Local Government Energy Audit:
Energy Audit Report

Crawford Rodriguez

Elementary School

1025 Larsen Road

Jackson, NJ 08527

Jackson Township BOE

June 21, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

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

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

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

1.1 Facility Summary

Crawford Rodriguez Elementary School is a 107,400 square foot facility comprised of various space types such as classrooms, offices, hallways, gymnasium, kitchen, media center, storage closets and a mechanical space. This is a two story facility. The building is occupied from 9:00 AM to 3:00 PM during the weekdays. The school remains closed during weekends.

The school was constructed in 2000. The building is heated using two gas-fired non-condensing hot water boilers and cooled using two water-cooled screw chillers. Lighting at the school consists of linear T8 tubes, compact fluorescent lamps (CFL) and metal halide lamp fixtures.

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 14 measures and recommends 12 measures which together represent an opportunity for Crawford Rodriguez Elementary School to reduce annual energy costs by roughly $80,078 and annual greenhouse gas emissions by 714,896 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 8.5 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 Crawford Rodriguez Elementary School's annual energy use by 21%.

Figure 1 – Previous 12 Month Utility Costs

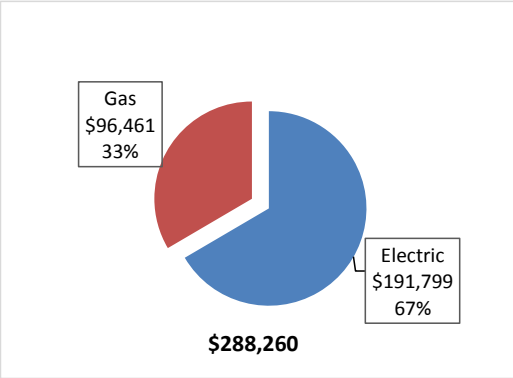
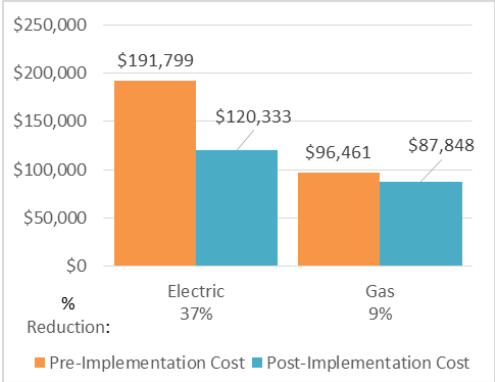


Figure 2 – Potential Post-Implementation Costs



A detailed description of Crawford Rodriguez 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 Natural Gas Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**199,266**	**41.6**	**0.0**	**0.0**	**0.0**	**0.0**	**$22,787.34**	**$198,603.87**	**$22,745.00**	**$175,858.87**	**7.7**	**200,659**
ECM 1	Install LED Fixtures	Yes	80,938	13.5	0.0	0.0	0.0	0.0	$9,255.75	$104,581.88	$8,950.00	$95,631.88	10.3	81,503
ECM 2	Retrofit Fixtures with LED Lamps	Yes	118,328	28.1	0.0	0.0	0.0	0.0	$13,531.60	$94,021.99	$13,795.00	$80,226.99	5.9	119,155
Lighting Control Measures			**32,026**	**7.6**	**0.0**	**0.0**	**0.0**	**0.0**	**$3,662.38**	**$62,690.00**	**$4,710.00**	**$57,980.00**	**15.8**	**32,250**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	29,348	7.0	0.0	0.0	0.0	0.0	$3,356.09	$41,690.00	$4,710.00	$36,980.00	11.0	29,553
	Install High/Low Lighitng Controls	No	2,678	0.6	0.0	0.0	0.0	0.0	$306.29	$21,000.00	$0.00	$21,000.00	68.6	2,697
Motor Upgrades			**2,241**	**0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**$256.31**	**$9,224.40**	**$0.00**	**$9,224.40**	**36.0**	**2,257**
	Premium Efficiency Motors	No	2,241	0.5	0.0	0.0	0.0	0.0	$256.31	$9,224.40	$0.00	$9,224.40	36.0	2,257
Variable Frequency Drive (VFD) Measures			**139,906**	**17.2**	**0.0**	**0.0**	**0.0**	**0.0**	**$15,999.19**	**$61,312.25**	**$6,440.00**	**$54,872.25**	**3.4**	**140,884**
ECM 4	Install VFDs on Constant Volume (CV) HVAC	Yes	34,948	8.6	0.0	0.0	0.0	0.0	$3,996.56	$27,648.45	$5,240.00	$22,408.45	5.6	35,193
ECM 5	Install VFDs on Chilled Water Pumps	Yes	71,340	7.3	0.0	0.0	0.0	0.0	$8,158.22	$20,777.80	$0.00	$20,777.80	2.5	71,839
ECM 6	Install VFDs on Hot Water Pumps	Yes	9,953	1.3	0.0	0.0	0.0	0.0	$1,138.17	$6,551.70	$0.00	$6,551.70	5.8	10,022
ECM 7	Install VFDs on Cooling Tower Fans	Yes	23,665	0.0	0.0	0.0	0.0	0.0	$2,706.23	$6,334.30	$1,200.00	$5,134.30	1.9	23,830
Electric Unitary HVAC Measures			**2,089**	**1.2**	**0.0**	**0.0**	**0.0**	**0.0**	**$238.84**	**$5,236.77**	**$322.00**	**$4,914.77**	**20.6**	**2,103**
ECM 8	Install High Efficiency Electric AC	Yes	2,089	1.2	0.0	0.0	0.0	0.0	$238.84	$5,236.77	$322.00	$4,914.77	20.6	2,103
Electric Chiller Replacement			**251,104**	**71.6**	**0.0**	**0.0**	**0.0**	**0.0**	**$28,715.45**	**$362,990.00**	**$21,500.00**	**$341,490.00**	**11.9**	**252,860**
ECM 9	Install High Efficiency Chillers	Yes	251,104	71.6	0.0	0.0	0.0	0.0	$28,715.45	$362,990.00	$21,500.00	$341,490.00	11.9	252,860
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**722.9**	**0.0**	**0.0**	**722.9**	**$8,517.21**	**$76,779.28**	**$8,844.00**	**$67,935.28**	**8.0**	**84,643**
ECM 10	Install High Efficiency Hot Water Boilers	Yes	0	0.0	722.9	0.0	0.0	722.9	$8,517.21	$76,779.28	$8,844.00	$67,935.28	8.0	84,643
Domestic Water Heating Upgrade			**0**	**0.0**	**8.1**	**0.0**	**0.0**	**8.1**	**$95.40**	**$143.40**	**$0.00**	**$143.40**	**1.5**	**948**
ECM 11	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	8.1	0.0	0.0	8.1	$95.40	$143.40	$0.00	$143.40	1.5	948
Plug Load Equipment Control - Vending Machine			**3,224**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**$368.65**	**$460.00**	**$0.00**	**$460.00**	**1.2**	**3,246**
ECM 12	Vending Machine Control	Yes	3,224	0.0	0.0	0.0	0.0	0.0	$368.65	$460.00	$0.00	$460.00	1.2	3,246
TOTALS			**629,855**	**139.6**	**731.0**	**0.0**	**0.0**	**731.0**	**$80,640.77**	**$777,439.96**	**$64,561.00**	**$712,878.96**	**8.8**	**719,850**
TOTAL OF ALL RECOMMENDED ECMS			**624,936**	**138**	**731**	**0**	**0**	**731**	**$ 80,078.17**	**$ 747,215.56**	**$ 64,561.00**	**$ 682,654.56**	**8.5**	**714,896**

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 measure save energy by reducing the power used by the lighting components due to improved electrical efficiency.

