20 - Summary of Unitary HVAC ECMs 20
Figure 21 - Summary of Plug Load Equipment Control ECMs 21
Figure 22 – Summary of Measures Evaluated, But Not Recommended 22
Figure 23 - Photovoltaic Screening 26
Figure 24 - Combined Heat and Power Screening 27
Figure 25 - ECM Incentive Program Eligibility 29

1 EXECUTIVE SUMMARY

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

The goal of a 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 local governments in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Wicoff Elementary School is a 47,470 square foot facility comprised of two floors. Space types include classrooms, offices, gym, auditorium, cafeteria, corridors, stairwells, storage rooms, library, media center, a commercial kitchen and a mechanical room including mechanical equipment.

The building was built in 1918 and the last renovation on the building took place in 1959.

Lighting at Wicoff Elementary School consists of aging and inefficient lighting and HVAC equipment in need of replacement. In addition, the heating is supplied by two boilers that serve heating hot water to a variety of heating equipment throughout the school. 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 seven measures and recommends six measures which together represent an opportunity for Wicoff Elementary School to reduce annual energy costs by roughly $15,483 and annual greenhouse gas emissions by 95,925 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 2.7 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 Wicoff Elementary School's annual energy use by 12%.

Figure 1 – Previous 12 Month Utility Costs

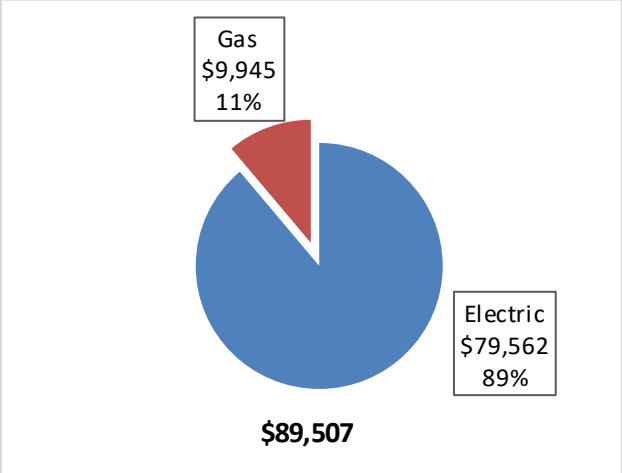
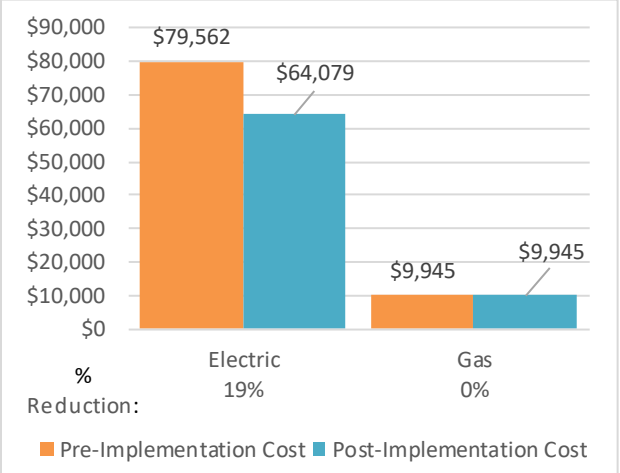


Figure 2 – Potential Post-Implementation Costs



A detailed description of Wicoff 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			**78,242**	**18.9**	**0.0**	**$12,717.44**	**$36,678.17**	**$9,295.00**	**$27,383.17**	**2.2**	**78,789**
ECM 1	Install LED Fixtures	Yes	8,439	1.3	0.0	$1,371.67	$3,996.03	$330.00	$3,666.03	2.7	8,498
ECM 2	Retrofit Fixtures with LED Lamps	Yes	69,803	17.6	0.0	$11,345.77	$32,682.14	$8,965.00	$23,717.14	2.1	70,291
Lighting Control Measures			**14,838**	**3.5**	**0.0**	**$2,411.70**	**$14,360.00**	**$1,540.00**	**$12,820.00**	**5.3**	**14,941**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	13,877	3.3	0.0	$2,255.58	$12,960.00	$1,540.00	$11,420.00	5.1	13,974
ECM 4	Install High/Low Lighitng Controls	Yes	960	0.2	0.0	$156.12	$1,400.00	$0.00	$1,400.00	9.0	967
Electric Unitary HVAC Measures			**16,337**	**8.0**	**0.0**	**$2,655.39**	**$68,793.11**	**$1,702.00**	**$67,091.11**	**25.3**	**16,451**
	Install High Efficiency Electric AC	No	15,769	7.8	0.0	$2,563.12	$67,102.22	$1,610.00	$65,492.22	25.6	15,879
ECM 5	Install High Efficiency Heat Pumps	Yes	568	0.2	0.0	$92.27	$1,690.89	$92.00	$1,598.89	17.3	572
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$261.99**	**$230.00**	**$0.00**	**$230.00**	**0.9**	**1,623**
ECM 6	Vending Machine Control	Yes	1,612	0.0	0.0	$261.99	$230.00	$0.00	$230.00	0.9	1,623
TOTALS FOR HIGH PRIORITY MEASURES			**95,259**	**22.6**	**0.0**	**$15,483.40**	**$52,959.06**	**$10,927.00**	**$42,032.06**	**2.7**	**95,925**
TOTALS FOR ALL EVALUATED MEASURES			**111,028**	**30.4**	**0.0**	**$18,046.52**	**$120,061.28**	**$12,537.00**	**$107,524.28**	**6.0**	**111,804**

* - 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.

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.

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 six 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 Wicoff Elementary School include:

- Use Window Treatments/Coverings
- Perform Routine Motor Maintenance
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Wicoff Elementary School. Based on the configuration of the site and its loads there is a moderate potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	150	kW DC STC
Electric Generation	112,867	kWh/yr
Displaced Cost	$9,820	/yr
Installed Cost	$390,000	

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

1.3 Implementation Planning

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

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

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

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

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

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Dr. Christopher Russo	Business Administrator	christopher.russo@ww-p.org	609-716-5000 Extn: 5020
Designated Representative			
Daniel Riggle	Account Executive	daniel.riggle@schneider-electric.com	808-346-2907
TRC Energy Services			
Alex Klieverik	Auditor	aklieverik@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On August 23, 2018, TRC performed an energy audit at Wicoff Elementary School located in Plainsboro, New Jersey. TRC's team met with Daniel Riggle to review the facility operations and help focus our investigation on specific energy-using systems.

Wicoff Elementary School is a 47,470 square foot facility comprised of various space types including classrooms, offices, gym, auditorium, cafeteria, corridors, stairwells, storage rooms, library, media center, a commercial kitchen and mechanical room including mechanical equipment.