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

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

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

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

Electric Chiller measures generally involve replacing older inefficient hydronic chillers with modern energy efficient systems. New chillers can provide equivalent cooling compared to older chillers at a reduced energy cost. These measures save energy by reducing chiller energy usage, due to improved electrical and heat transfer efficiency.

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

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

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

Energy Efficient Practices

TRC Energy Services also identified 11 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 Crawford Rodriguez Elementary School include:

- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

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

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	302	kW DC STC
Electric Generation	359,794	kWh/yr
Displaced Cost	$31,300	/yr
Installed Cost	$785,200	

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 (SS)
- Pay for Performance - Existing Building (P4P)
- 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.

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Michelle Richardson	Business Administrator	mrichardson@jacksonsd.org	(732) 833-4600
John Blair	Energy Education Specialist	jblair@jacksonsd.org	732-833-4600 Extn: 4380
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On January 26, 2018, TRC performed an energy audit at Crawford Rodriguez Elementary School located in Jackson, New Jersey. TRC's team met with John Blair to review the facility operations and help focus our investigation on specific energy-using systems.

Crawford Rodriguez Elementary School is a 107,400 square foot facility comprised of various space types such as classrooms, offices, hallways, gymnasium, kitchen, media center, storage closets and a mechanical space. This is a two story facility. The building is occupied from 9:00 AM to 3:00 PM during the weekdays. The school remains closed during weekends.

The building was constructed in 2000. The building is heated using two gas-fired non-condensing hot water boilers and cooled using two water-cooled screw chillers. Lighting at the school consists of linear T8 tubes, compact fluorescent lamps (CFL) and metal halide lamp fixtures.

2.3 Building Occupancy

The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 97 full time staff (including administration, maintenance and teachers) and 800 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Crawford Rodriguez ES	Weekday	9AM - 3PM
Crawford Rodriguez ES	Weekend	Saturday - Basketball Sunday - No operation

2.4 Building Envelope

The building is constructed of concrete block and structural steel with a brick facade. The windows throughout the facility are double paned and in good condition. The majority of the building roof sections are pitched with asphalt shingles. Some smaller spaces have flat roofs with rubber membrane. The exterior doors are constructed of aluminum and in good condition.

Image 1: Building Envelope

2.5 On-Site Generation

Crawford Rodriguez Elementary School does not have any on-site electric generation systems currently installed.

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). Spaces such as hallways, classrooms, office suites, stairwells etc., utilize 1-lamp, 2-lamp or 3-lamp 4-foot fixtures. The teachers' lounge and portions of the media center, office space, hallways, and vestibules are lit using 26-watt CFL lamps in recessed can ceiling fixtures. The gym is illuminated using 250-Watt metal halide lamp high bay fixtures.

Lighting control in most spaces is provided by manual wall switches. The building's exterior lighting consists of pole type fixtures with 250-Watt metal halide lamps and wall packs with 100-Watt metal halide lamps. Exterior fixtures are controlled by photocells. The exit signs throughout the school are LED fixtures.

Image 2: Lighting Systems

Hot Water Heating and Distribution Systems

The hot water heating system consists of two gas-fired non-condensing Cleaver Brooks hot water boilers, each with an output capacity of 2010 MBh. The boilers both have a rated efficiency of 80%. Hot water from the boilers are circulated to air handlers and classroom unit ventilators using two constant speed 5 hp pumps. Hot water is supplied at 180°F when the outside air temperature is below 50°F, and the setpoint is reset to 155°F when the outside air is above 65°F. The rooftop air handling units are fitted with hot water and chiller water coils. Supply fans provide ventilation and space conditioning to large spaces including the cafeteria and gym. The boilers are original to the building and maintained well. The space temperatures and schedules are controlled by Johnson Controls Metasys.

Image 3: Heating and Ventilation Systems

Chilled Water Air Conditioning System (CHW) and Air Conditioning System (DX)

There are two 250-ton York water-cooled chillers providing chilled water to the building. The chiller is original to the building, installed in 2000 and has been evaluated for replacement. Chilled water is circulated to the building by four constant speed 15 hp pumps. One of these pumps was recently replaced while the others are original to the building. The condenser water is fed to the EVAPCO cooling tower using two constant speed 5 hp pumps. The cooling tower fan is driven by a constant speed 20 hp motor.

As described in the prior section, space conditioning is achieved in the zones by the rooftop air handling equipment and the classroom unit ventilators. The occupied heating and cooling space temperature setpoint is 70°F. Space temperatures and schedules are controlled via Johnson Controls Metasys.

Image 4: Chiller and Chilled Water Distribution

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of two AO Smith gas fired water heaters, each with an input capacity of 275 MBh and a tank capacity of 98 gallons. The units were installed in 2016, have an efficiency of 80% and in good condition.

Image 5: Domestic Water Heating

Food Service & Refrigeration

The school has electric and gas kitchen equipment. The kitchen operates from 8:00 AM to 1:45 PM on weekdays from September through June and serves lunch to all the students. Food is mostly stored, reheated, and served. The kitchen equipment includes an ice-cream chest, food warming and food holding cabinets, single and double door commercial refrigerators, four gas-fired convection ovens, a six burner cooking range, one walk-in box with freezer and refrigerator, and several deep fryers. All of the kitchen equipment is original to the building.

Building Plug Load

There are roughly 63 computer work stations throughout the facility. Other office plug loads include Chromebooks, Chromebook carts, printers, projectors and smart boards. There is kitchenette equipment that include plug loads such as refrigerators, microwave ovens, coffee machines and toaster ovens. There is no centralized PC power management software installed.

There are two refrigerated and two non-refrigerated vending machine in the teachers' lounge. No controls were installed on these.