The building was constructed in 1918. The building was last renovated in 1959 and the site is seeking an opportunity to develop new energy efficiency measures to achieve a better building EUI and reduction in energy cost.

2.3 Building Occupancy

The school building is open Monday through Friday. The typical schedule is presented in the table below. The school building is used for some summer activities but exact schedule of the building's usage and operation has not been identified. During a typical day, the facility is occupied by approximately 78 staff and 458 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Wicoff ES	Weekday	M-F, 7:00 AM - 4:00 PM (full) 6:00 AM - 6:00 PM (partial)
Wicoff ES	Weekend	No Operation

2.4 Building Envelope

The building is constructed of a combination of brick and cavity wall panels with a stone façade. The buildings have flat roofs covered with SBS asphalt membrane that is in good condition. The building has single pane windows. The wooden framed exterior doors are not in good condition and seem to not have any window seals, increasing the level of outside air infiltration.

Figure 7 – Building Exterior and Roof

2.5 On-Site Generation

Wicoff 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), incandescent lamps and few LED lamps. Most of the fixtures are 2-lamp or 3-lamp, 4-foot long troffers with diffusers.

A small area of the building and the majority of the office spaces are primarily lit with 13-Watt, 18-Watt or 23-Watt CFL lamps in recessed can ceiling fixtures, 60-Watt incandescent lamps as well as a few 9-Watt LED lights.

The majority of the spaces throughout the school building do not have any lighting controls aside from manual wall switches. There are only five classrooms with wall mount occupancy sensors.

The building's exterior lighting is minimal and consists of a mix of efficient high pressure sodium (HPS), metal halide (MH) fixtures, some incandescent lights as well as LED canopy fixtures. The MH fixtures are controlled by photocells and the rest of the exterior fixtures are controlled by a timer.

Hot Water Heating System

The hot water system consists of two 2,610 MBH output AERCO Benchmark 3.0, low emission condensing boilers (BR1 & 2). The boilers have a nominal combustion efficiency range, ranging from 87% to 90% depending on return water temperature. The boilers are configured for distribution by three hot water pumps (HHWP1, 2 & 3). Each boiler is supplied by a dedicated 5 hp pump and an additional pump for redundancy. Each pump has variable frequency drive (VFD). The hot water return temperature was noted at 82°F at the time of inspection. The boiler operation is controlled by AERCO's Boiler Management System. The sequence of boilers operations could not be recorded at the time of inspection. The boilers provide hot water to the kitchen's air handlers as well as the AAON DX units.

Only a single boiler is required to meet the facility heating demand at a given time. The boilers are in good condition and well maintained.

Direct Expansion Air Conditioning System (DX)

A 17-ton AAON DX package unit is used to condition the Cafeteria. A 4.5-ton Carrier DX package unit is used to condition the gymnasium. A 2-ton York and 6-ton Goodman DX package units are used to condition the classrooms and associated areas. All these units are located on the roof of the building. The units provide constant air volume with single 0.5 to 0.75 hp supply fans in each unit.

The units are controlled by programmable thermostats located in each of the areas the units are serving.

The cooling for the rest of the building is provided by various 1 to 2-ton split system air conditioning (AC) units. Some of these units are located outside of the classrooms or on the roof. Each of these units are manually controlled from the spaces they serve.

In addition, there are 11 2-ton window AC units that serve class rooms as well as one 6 ton through the wall AC units. These units are manually controlled.

One of the classrooms is also served by a 1-ton split-system air source heat pump with 10 Kbtu/hr input heating capacity.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of two water heaters. One is an A.O. Smith gas fired hot water heater with an input rating of 199 MBh and a nominal efficiency of 85%. A second A.O. Smith hot water heater is electric; it has an input capacity of 5 kW. The gas fired water heater has a 100-gallon storage tank and the electric heater has a 40-gallon tank. The gas fired heater serves most of the building and uses a 1/8 hp recirculation pump and the electric heater serves only the classrooms.

Food Service Equipment

The school has an all-electric kitchen that is used to prepare breakfast and lunches per day for the students and staff. Most of the cooking is done using the convection oven, the single large griddle and the combined oven and steamer cooker.

Refrigeration

The kitchen has three stand-up refrigerators that is used to store food prepared for school lunches.

Building Plug Load

There are roughly 14 computer work stations throughout the facility. There is no centralized PC power management software installed. In addition, there are 11 desk printers, 21 projectors, four minifridges and four microwaves. There are also about 15 LCD TVs in different classrooms and one Kiln unit.

The facility has one refrigerated beverage vending machines.

2.7 Water-Using Systems

There are 12 restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2 gallons per minute (gpm) or 3 gpm, 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

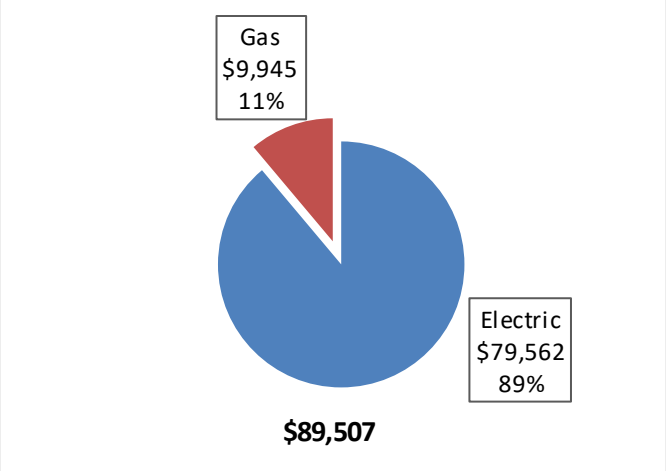
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 8 - Utility Summary

Utility Summary for Wicoff Elementary School		
Fuel	**Usage**	**Cost**
Electricity	489,491 kWh	$79,562
Natural Gas	9,702 Therms	$9,945
Total		**$89,507**

The current annual energy cost for this facility is $89,507 as shown in the chart below.