2.7 Water-Using Systems

The restroom faucets are rated for 2.2 gallons per minute (gpm) or higher (in some of the classrooms). The toilets are rated at 1.6 gallons per flush (gpf) and the urinals are rated at 1 gpf.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

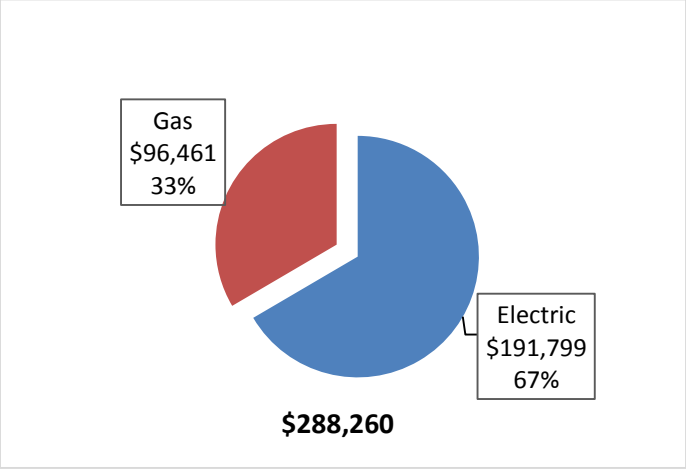
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Crawford Rodriguez Elementary School		
Fuel	**Usage**	**Cost**
Electricity	1,677,200 kWh	$191,799
Natural Gas	81,871 Therms	$96,461
Total		**$288,260**

The current annual energy cost for this facility is $288,260 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.114/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 third party electric supply is provided by New Constellation Energy. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

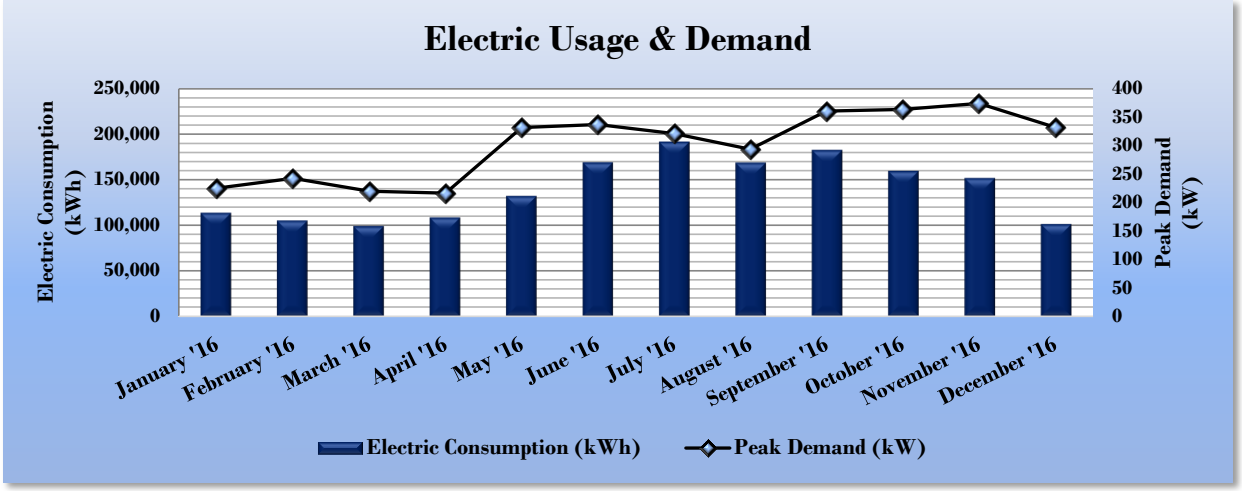


Figure 10 - Electric Usage & Demand

Electric Billing Data for Crawford Rodriguez Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
1/31/16	30	113,200	225		$12,420
2/28/16	28	104,800	242		$11,717
3/31/16	32	98,800	220		$11,027
4/30/16	30	108,000	217		$12,134
5/31/16	31	131,600	332		$14,841
6/30/16	30	168,400	337		$18,963
7/31/16	31	191,200	321		$21,506
8/31/16	31	168,000	294		$18,977
9/30/16	30	182,000	361		$21,048
10/31/16	31	159,200	364		$18,792
11/30/16	30	151,200	374		$18,227
12/31/16	31	100,800	332		$12,147
Totals	**365**	**1,677,200**	**374.2**	**$0**	**$191,799**
Annual	**365**	**1,677,200**	**374.2**	**$0**	**$191,799**

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.178/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. Summer gas usage is considerably higher than we would expect to see in a New Jersey elementary school. We recommend that the facility review equipment operations to ensure that the boiler in particular is not operating during the summer months.

Figure 11 - Natural Gas Usage

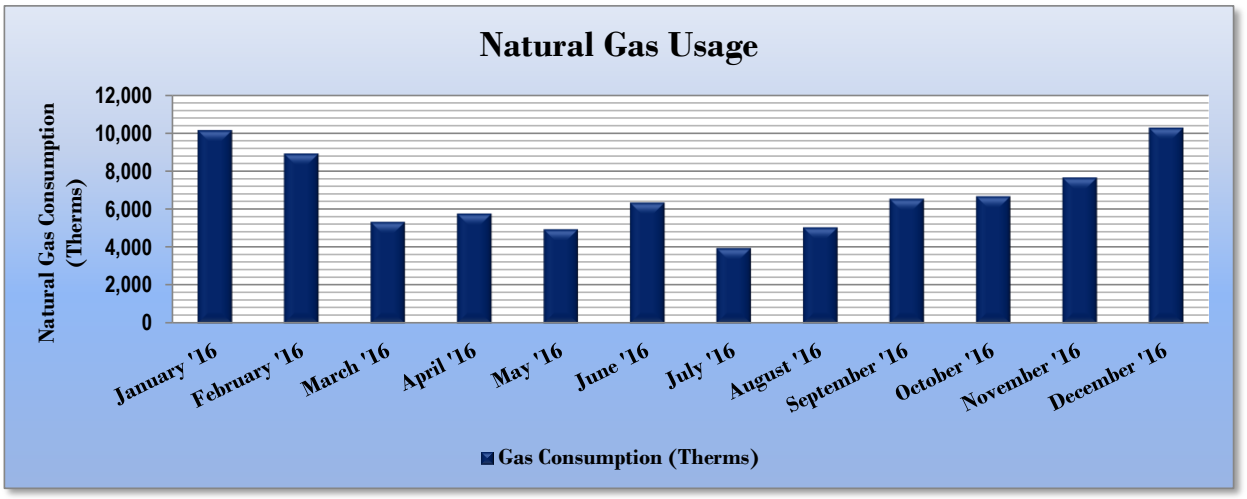


Figure 12 - Natural Gas Usage

Gas Billing Data for Crawford Rodriguez Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
2/5/16	30	10,161	$11,325
3/3/16	27	8,928	$10,044
4/1/16	29	5,329	$6,303
5/3/16	32	5,769	$6,761
6/3/16	31	4,950	$5,909
7/5/16	32	6,341	$7,355
8/5/16	31	3,957	$4,846
9/1/16	27	5,043	$5,966
10/4/16	33	6,547	$7,605
11/3/16	30	6,682	$8,324
12/5/16	32	7,659	$9,464
1/4/17	30	10,280	$12,294
Totals	**364**	**81,647**	**$96,196**
Annual	**365**	**81,871**	**$96,461**

3.4 Benchmarking

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

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

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Crawford Rodriguez Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	247.4	141.4
Site Energy Use Intensity (kBtu/ft^2)	129.5	58.2

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

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Crawford Rodriguez Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	177.9	141.4
Site Energy Use Intensity (kBtu/ft^2)	102.9	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 4.

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

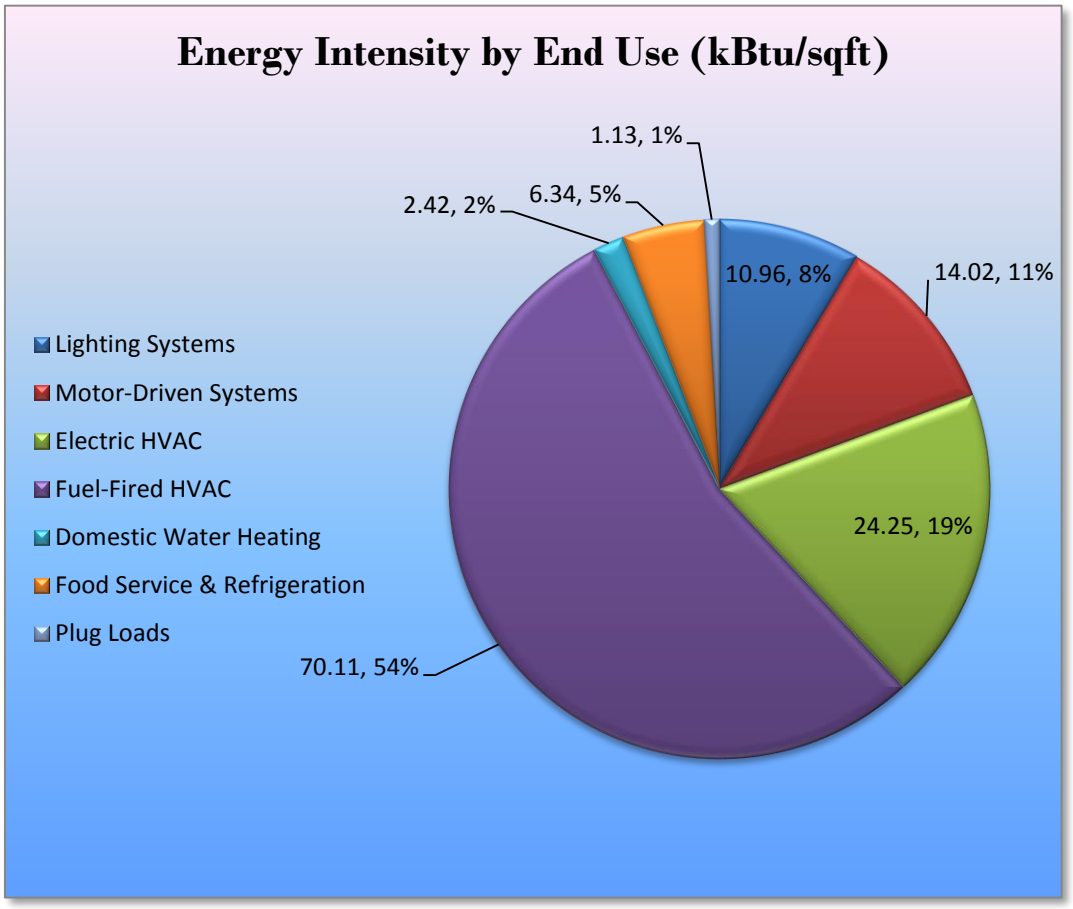
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 15 - Energy Balance (% 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 the Crawford Rodriguez Elementary School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**199,266**	**41.6**	**0.0**	**$22,787.34**	**$198,603.87**	**$22,745.00**	**$175,858.87**	**7.7**	**200,659**
ECM 1	Install LED Fixtures	80,938	13.5	0.0	$9,255.75	$104,581.88	$8,950.00	$95,631.88	10.3	81,503
ECM 2	Retrofit Fixtures with LED Lamps	118,328	28.1	0.0	$13,531.60	$94,021.99	$13,795.00	$80,226.99	5.9	119,155
Lighting Control Measures		**29,348**	**7.0**	**0.0**	**$3,356.09**	**$41,690.00**	**$4,710.00**	**$36,980.00**	**11.0**	**29,553**
ECM 3	Install Occupancy Sensor Lighting Controls	29,348	7.0	0.0	$3,356.09	$41,690.00	$4,710.00	$36,980.00	11.0	29,553
Variable Frequency Drive (VFD) Measures		**139,906**	**17.2**	**0.0**	**$15,999.19**	**$61,312.25**	**$6,440.00**	**$54,872.25**	**3.4**	**140,884**
ECM 4	Install VFDs on Constant Volume (CV) HVAC	34,948	8.6	0.0	$3,996.56	$27,648.45	$5,240.00	$22,408.45	5.6	35,193
ECM 5	Install VFDs on Chilled Water Pumps	71,340	7.3	0.0	$8,158.22	$20,777.80	$0.00	$20,777.80	2.5	71,839
ECM 6	Install VFDs on Hot Water Pumps	9,953	1.3	0.0	$1,138.17	$6,551.70	$0.00	$6,551.70	5.8	10,022
ECM 7	Install VFDs on Cooling Tower Fans	23,665	0.0	0.0	$2,706.23	$6,334.30	$1,200.00	$5,134.30	1.9	23,830
Electric Unitary HVAC Measures		**2,089**	**1.2**	**0.0**	**$238.84**	**$5,236.77**	**$322.00**	**$4,914.77**	**20.6**	**2,103**
ECM 8	Install High Efficiency Electric AC	2,089	1.2	0.0	$238.84	$5,236.77	$322.00	$4,914.77	20.6	2,103
Electric Chiller Replacement		**251,104**	**71.6**	**0.0**	**$28,715.45**	**$362,990.00**	**$21,500.00**	**$341,490.00**	**11.9**	**252,860**
ECM 9	Install High Efficiency Chillers	251,104	71.6	0.0	$28,715.45	$362,990.00	$21,500.00	$341,490.00	11.9	252,860
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**722.9**	**$8,517.21**	**$76,779.28**	**$8,844.00**	**$67,935.28**	**8.0**	**84,643**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	722.9	$8,517.21	$76,779.28	$8,844.00	$67,935.28	8.0	84,643
Domestic Water Heating Upgrade		**0**	**0.0**	**8.1**	**$95.40**	**$143.40**	**$0.00**	**$143.40**	**1.5**	**948**
ECM 11	Install Low-Flow Domestic Hot Water Devices	0	0.0	8.1	$95.40	$143.40	$0.00	$143.40	1.5	948
Plug Load Equipment Control - Vending Machine		**3,224**	**0.0**	**0.0**	**$368.65**	**$460.00**	**$0.00**	**$460.00**	**1.2**	**3,246**
ECM 12	Vending Machine Control	3,224	0.0	0.0	$368.65	$460.00	$0.00	$460.00	1.2	3,246
TOTALS		**624,936**	**138.5**	**731.0**	**$80,078.17**	**$747,215.56**	**$64,561.00**	**$682,654.56**	**8.5**	**714,896**