Figure 9 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.163/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 10 - Electric Usage & Demand

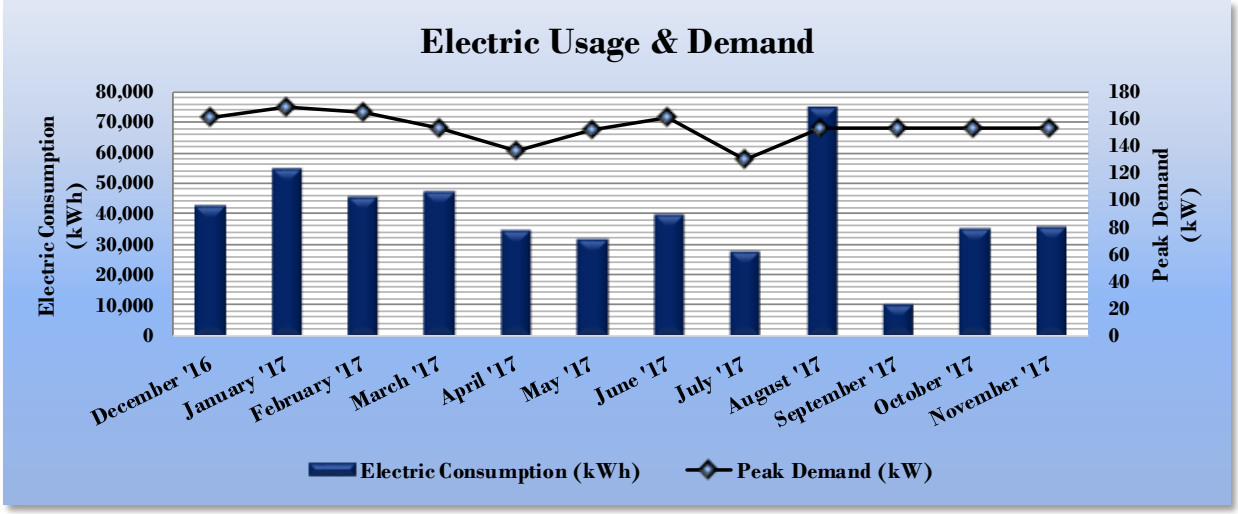


Figure 11 - Electric Usage & Demand

Electric Billing Data for Wicoff Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
12/13/16	33	42,780	161		$5,396
1/18/17	35	54,540	169		$6,753
2/16/17	28	45,880	165		$5,784
3/20/17	31	47,590	153		$5,926
4/17/17	27	34,760	136		$4,443
5/18/17	30	32,040	152		$4,287
6/19/17	31	39,690	161		$6,797
7/19/17	29	27,540	129		$4,947
8/17/17	28	74,700	153		$13,011
9/17/17	30	10,590	153		$9,087
10/17/17	29	35,215	153		$6,765
11/15/17	28	36,120	153		$5,059
Totals	**359**	**481,445**	**169**	**$0**	**$78,254**
Annual	**365**	**489,491**	**169**	**$0**	**$79,562**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is $1.025/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 12 - Natural Gas Usage

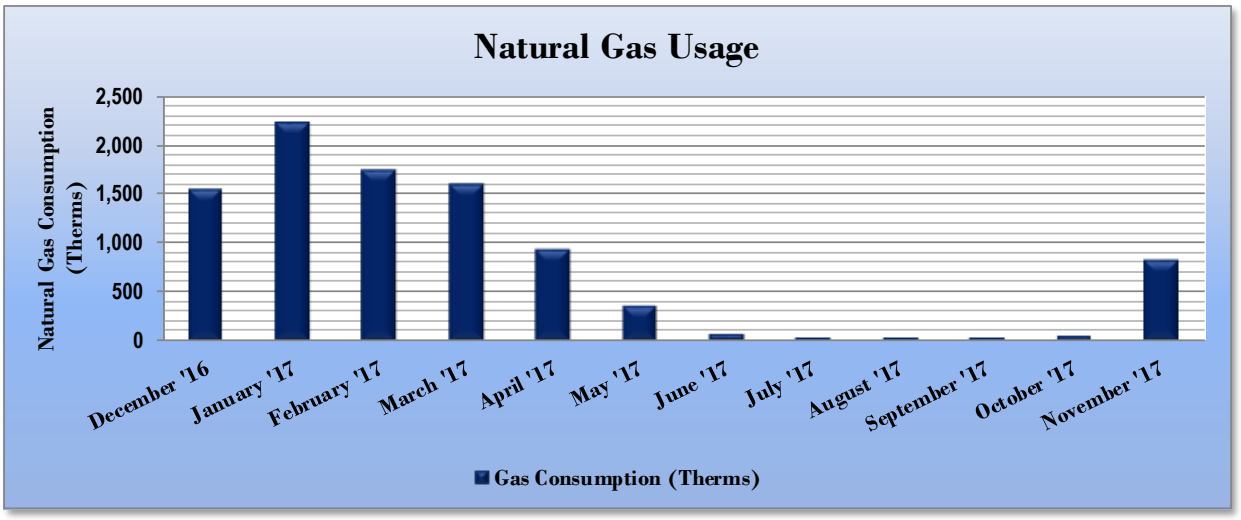


Figure 13 - Natural Gas Usage

Gas Billing Data for Wicoff Elementary School				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
12/13/16	33	1,552	$1,448	Yes
1/18/17	35	2,232	$2,022	Yes
2/16/17	28	1,755	$1,679	No
3/20/17	31	1,612	$1,573	No
4/17/17	27	944	$701	No
5/18/17	30	367	$338	No
6/19/17	31	74	$154	No
7/19/17	29	40	$132	No
8/17/17	28	41	$296	No
9/17/17	30	42	$65	Yes
10/17/17	29	54	$84	Yes
11/15/17	28	829	$1,288	Yes
Totals	**359**	**9,542**	**$9,781**	5
Annual	**365**	**9,702**	**$9,945**	

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 14 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Wicoff Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	131.9	141.4
Site Energy Use Intensity (kBtu/ft^2)	55.6	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 15 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Wicoff Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	110.4	141.4
Site Energy Use Intensity (kBtu/ft^2)	48.8	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 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is not is one of the building categories that are eligible to receive a score. This facility has a current score of 56.

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

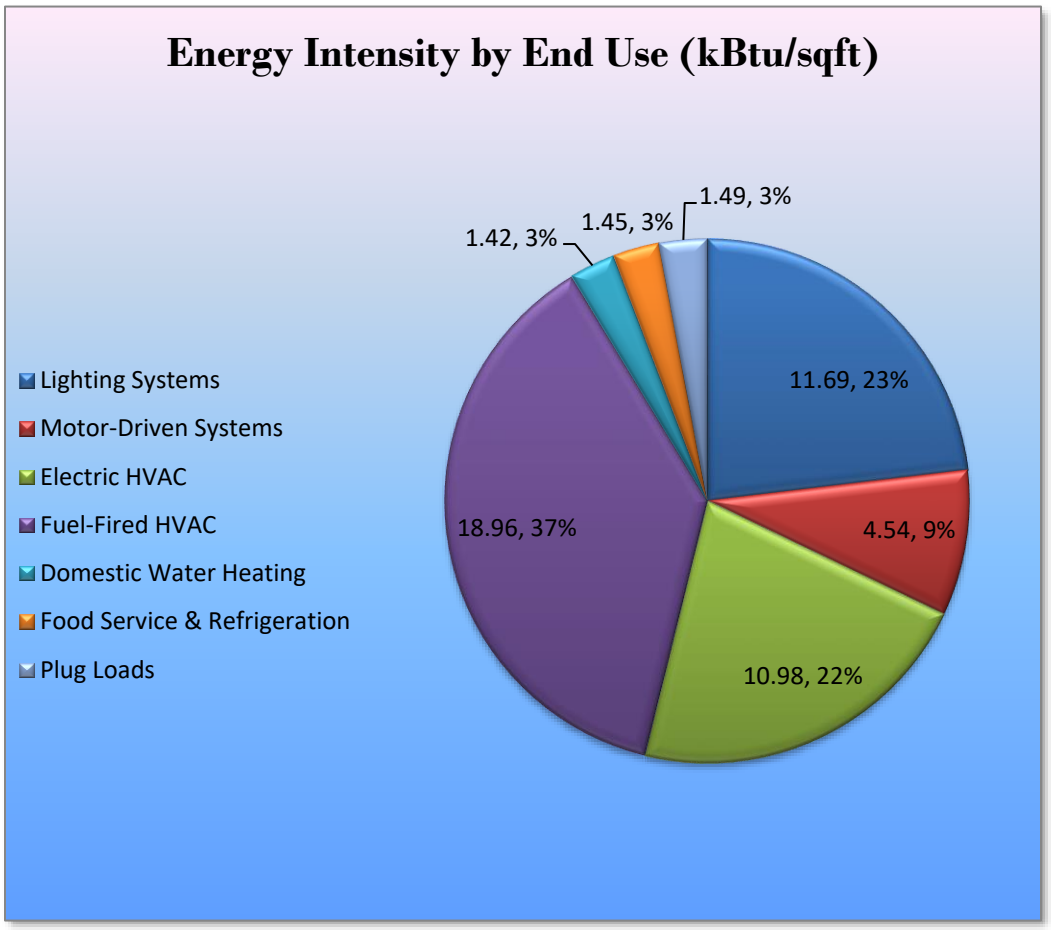
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 ENERGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

3.5 Energy End-Use Breakdown

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

Figure 16 - 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 Wicoff 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 17 – 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		**78,242**	**18.9**	**0.0**	**$12,717.44**	**$36,678.17**	**$9,295.00**	**$27,383.17**	**2.2**	**78,789**
ECM 1	Install LED Fixtures	8,439	1.3	0.0	$1,371.67	$3,996.03	$330.00	$3,666.03	2.7	8,498
ECM 2	Retrofit Fixtures with LED Lamps	69,803	17.6	0.0	$11,345.77	$32,682.14	$8,965.00	$23,717.14	2.1	70,291
Lighting Control Measures		**14,838**	**3.5**	**0.0**	**$2,411.70**	**$14,360.00**	**$1,540.00**	**$12,820.00**	**5.3**	**14,941**
ECM 3	Install Occupancy Sensor Lighting Controls	13,877	3.3	0.0	$2,255.58	$12,960.00	$1,540.00	$11,420.00	5.1	13,974
ECM 4	Install High/Low Lighitng Controls	960	0.2	0.0	$156.12	$1,400.00	$0.00	$1,400.00	9.0	967
Electric Unitary HVAC Measures		**568**	**0.2**	**0.0**	**$92.27**	**$1,690.89**	**$92.00**	**$1,598.89**	**17.3**	**572**
ECM 5	Install High Efficiency Heat Pumps	568	0.2	0.0	$92.27	$1,690.89	$92.00	$1,598.89	17.3	572
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$261.99**	**$230.00**	**$0.00**	**$230.00**	**0.9**	**1,623**
ECM 6	Vending Machine Control	1,612	0.0	0.0	$261.99	$230.00	$0.00	$230.00	0.9	1,623
TOTALS		**95,259**	**22.6**	**0.0**	**$15,483.40**	**$52,959.06**	**$10,927.00**	**$42,032.06**	**2.7**	**95,925**

* - 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 18 below.

Figure 18 – 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		**78,242**	**18.9**	**0.0**	**$12,717.44**	**$36,678.17**	**$9,295.00**	**$27,383.17**	**2.2**	**78,789**
ECM 1	Install LED Fixtures	8,439	1.3	0.0	$1,371.67	$3,996.03	$330.00	$3,666.03	2.7	8,498
ECM 2	Retrofit Fixtures with LED Lamps	69,803	17.6	0.0	$11,345.77	$32,682.14	$8,965.00	$23,717.14	2.1	70,291

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	8,439	1.3	0.0	$1,371.67	$3,996.03	$330.00	$3,666.03	2.7	8,498

Measure Description

We recommend replacing exterior fixtures containing metal halide or high pressure sodium lamps with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a metal halide or high pressure sodium lamps.

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	68,846	17.4	0.0	$11,190.28	$32,561.56	$8,930.00	$23,631.56	2.1	69,328
Exterior	957	0.1	0.0	$155.48	$120.58	$35.00	$85.58	0.6	963

Measure Description

We recommend retrofitting existing fluorescent and incandescent 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 recommendations for lighting control measures are summarized in Figure 19 below.

Figure 19 – 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		**14,838**	**3.5**	**0.0**	**$2,411.70**	**$14,360.00**	**$1,540.00**	**$12,820.00**	**5.3**	**14,941**
ECM 3	Install Occupancy Sensor Lighting Controls	13,877	3.3	0.0	$2,255.58	$12,960.00	$1,540.00	$11,420.00	5.1	13,974
ECM 4	Install High/Low Lighitng Controls	960	0.2	0.0	$156.12	$1,400.00	$0.00	$1,400.00	9.0	967

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
13,877	3.3	0.0	$2,255.58	$12,960.00	$1,540.00	$11,420.00	5.1	13,974

Measure Description

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

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

ECM 4: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
960	0.2	0.0	$156.12	$1,400.00	$0.00	$1,400.00	9.0	967

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

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

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

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

4.1.3 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are 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		**568**	**0.2**	**0.0**	**$92.27**	**$1,690.89**	**$92.00**	**$1,598.89**	**17.3**	**572**
ECM 5	Install High Efficiency Heat Pumps	568	0.2	0.0	$92.27	$1,690.89	$92.00	$1,598.89	17.3	572

ECM 5: Install High Efficiency Heat 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)
568	0.2	0.0	$92.27	$1,690.89	$92.00	$1,598.89	17.3	572

Measure Description

We recommend replacing standard efficiency heat pumps with high efficiency heat pumps. 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 and a higher HPSF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours. This recommended measure is for the unit located on the roof serving one of the classrooms.

4.1.4 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment control measures are summarized in Figure 21 below.