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

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

4.1.1 Lighting Upgrades

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

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**199,266**	**41.6**	**0.0**	**$22,787.34**	**$198,603.87**	**$22,745.00**	**$175,858.87**	**7.7**	**200,659**
ECM 1	Install LED Fixtures	80,938	13.5	0.0	$9,255.75	$104,581.88	$8,950.00	$95,631.88	10.3	81,503
ECM 2	Retrofit Fixtures with LED Lamps	118,328	28.1	0.0	$13,531.60	$94,021.99	$13,795.00	$80,226.99	5.9	119,155

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	27,258	6.5	0.0	$3,117.13	$12,397.00	$550.00	$11,847.00	3.8	27,449
Exterior	53,680	7.0	0.0	$6,138.61	$92,184.88	$8,400.00	$83,784.88	13.6	54,055

Measure Description

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

LED installations are targeted for both the gym and the cafeteria, replacing the overhead general lighting systems. We recommend that each new fixture be equipped with an occupancy sensor to eliminate unnecessary lighting use. Exterior systems are targeted for replacement as well, including the pole lighting and wall mounted fixtures.

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

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	118,328	28.1	0.0	$13,531.60	$94,021.99	$13,795.00	$80,226.99	5.9	119,155
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing incandescent and linear T8 tubes with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

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

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**29,348**	**7.0**	**0.0**	**$3,356.09**	**$41,690.00**	**$4,710.00**	**$36,980.00**	**11.0**	**29,553**
ECM 3	Install Occupancy Sensor Lighting Controls	29,348	7.0	0.0	$3,356.09	$41,690.00	$4,710.00	$36,980.00	11.0	29,553

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)
29,348	7.0	0.0	$3,356.09	$41,690.00	$4,710.00	$36,980.00	11.0	29,553

Measure Description

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

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

4.1.3 Variable Frequency Drive Measures

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

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**139,906**	**17.2**	**0.0**	**$15,999.19**	**$61,312.25**	**$6,440.00**	**$54,872.25**	**3.4**	**140,884**
ECM 4	Install VFDs on Constant Volume (CV) HVAC	34,948	8.6	0.0	$3,996.56	$27,648.45	$5,240.00	$22,408.45	5.6	35,193
ECM 5	Install VFDs on Chilled Water Pumps	71,340	7.3	0.0	$8,158.22	$20,777.80	$0.00	$20,777.80	2.5	71,839
ECM 6	Install VFDs on Hot Water Pumps	9,953	1.3	0.0	$1,138.17	$6,551.70	$0.00	$6,551.70	5.8	10,022
ECM 7	Install VFDs on Cooling Tower Fans	23,665	0.0	0.0	$2,706.23	$6,334.30	$1,200.00	$5,134.30	1.9	23,830

Please note that VFDs generally require that the controlled motors be inverter rated, often requiring that motors be replaced. We recommend a careful review of the existing motor specifications prior to purchase and installation of VFDs.

ECM 4: Install VFDs on Constant Volume (CV) HVAC

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
34,948	8.6	0.0	$3,996.56	$27,648.45	$5,240.00	$22,408.45	5.6	35,193

Measure Description

We recommend installing variable frequency drives (VFDs) to control supply, return, and exhaust fan motor speeds to convert constant-volume, single-zone air handling systems into a variable-air-volume (VAV) systems. VFDs have been recommended for several of the larger AHU and heat recovery units (HRU). A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one. Zone thermostats will cause the VFD to modulate fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings results from reducing fan speed (and power) when there is a reduced load required for the zone. The magnitude of energy savings is based on the estimated amount of time that fan motors operate at partial load.

VAV systems should not be controlled such that the supply air temperature is raised at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low, e.g. 55°F, until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

ECM 5: Install VFDs on Chilled Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
71,340	7.3	0.0	$8,158.22	$20,777.80	$0.00	$20,777.80	2.5	71,839

Measure Description

We recommend installing variable frequency drives (VFD) to control the three 15 hp chilled water pumps. This measure requires that chilled water coils be served by 2-way valves and that a differential pressure sensor be installed in the chilled water loop. As the chilled water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as chilled water valves close. The magnitude of energy savings is based on the estimated amount of time that the system operates at reduced loads.

For systems with variable chilled water flow through the chiller, the minimum flow to prevent the chiller from tripping off will have to be determined during the final project design. The control system should be programmed to maintain the minimum flow through the chiller and to prevent pump cavitation.

ECM 6: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
9,953	1.3	0.0	$1,138.17	$6,551.70	$0.00	$6,551.70	5.8	10,022

Measure Description

We recommend installing variable frequency drives (VFD) to control the two 5 hp hot water pumps. This measure requires that a majority of the hot water coils be served by 2-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

ECM 7: Install VFDs on Cooling Tower Fans

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)
23,665	0.0	0.0	$2,706.23	$6,334.30	$1,200.00	$5,134.30	1.9	23,830

Measure Description

We recommend installing a variable frequency drive (VFD) to control the 20 hp cooling tower fan motor. The VFD will allow the cooling tower fan to operate at the minimum speed necessary to maintain the temperature of the condenser water returning to the chiller. Energy savings results from reducing fan speed (and power) when there is a reduced load on the chiller and outside air wet bulb temperatures are depressed. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.1.4 Electric Unitary HVAC Measures

Our 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		**2,089**	**1.2**	**0.0**	**$238.84**	**$5,236.77**	**$322.00**	**$4,914.77**	**20.6**	**2,103**
ECM 8	Install High Efficiency Electric AC	2,089	1.2	0.0	$238.84	$5,236.77	$322.00	$4,914.77	20.6	2,103

ECM 8: 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)
2,089	1.2	0.0	$238.84	$5,236.77	$322.00	$4,914.77	20.6	2,103

Measure Description

We recommend replacing the Rheem 3.5 ton standard efficiency split AC unit with a high efficiency split AC unit. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

4.1.5 Electric Chiller Replacement

Our recommendations for electric chiller replacements are summarized in Figure 21.