Figure 21 - 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**	**$261.99**	**$230.00**	**$0.00**	**$230.00**	**0.9**	**1,623**
ECM 6	Vending Machine Control	1,612	0.0	0.0	$261.99	$230.00	$0.00	$230.00	0.9	1,623

ECM 6: 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	$261.99	$230.00	$0.00	$230.00	0.9	1,623

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install 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 ECM Evaluated But Not Recommended

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

Figure 22 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures	**15,769**	**7.8**	**0.0**	**$2,563.12**	**$67,102.22**	**$1,610.00**	**$65,492.22**	**25.6**	**15,879**
Install High Efficiency Electric AC	15,769	7.8	0.0	$2,563.12	$67,102.22	$1,610.00	$65,492.22	25.6	15,879
TOTALS	**15,769**	**7.8**	**0.0**	**$2,563.12**	**$67,102.22**	**$1,610.00**	**$65,492.22**	**25.6**	**15,879**

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

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

Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
15,769	7.8	0.0	$2,563.12	$67,102.22	$1,610.00	$65,492.22	25.6	15,879

Measure Description

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

Reasons for not Recommending

This measure is not recommended because the payback period exceeds the expected life of the replacement equipment.

5 ENERGY EFFICIENT PRACTICES

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

Use Window Treatments/Coverings

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

Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Water Conservation

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

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

6 On-Site Generation Measures

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

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

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

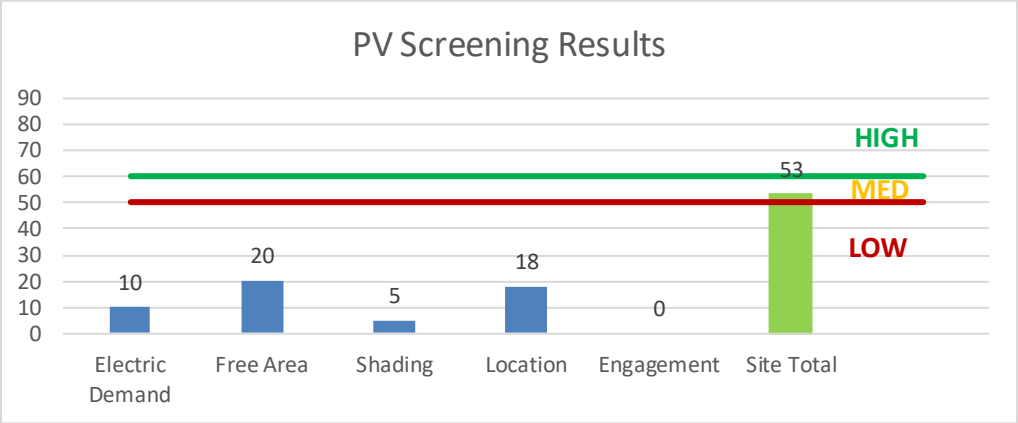
6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the potential for PV at the 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 Wicoff Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 23 - Photovoltaic Screening



Potential	Medium	
System Potential	150	kW DC STC
Electric Generation	112,867	kWh/yr
Displaced Cost	$9,820	/yr
Installed Cost	$390,000	

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

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

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

6.2 Combined Heat and Power

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

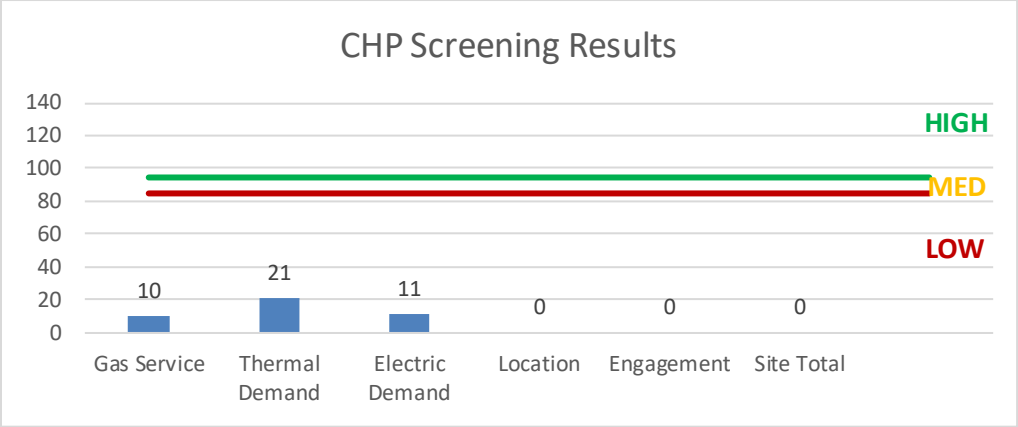
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

Figure 24 - 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, DR is not a good option or this facility.

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 25 for a list of the eligible programs identified for each recommended ECM.

Figure 25 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x		x			
ECM 2	Retrofit Fixtures with LED Lamps	x		x			
ECM 3	Install Occupancy Sensor Lighting Controls	x		x			
ECM 4	Install High/Low Lighitng Controls	x		x			
ECM 5	Install High Efficiency Heat Pumps	x		x			
ECM 6	Vending Machine Control			x			

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with a peak electric demand that does not exceed 200 kW for any recent 12-month period. You will 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. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

To participate in the Direct Install program you will need to contact the participating contractor who 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.

Since Direct Install offers a free assessment of eligible measures, Direct Install is also available to small businesses and other commercial facilities too that may not be eligible for the more detailed facility audits provided by LGEA.

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. SREC's are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

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

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar 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 descriptions and application can be found at: www.njcleanenergy.com/ESIP.

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.09	66	0.0	$10.73	$182.58	$50.00	12.36
Boiler Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	400	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	400	0.04	26	0.0	$4.19	$73.03	$20.00	12.67
Boiler Room	1	Incandescent: 60 Watt - 1L	Wall Switch	60	400	Relamp	No	1	LED Screw-In Lamps: LED 1L	Wall Switch	9	400	0.03	23	0.0	$3.81	$17.23	$5.00	3.21
Custodial Break Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,400	0.07	309	0.0	$50.24	$146.06	$40.00	2.11
Custodial Office	1	LED Screw-In Lamps: A19 - 9 Watt - 2L	Wall Switch	18	2,400	None	No	1	LED Screw-In Lamps: A19 - 9 Watt - 2L	Wall Switch	18	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Custodial RR	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	None	No	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room/Break Room Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.02	15	0.0	$2.47	$36.52	$10.00	10.75
Kitchen	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.27	1,151	0.0	$187.07	$635.15	$135.00	2.67
Kitchen	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen - Venthood	1	Incandescent: 60 Watt - 1L	Wall Switch	60	2,400	Relamp	No	1	LED Screw-In Lamps: LED 1L	Wall Switch	9	2,400	0.03	141	0.0	$22.88	$17.23	$5.00	0.53
Kitchen RR	1	Compact Fluorescent: A19 - 13 Watt - 2L	Wall Switch	26	2,400	Relamp	No	1	LED Screw-In Lamps: LED 2L	Wall Switch	18	2,400	0.01	22	0.0	$3.50	$34.45	$10.00	6.99
Kitchen RR	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,400	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,400	0.01	44	0.0	$7.18	$32.52	$10.00	3.14
Kitchen Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
Kitchen Storage	1	Compact Fluorescent: A19 - 13 Watt - 1L	Wall Switch	13	2,400	Relamp	No	1	LED Screw-In Lamps: LED 1L	Wall Switch	9	2,400	0.00	11	0.0	$1.75	$17.23	$5.00	6.99
CR17- Music Room	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.66	2,762	0.0	$448.97	$1,146.36	$275.00	1.94
Nurse's Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.14	575	0.0	$93.54	$452.58	$85.00	3.93
Nurse's RR1	1	Incandescent: 60 Watt - 2L	Wall Switch	120	2,400	Relamp	No	1	LED Screw-In Lamps: LED 2L	Wall Switch	18	2,400	0.07	282	0.0	$45.76	$34.45	$10.00	0.53
Nurse Area	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.16	691	0.0	$112.24	$489.09	$95.00	3.51
Nurse Exam Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.16	691	0.0	$112.24	$489.09	$95.00	3.51
Nurse's RR2	1	Incandescent: 60 Watt - 2L	Wall Switch	120	2,400	Relamp	No	1	LED Screw-In Lamps: LED 2L	Wall Switch	18	2,400	0.07	282	0.0	$45.76	$34.45	$10.00	0.53
Principle's Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,680	0.14	608	0.0	$98.78	$489.09	$95.00	3.99
Main Office	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.29	1,208	0.0	$196.42	$653.41	$140.00	2.61
CR15	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.49	2,072	0.0	$336.73	$927.27	$215.00	2.12
CR15	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
Connector Hall	1	Incandescent: 60 Watt - 2L	Wall Switch	120	2,400	Relamp	No	1	LED Screw-In Lamps: LED 2L	Wall Switch	18	2,400	0.07	282	0.0	$45.76	$34.45	$10.00	0.53

	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
Storage Room	1	Incandescent: 60 Watt - 2L	Wall Switch	120	400	Relamp	No	1	LED Screw-In Lamps: LED 2L	Wall Switch	18	400	0.07	47	0.0	$7.63	$34.45	$10.00	3.21
Hall RR1	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	None	No	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hall RR2	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	None	No	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR9	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.49	2,072	0.0	$336.73	$927.27	$215.00	2.12
CR9	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
CR15a	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.05	230	0.0	$37.41	$343.03	$20.00	8.63
CR10	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.49	2,072	0.0	$336.73	$927.27	$215.00	2.12
CR11	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.49	2,072	0.0	$336.73	$927.27	$215.00	2.12
CR12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.49	2,072	0.0	$336.73	$927.27	$215.00	2.12
CR13	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,680	0.38	1,621	0.0	$263.42	$854.24	$195.00	2.50
CR14	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,680	0.38	1,621	0.0	$263.42	$854.24	$195.00	2.50
CR14	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
Door 14	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	None	No	1	LED Screw-In Lamps: A19 - 9 Watt - 1L	Wall Switch	9	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR1 - KG	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.70	2,935	0.0	$477.03	$1,201.13	$290.00	1.91
CR1- RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR2-KG	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.70	2,935	0.0	$477.03	$1,201.13	$290.00	1.91
CR2-RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR3-KG	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.70	2,935	0.0	$477.03	$1,201.13	$290.00	1.91
CR3-RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR4-Art	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.74	3,107	0.0	$505.09	$1,255.91	$305.00	1.88
CR5	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.57	2,417	0.0	$392.85	$1,036.82	$245.00	2.02
CR5-RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR6	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.57	2,417	0.0	$392.85	$1,036.82	$245.00	2.02
CR6-RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR7	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.57	2,417	0.0	$392.85	$1,036.82	$245.00	2.02

	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
CR7-RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR7-Floor Lamp	1	Incandescent: 60 Watt - 5L	Wall Switch	300	2,400	Relamp	No	1	LED Screw-In Lamps: LED -5L	Wall Switch	45	2,400	0.17	704	0.0	$114.40	$86.13	$25.00	0.53
CR8	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	17	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.70	2,935	0.0	$477.03	$1,201.13	$290.00	1.91
CR8-RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR33	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.52	2,187	0.0	$355.43	$963.79	$225.00	2.08
CR33-RR	1	Incandescent: 60 Watt - 1L	Wall Switch	60	2,400	Relamp	No	1	LED Screw-In Lamps: LED-1L	Wall Switch	9	2,400	0.03	141	0.0	$22.88	$17.23	$5.00	0.53
CR24	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.52	2,187	0.0	$355.43	$963.79	$225.00	2.08
CR24-RR	1	LED Screw-In Lamps: A19 - 13 Watt - 1L	Wall Switch	13	2,400	None	No	1	LED Screw-In Lamps: A19 - 13 Watt - 1L	Wall Switch	13	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
CR32	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.33	1,381	0.0	$224.48	$708.18	$155.00	2.46
Staff RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
Faculty Room#25	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.25	1,036	0.0	$168.36	$598.64	$125.00	2.81
Utility Closet	1	Incandescent: 60 Watt - 1L	Wall Switch	60	400	Relamp	No	1	LED Screw-In Lamps: LED-1L	Wall Switch	9	400	0.03	23	0.0	$3.81	$17.23	$5.00	3.21
Faculty Break Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.12	518	0.0	$84.18	$434.32	$80.00	4.21
Electrical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	400	0.02	15	0.0	$2.47	$36.52	$10.00	10.75
CR31	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.19	806	0.0	$130.95	$525.61	$105.00	3.21
CR29	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.22	921	0.0	$149.66	$562.12	$115.00	2.99
#26 Media Cneter	33	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	33	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	1.35	5,697	0.0	$926.00	$2,347.49	$565.00	1.92
#26 Media Cneter	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
#26 - Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.12	518	0.0	$84.18	$434.32	$80.00	4.21
CR28 - CST	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$74.83	$416.06	$75.00	4.56
CR28 - Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$74.83	$416.06	$75.00	4.56
Guidance Con. Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$74.83	$416.06	$75.00	4.56
Dining Area	25	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	25	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	1.03	4,316	0.0	$701.52	$1,909.31	$445.00	2.09
Dining Area	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.00	11	0.0	$1.79	$36.52	$10.00	14.78
Dining Area	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