Figure 21 - Summary of Electric Chiller Replacement 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 Chiller Replacement		**251,104**	**71.6**	**0.0**	**$28,715.45**	**$362,990.00**	**$21,500.00**	**$341,490.00**	**11.9**	**252,860**
ECM 9	Install High Efficiency Chillers	251,104	71.6	0.0	$28,715.45	$362,990.00	$21,500.00	$341,490.00	11.9	252,860

ECM 9: Install High Efficiency Chillers

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)
251,104	71.6	0.0	$28,715.45	$362,990.00	$21,500.00	$341,490.00	11.9	252,860

Measure Description

We recommend replacing (two) older, inefficient, 250-ton, York water-cooled screw chillers with new high efficiency chillers. The type of chiller to be installed depends on the magnitude of the cooling load and variability of the cooling load profile. Positive displacement chillers are usually under 600 tons of cooling capacity and centrifugal chillers generally start at 150 tons of cooling capacity. Constant speed chillers should be used to meet cooling loads with little or no variation while variable speed chillers are more efficient for variable cooling load profiles. Water cooled chillers are more efficient than air cooled chillers but require cooling towers and additional pumps to circulate the cooling water. In any given size range variable speed chillers tend to have better partial load efficiency, but worse full load efficiency, than constant speed chillers.

The savings result from the improvement in chiller efficiency and matching the right type of chiller to the cooling load. The energy savings associated with this measure is based on the cooling capacity of the new chiller, the improvement in efficiency compared with the base case equipment, the cooling load profile, and the estimated annual operating hours of the chiller before and after the upgrade. Energy savings are maximized by proper selection of new equipment based on the cooling load profile.

4.1.6 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 22 below.

Figure 22 - Summary of Gas-Fired Heating Replacement 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)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**722.9**	**$8,517.21**	**$76,779.28**	**$8,844.00**	**$67,935.28**	**8.0**	**84,643**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	722.9	$8,517.21	$76,779.28	$8,844.00	$67,935.28	8.0	84,643

ECM 10: Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	722.9	$8,517.21	$76,779.28	$8,844.00	$67,935.28	8.0	84,643

Measure Description

We recommend replacing older inefficient (2010 MBh, Cleaver Brooks) hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies of approximately 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. If the return water temperature drops below 130°F, the unit will enter "condensing mode" providing more efficient operation.

The approach to revitalizing the hot water heating system should include design considerations such as flow requirements and loop temperature. Condensing hydronic boilers should be considered only if recommended when it could be confirmed that the return water temperature of the loop can be set to less than 130°F during most of the operating hours. Please be aware that condensing boilers are typically 10% - 15% more expensive than standard high efficiency boilers and should only be selected if the design conditions support "condensing mode" operation.

Finally, the high summer gas use suggests that the boiler system may be operating unnecessarily. If boiler replacement is deferred for any reason, a review of the current boiler control functionality and set points should be conducted as a priority measure.

4.1.7 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 23 below.

Figure 23 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**8.1**	**$95.40**	**$143.40**	**$0.00**	**$143.40**	**1.5**	**948**
ECM 11	Install Low-Flow Domestic Hot Water Devices	0	0.0	8.1	$95.40	$143.40	$0.00	$143.40	1.5	948

ECM 11: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	8.1	$95.40	$143.40	$0.00	$143.40	1.5	948

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general.

Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.1.8 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment control measures are summarized in Figure 24 below.

Figure 24 - 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		**3,224**	**0.0**	**0.0**	**$368.65**	**$460.00**	**$0.00**	**$460.00**	**1.2**	**3,246**
ECM 12	Vending Machine Control	3,224	0.0	0.0	$368.65	$460.00	$0.00	$460.00	1.2	3,246

ECM 12: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
3,224	0.0	0.0	$368.65	$460.00	$0.00	$460.00	1.2	3,246

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 ECMs Evaluated But Not Recommended

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

Figure 25 – 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)
Lighting Control Measures	**2,678**	**0.6**	**0.0**	**$306.29**	**$21,000.00**	**$0.00**	**$21,000.00**	**68.6**	**2,697**
Install High/Low Lighitng Controls	2,678	0.6	0.0	$306.29	$21,000.00	$0.00	$21,000.00	68.6	2,697
Motor Upgrades	**2,241**	**0.5**	**0.0**	**$256.31**	**$9,224.40**	**$0.00**	**$9,224.40**	**36.0**	**2,257**
Premium Efficiency Motors	2,241	0.5	0.0	$256.31	$9,224.40	$0.00	$9,224.40	36.0	2,257
TOTALS	**4,920**	**1.2**	**0.0**	**$562.60**	**$30,224.40**	**$0.00**	**$30,224.40**	**53.7**	**4,954**

* - 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/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)
2,678	0.6	0.0	$306.29	$21,000.00	$0.00	$21,000.00	68.6	2,697

Measure Description

We evaluated 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.

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.

Reasons for not Recommending

We typically evaluate hallways and similar areas for high low controls. In this case, the facility layout does not lend itself to a cost effective control strategy for this type of measure.

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,241	0.5	0.0	$256.31	$9,224.40	$0.00	$9,224.40	36.0	2,257

Measure Description

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

Reasons for not Recommending

The equipment addressed by the measures above is approaching the end of its useful life, and was therefore evaluated for replacement. The payback periods for investments in the replacement equipment is longer than the expected useful life of the proposed replacement equipment. The measures are therefore not cost effective on the basis of energy savings alone. As the District plans for replacement of this equipment, we suggest consideration be given to replacement with a higher efficiency equivalents of the respective units.

Please note prior discussions regarding recommended boiler replacements, chiller replacements and VFDs. A complete review of the heating and cooling systems should involve consideration of new motors, especially in the case of the proposed VFDs, where inverter rated motors will be required.

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 Proper Lighting Maintenance