	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
Dining Area	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
18/23 Storage Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	280	0.11	77	0.0	$12.47	$416.06	$40.00	30.15
18/23 Storage Room	1	Compact Fluorescent: 18 Watt - 1L	Wall Switch	18	400	Relamp	No	1	LED Screw-In Lamps: LED -1L	Wall Switch	13	400	0.00	2	0.0	$0.40	$17.23	$5.00	30.28
CR23	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.33	1,381	0.0	$224.48	$708.18	$155.00	2.46
CR20	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,680	Relamp	No	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.68	2,008	0.0	$326.43	$1,150.22	$315.00	2.56
CR19a	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,680	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.10	287	0.0	$46.63	$164.32	$45.00	2.56
CR19a	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,680	Relamp	No	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.68	2,008	0.0	$326.43	$1,150.22	$315.00	2.56
CR21	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,680	Relamp	No	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.68	2,008	0.0	$326.43	$1,150.22	$315.00	2.56
CR21a	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,680	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.10	287	0.0	$46.63	$164.32	$45.00	2.56
CR22	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,680	Relamp	No	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.68	2,008	0.0	$326.43	$1,150.22	$315.00	2.56
CR18	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.33	1,381	0.0	$224.48	$708.18	$155.00	2.46
Storage/Mech	1	Compact Fluorescent: 18 Watt - 1L	Wall Switch	18	2,400	Relamp	No	1	LED Screw-In Lamps: LED -1L	Wall Switch	13	2,400	0.00	15	0.0	$2.42	$17.23	$5.00	5.05
Storage/Mech	1	LED Screw-In Lamps: 9 Watt - 1L	Wall Switch	9	2,400	None	No	1	LED Screw-In Lamps: 9 Watt - 1L	Wall Switch	9	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boys RR	1	Incandescent: 60 Watt - 1L	Wall Switch	60	2,400	Relamp	No	1	LED Screw-In Lamps: LED -1L	Wall Switch	9	2,400	0.03	141	0.0	$22.88	$17.23	$5.00	0.53
Boys RR Outside Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.04	182	0.0	$29.61	$73.03	$20.00	1.79
Girls RR	1	LED Screw-In Lamps: 9 Watt - 1L	Wall Switch	9	2,400	None	No	1	LED Screw-In Lamps: 9 Watt - 1L	Wall Switch	9	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Girls RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
Stage Area	2	Incandescent: 75 Watt - 1L	Wall Switch	75	2,400	Relamp	Yes	2	LED Screw-In Lamps: LED -1L	Occupancy Sensor	11	1,680	0.09	371	0.0	$60.23	$304.45	$45.00	4.31
Stage Area	4	Compact Fluorescent: 23 Watt - 1L	Wall Switch	23	2,400	Relamp	Yes	4	LED Screw-In Lamps: LED -1L	Occupancy Sensor	16	1,680	0.03	129	0.0	$21.05	$338.90	$55.00	13.49
Stage Area	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
Stage Area - Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.05	230	0.0	$37.41	$343.03	$20.00	8.63
Stage Lighting	12	Incandescent: 120 Watt - 1L	Wall Switch	120	2,400	Relamp	Yes	12	LED Screw-In Lamps: LED -1L	Occupancy Sensor	18	1,680	0.84	3,557	0.0	$578.17	$476.70	$95.00	0.66
Stage Lighting	80	Incandescent: 100 Watt - 1L	Wall Switch	100	2,400	None	No	80	Incandescent: 100 Watt - 1L	Wall Switch	100	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
IDF Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.05	230	0.0	$37.41	$343.03	$20.00	8.63
Gym/MPR	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

	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
Gym/MPR	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,680	0.96	4,052	0.0	$658.56	$1,730.60	$435.00	1.97
Stairwell1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
Stairwell1	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
CR18 Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
CR23 Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
Stairwell2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.02	91	0.0	$14.80	$36.52	$10.00	1.79
Stairwell2	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
2nd Floor Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,680	0.14	575	0.0	$93.54	$382.58	$50.00	3.56
2nd Floor Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Entry	6	LED Screw-In Lamps: 18 Watt - 1L	Wall Switch	18	2,400	None	No	6	LED Screw-In Lamps: 18 Watt - 1L	Wall Switch	18	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Entry	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
CR10 - 13 Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,680	0.08	345	0.0	$56.12	$309.55	$30.00	4.98
CR10 - 13 Hall	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,680	0.24	1,013	0.0	$164.64	$565.15	$100.00	2.83
Door 13	1	LED Screw-In Lamps: 18 Watt - 1L	Wall Switch	18	2,400	None	No	1	LED Screw-In Lamps: 18 Watt - 1L	Wall Switch	18	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Door Hall 10 to 12	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.55	2,302	0.0	$374.14	$1,000.30	$235.00	2.05
Door Hall 10 to 12	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Entrance Hall	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,680	0.36	1,496	0.0	$243.19	$874.70	$130.00	3.06
Main Entrance Hall	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
Main Entrance Hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,680	0.19	810	0.0	$131.71	$492.12	$80.00	3.13
Main Office Hall	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,680	0.19	806	0.0	$130.95	$455.61	$70.00	2.94
Main Office Hall	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Office Hall	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,400	0.04	155	0.0	$25.12	$73.03	$20.00	2.11
Main Office Hall	1	LED Screw-In Lamps: 18 Watt - 1L	Wall Switch	18	2,400	None	No	1	LED Screw-In Lamps: 18 Watt - 1L	Wall Switch	18	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Parking Lot	6	Metal Halide: (1) 400W Lamp	Daylight Dimming	458	3,640	Fixture Replacement	No	6	LED - Fixtures: Architectural Flood/Spot Luminaire	Daylight Dimming	137	3,640	1.26	8,052	0.0	$1,308.80	$3,104.79	$300.00	2.14
Bldg Lights	1	LED - Fixtures: Architectural Flood/Spot Luminaire	Daylight Dimming	75	3,640	None	No	1	LED - Fixtures: Architectural Flood/Spot Luminaire	Daylight Dimming	75	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

	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
Bldg Lights	2	Incandescent: 60 Watt - 1L	Daylight Dimming	60	3,640	Relamp	No	2	LED Screw-In Lamps: LED -1L	Daylight Dimming	9	3,640	0.07	427	0.0	$69.40	$34.45	$10.00	0.35
Bldg Lights	2	Compact Fluorescent: 13 Watt - 1L	Daylight Dimming	13	3,640	Relamp	No	2	LED Screw-In Lamps: LED -1L	Daylight Dimming	9	3,640	0.01	33	0.0	$5.31	$34.45	$10.00	4.61
Bldg Canopy	3	LED - Fixtures: Fuel Pump Canopy	Daylight Dimming	13	3,640	None	No	3	LED - Fixtures: Fuel Pump Canopy	Daylight Dimming	13	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Bldg Canopy	4	LED - Fixtures: Fuel Pump Canopy	Daylight Dimming	18	3,640	None	No	4	LED - Fixtures: Fuel Pump Canopy	Daylight Dimming	18	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Door11	1	LED - Fixtures: Fuel Pump Canopy	Daylight Dimming	40	3,640	None	No	1	LED - Fixtures: Fuel Pump Canopy	Daylight Dimming	40	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Door 10	1	High-Pressure Sodium: (1) 150W Lamp	Daylight Dimming	188	3,640	Fixture Replacement	No	1	LED - Fixtures: Ceiling Mount	Daylight Dimming	56	3,640	0.09	551	0.0	$89.54	$297.08	$10.00	3.21
Door 10	2	High-Pressure Sodium: (1) 150W Lamp	Daylight Dimming	188	3,640	Fixture Replacement	No	2	LED - Fixtures: Ceiling Mount	Daylight Dimming	56	3,640	0.17	1,102	0.0	$179.08	$594.16	$20.00	3.21
Door 9	1	LED - Fixtures: LED - Fixtures	Daylight Dimming	18	3,640	None	No	1	LED - Fixtures: LED - Fixtures	Daylight Dimming	18	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Door 8	1	Incandescent: 60 Watt - 1L	Daylight Dimming	60	3,640	Relamp	No	1	LED Screw-In Lamps: LED -1L	Daylight Dimming	9	3,640	0.03	213	0.0	$34.70	$17.23	$5.00	0.35
Door 7	1	Incandescent: 60 Watt - 1L	Daylight Dimming	60	3,640	Relamp	No	1	LED Screw-In Lamps: LED -1L	Daylight Dimming	9	3,640	0.03	213	0.0	$34.70	$17.23	$5.00	0.35
Door 6	1	LED - Fixtures: LED - Fixtures	Daylight Dimming	18	3,640	None	No	1	LED - Fixtures: LED - Fixtures	Daylight Dimming	18	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Door 4	1	Incandescent: 60 Watt - 1L	Daylight Dimming	60	3,640	Relamp	No	1	LED Screw-In Lamps: LED -1L	Daylight Dimming	9	3,640	0.03	213	0.0	$34.70	$17.23	$5.00	0.35

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
Roof	Cafeteria	2	Supply Fan	0.8	81.8%	No	3,400	No	81.8%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Classrooms	2	Supply Fan	0.5	76.2%	No	3,400	No	76.2%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Gym	2	Supply Fan	0.5	76.2%	No	3,400	No	76.2%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Classrooms	2	Supply Fan	0.5	76.2%	No	3,400	No	76.2%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Main Area	2	Supply Fan	0.5	76.2%	No	3,400	No	76.2%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage Mechanical Room	Various Space	1	Supply Fan	0.1	86.5%	No	3,400	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	DHW	1	Water-Source Heat Pump Circulation Pump	0.1	68.5%	No	3,400	No	68.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Hot Water Heat Supply	3	Heating Hot Water Pump	5.0	87.5%	Yes	3,400	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Hot Water Heat Supply	1	Boiler Feed Water Pump	1.0	83.5%	No	3,400	No	83.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Kitchen-AHU	1	Supply Fan	10.0	89.5%	No	0	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Outside	Class Room	1	Supply Fan	0.3	72.4%	No	3,400	No	72.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Class Rooms	PTAC Units	27	Supply Fan	0.3	72.4%	No	3,400	No	72.4%	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
Rooftop	Cafeteria	1	Packaged AC	17.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	2nd Fl Classrooms	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.31	1,169	0.0	$189.98	$2,992.44	$184.00	14.78
Rooftop	2nd Fl Classrooms	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Gym	1	Packaged AC	4.50		Yes	1	Packaged AC	4.50		14.00		No	0.70	1,368	0.0	$222.28	$10,210.32	$414.00	44.07
Rooftop	Classrooms	1	Split-System Air-Source HP	1.00	10.00	Yes	1	Split-System Air-Source HP	1.00	10.00	14.00	3.80	No	0.16	568	0.0	$92.27	$1,690.89	$92.00	17.33
Rooftop	Classrooms	2	Packaged AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Main Area	2	Packaged AC	6.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Outside	Class Room	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.16	304	0.0	$49.40	$1,496.22	$92.00	28.43
Outside	Class Room	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.16	304	0.0	$49.40	$1,496.22	$92.00	28.43
Outside	Class Room	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.16	304	0.0	$49.40	$1,496.22	$92.00	28.43
Outside	Class Room	1	Ductless Mini-Split AC	3.00		Yes	1	Ductless Mini-Split AC	3.00		18.00		No	0.85	1,655	0.0	$268.93	$8,218.48	$0.00	30.56
Outside	Class Room	1	Split-System AC	2.00		Yes	1	Split-System AC	2.00		14.00		No	0.31	608	0.0	$98.79	$2,992.44	$184.00	28.43
Outside	Class Room	1	Through-The-Wall AC	6.00		Yes	1	Through-The-Wall AC	6.00		12.00		No	0.37	709	0.0	$115.26	$5,269.84	$0.00	45.72
Class Rooms	Class Room	11	Window AC	2.00		Yes	11	Window AC	2.00		12.00		No	3.88	7,526	0.0	$1,223.33	$23,952.72	$0.00	19.58
Rooftop	Class Room	2	Split-System AC	3.00		Yes	2	Split-System AC	3.00		14.00		No	0.94	1,823	0.0	$296.37	$8,977.32	$552.00	28.43

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Whole Building	2	Condensing Hot Water Boiler	2,700.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

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

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	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	Gas Convection Oven (Half Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Electric Convection Oven (Full Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Rack Oven (Single)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Various	14	Desktops	120.0	No
Various	11	Desk Printers	80.0	No
Various	21	Projector	287.0	No
Various	4	Mini Fridge	75.0	No
Various	4	Microwave	800.0	No
Various	2	Water Cooler	75.0	No
Various	3	Refrigerator	150.0	No
Various	3	Coffee Maker	900.0	No
Various	15	LCD TV	40.0	No
Class room	1	Kiln	11,520.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Various	1	Refrigerated	Yes	0.00	1,612	0.0	$261.99	$230.00	$0.00	0.88

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

56

ENERGY STAR® Score[1]

Wicoff Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 47,470
Built: 1918

For Year Ending: November 30, 2017
Date Generated: October 12, 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
Wicoff Elementary School 510 Plainsboro Road Plainsboro, New Jersey 08536	_____ , (___)___-_____	___ _____ , (___)___-_____ _____

Property ID: 6389379

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
54.2 kBtu/ft²

Source EUI
117 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,630,383 (63%)
Natural Gas (kBtu)	941,136 (37%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	57.6
National Median Source EUI (kBtu/ft²)	124.4
% Diff from National Median Source EUI	-6%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	215

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)