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

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Water Conservation

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

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

Refer to Section 4.1.7 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

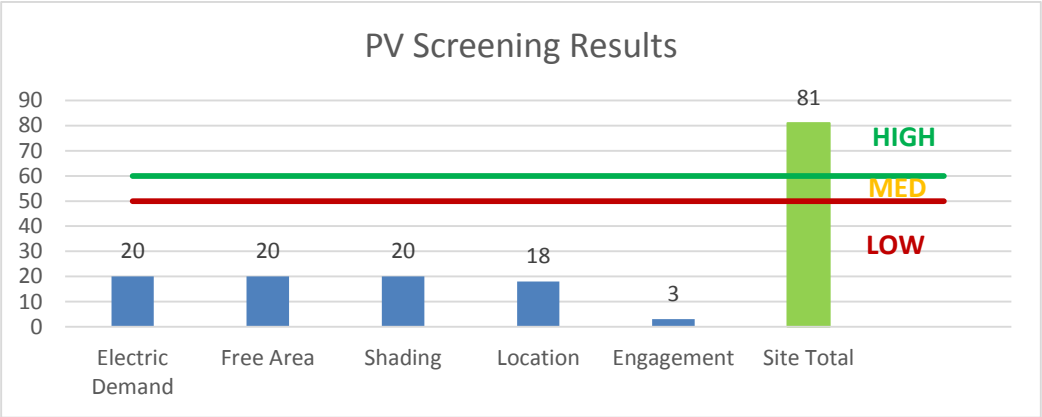
6.1 Photovoltaic

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

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

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

Figure 26 - Photovoltaic Screening



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

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

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

6.2 Combined Heat and Power

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

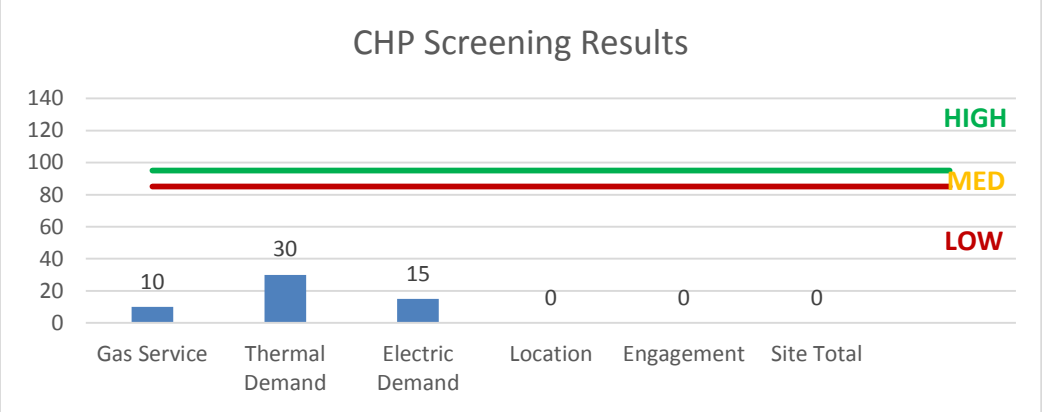
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

Low or infrequent thermal loads 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 27 - 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.

This facility is already participating in a district wide demand response program.

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

Figure 28 - 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 VFDs on Constant Volume (CV) HVAC	x			x		
ECM 5	Install VFDs on Chilled Water Pumps				x		
ECM 6	Install VFDs on Hot Water Pumps				x		
ECM 7	Install VFDs on Cooling Tower Fans	x			x		
ECM 8	Install High Efficiency Electric AC	x			x		
ECM 9	Install High Efficiency Chillers	x			x		
ECM 10	Install High Efficiency Hot Water Boilers	x			x		
ECM 11	Install Low-Flow Domestic Hot Water Devices				x		
ECM 12	Vending Machine Control	x			x		

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. 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.

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program the minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings. P4P is a generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also utilize the P4P program.

Incentives

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

How to Participate

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

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

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

8.3 SREC Registration Program

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

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

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows 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
Pump room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.06	238	0.0	$27.17	$175.50	$30.00	5.35
D104 - Receiving	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.13	546	0.0	$62.49	$351.00	$60.00	4.66
Boiler room	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.26	1,093	0.0	$124.99	$702.00	$120.00	4.66
Chiller room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.17	729	0.0	$83.32	$468.00	$80.00	4.66
Receiving hall	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,680	0.22	921	0.0	$105.29	$668.00	$80.00	5.58
Receiving 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	$92.13	$609.50	$70.00	5.86
Fire pump room	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	$20.83	$117.00	$20.00	4.66
Electrical room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.19	820	0.0	$93.74	$526.50	$90.00	4.66
D103 custodial 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	$78.97	$467.00	$60.00	5.15
D103 a - Maintenance	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	$52.65	$350.00	$40.00	5.89
D103 b - Custodial office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.08	345	0.0	$39.48	$291.50	$30.00	6.62
D103 c - Men's restroom	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	$26.32	$233.00	$20.00	8.09
D103 c - Men's restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$58.50	$10.00	3.68
D103e - Women's restroom	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	$26.32	$233.00	$20.00	8.09
D103e - Women's restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$58.50	$10.00	3.68
D214 - Custodial closet	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	$26.32	$233.00	$20.00	8.09
D215 - Serving room	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	$105.29	$738.00	$115.00	5.92
D215 - Serving room	12	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	12	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.21	878	0.0	$100.44	$1,560.07	$35.00	15.18
Kitchen	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,400	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,400	0.55	2,318	0.0	$265.12	$1,427.00	$300.00	4.25
D216 Locker room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
D216 Locker room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$58.50	$10.00	3.68
Restroom Men/Women	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
D216 d - Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
D216 d - Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
Pantry	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48

	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
D216h - Dry storage	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	$26.32	$233.00	$40.00	7.33
Cafeteria	23	Metal Halide: (1) 250W Lamp	Wall Switch	295	2,400	Fixture Replacement	Yes	23	LED - Fixtures: Ceiling Mount	Occupancy Sensor	89	1,680	3.51	14,794	0.0	$1,691.79	$10,244.20	$1,035.00	5.44
Cafeteria	25	Halogen Incandescent: 1 Lamp	Wall Switch	75	2,400	Relamp	No	25	LED Screw-In Lamps: 1 Lamp	Wall Switch	11	2,400	1.04	4,399	0.0	$503.03	$2,446.33	$125.00	4.61
Teachers Lounge	4	Compact Fluorescent: 4 Lamps	Wall Switch	104	2,400	Relamp	Yes	4	LED Screw-In Lamps: Ceiling mount - 4 Lamps	Occupancy Sensor	73	1,680	0.14	586	0.0	$66.96	$1,130.05	$35.00	16.35
Electrical closet near nurse's office	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	$20.83	$117.00	$20.00	4.66
Telephone Data/closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
KG - B210 classroom	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	$355.36	$1,623.60	$305.00	3.71
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
KG - B209 classroom	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	$355.36	$1,623.60	$305.00	3.71
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
KG - B211 classroom	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	$355.36	$1,623.60	$305.00	3.71
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
KG - B212 classroom	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	$355.36	$1,623.60	$305.00	3.71
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
B hallway vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.02	97	0.0	$11.05	$71.80	$10.00	5.59
B hallway	10	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.14	603	0.0	$68.96	$1,159.00	$50.00	16.08
B hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.26	1,086	0.0	$124.14	$2,446.20	$90.00	18.98
B213 - Nurse'd 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	$52.65	$504.00	$75.00	8.15
B213 - Nurse'd 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	$52.65	$504.00	$75.00	8.15
B213 - Nurse'd office	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	$5.05	$48.20	$10.00	7.56
B213 - Nurse'd office	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	$20.83	$117.00	$20.00	4.66

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
B213 - Nurse's office restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
Media center	102	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	102	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	2.79	11,739	0.0	$1,342.48	$7,587.00	$1,230.00	4.74
Media center	9	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	9	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.16	659	0.0	$75.33	$967.55	$35.00	12.38
Media center	4	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	Yes	4	LED Screw-In Lamps: Ceiling mount - 4 lamps	Occupancy Sensor	73	1,680	0.14	586	0.0	$66.96	$860.05	$35.00	12.32
C205 a - Classroom	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	$78.97	$621.00	$95.00	6.66
C205 a - Classroom	1	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	1	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.02	73	0.0	$8.37	$107.51	$35.00	8.66
C205b - Classroom	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	$26.32	$387.00	$55.00	12.61
C205d - Work room	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	$52.65	$504.00	$75.00	8.15
MC - closet	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	$52.65	$350.00	$40.00	5.89
MC - closet	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	$52.65	$350.00	$40.00	5.89
Gym	32	Metal Halide: (1) 250W Lamp	Wall Switch	295	2,400	Fixture Replacement	Yes	32	LED - Fixtures: Ceiling Mount	Occupancy Sensor	89	1,680	4.89	20,583	0.0	$2,353.80	$14,252.80	$1,440.00	5.44
Receptiom	9	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	9	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.09	388	0.0	$44.31	$967.55	$0.00	21.83
Reception	2	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	2	LED Screw-In Lamps: Ceiling mount - 4 Lamps	Wall Switch	73	2,400	0.04	172	0.0	$19.69	$430.02	$0.00	21.83
Main entrance - vestibule	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.03	145	0.0	$16.57	$107.70	$15.00	5.59
Electrical machine room	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	$20.83	$117.00	$20.00	4.66
Stairwell	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.09	386	0.0	$44.19	$287.20	$40.00	5.59
B hallway	2	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	2	LED Screw-In Lamps: Ceiling mount - 4 Lamps	Wall Switch	73	2,400	0.04	172	0.0	$19.69	$430.02	$0.00	21.83
B hallway	3	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	3	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.03	129	0.0	$14.77	$322.52	$0.00	21.83
B hallway	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.29	1,206	0.0	$137.93	$2,518.00	$100.00	17.53
B202 - hallway	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,680	0.66	2,762	0.0	$315.88	$3,003.20	$240.00	8.75
B206	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,680	0.17	724	0.0	$82.76	$700.80	$95.00	7.32
B206 a - office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.04	173	0.0	$19.74	$191.20	$15.00	8.92
Vestibule near B206	4	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	4	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.04	172	0.0	$19.69	$430.02	$0.00	21.83
Vestibule near B206	1	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	1	LED Screw-In Lamps: Ceiling mount - 4 Lamps	Wall Switch	73	2,400	0.02	86	0.0	$9.85	$215.01	$0.00	21.83
B205	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.66	2,762	0.0	$315.88	$1,473.20	$275.00	3.79

	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
B204	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.66	2,762	0.0	$315.88	$1,473.20	$275.00	3.79
B208	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.45	1,899	0.0	$217.17	$1,097.20	$200.00	4.13
B207	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.45	1,899	0.0	$217.17	$1,097.20	$200.00	4.13
B203	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.45	1,899	0.0	$217.17	$1,097.20	$200.00	4.13
B201	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
C hallway	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.34	1,447	0.0	$165.51	$4,061.60	$120.00	23.81
Main office suite	9	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	9	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.16	659	0.0	$75.33	$1,237.55	$35.00	15.96
Main office suite	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$451.20	$125.00	2.75
Main office suite - copy room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
Main office suite - conference room	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.16	691	0.0	$78.97	$416.80	$80.00	4.26
Main office suite - conference room	10	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	10	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.17	732	0.0	$83.70	$1,075.06	$20.00	12.60
Main office suite - C201 C - Principal's office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
Main office suite - C201 C - Principal's office	2	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	2	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.03	146	0.0	$16.74	$215.01	$20.00	11.65
Main office suite hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,400	0.06	273	0.0	$31.25	$175.50	$30.00	4.66
Main office suite restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
Main office suite restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$58.50	$10.00	3.68
Main office suite C201f	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
Child study office suite	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.16	691	0.0	$78.97	$570.80	$95.00	6.03
Child study office - C202a - office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
Child study office - C202b - office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
Child study office - 202c - office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
Child study office suite - C202e - conference room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$150.40	$50.00	2.54
Child study office suite - C202e - conference room	8	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	Yes	8	LED Screw-In Lamps: Ceiling mount - 4 Lamps	Occupancy Sensor	73	1,680	0.28	1,171	0.0	$133.93	$1,836.10	$20.00	13.56
Child study office suite - C202 - office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.16	691	0.0	$78.97	$416.80	$80.00	4.26
Child study office suite - OT/PT room	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.37	1,554	0.0	$177.68	$946.80	$170.00	4.37

	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
Cafeteria vestibule	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.03	145	0.0	$16.57	$107.70	$15.00	5.59
Cafeteria hall	10	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	10	LED Screw-In Lamps: Recessed - 2 Lamps	Occupancy Sensor	36	1,680	0.17	732	0.0	$83.70	$1,275.06	$0.00	15.23
Main office lobby	7	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	7	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.07	301	0.0	$34.47	$752.54	$0.00	21.83
Main office lobby	1	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	1	LED Screw-In Lamps: Ceiling Mount - 4 Lamps	Wall Switch	73	2,400	0.02	86	0.0	$9.85	$215.01	$0.00	21.83
Main office lobby	7	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	7	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.07	301	0.0	$34.47	$752.54	$0.00	21.83
Media center entrance	10	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	10	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.10	431	0.0	$49.24	$1,075.06	$0.00	21.83
Media center entrance	1	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	1	LED Screw-In Lamps: Ceiling Mount - 4 Lamps	Wall Switch	73	2,400	0.02	86	0.0	$9.85	$215.01	$0.00	21.83
Media center entrance	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.07	290	0.0	$33.14	$215.40	$30.00	5.59
C205e	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.33	1,381	0.0	$157.94	$871.60	$155.00	4.54
D - hallway	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	20	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.29	1,206	0.0	$137.93	$2,518.00	$100.00	17.53
D202	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.87	3,683	0.0	$421.17	$2,142.00	$355.00	4.24
D202a - 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	$26.32	$387.00	$55.00	12.61
D202b - 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	$26.32	$387.00	$55.00	12.61
D201 - Art	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.87	3,683	0.0	$421.17	$2,142.00	$355.00	4.24
Gym entrance	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.09	386	0.0	$44.19	$287.20	$40.00	5.59
Gym entrance vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.02	97	0.0	$11.05	$71.80	$10.00	5.59
Electrical closet	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	$10.42	$58.50	$10.00	4.66
Girls' restroom	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	$78.97	$621.00	$95.00	6.66
Boys' restroom	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	$78.97	$621.00	$95.00	6.66
Music room hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,680	0.11	460	0.0	$52.65	$434.00	$40.00	7.48
Music room	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	$52.65	$504.00	$75.00	8.15
Music sound system	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	$20.83	$117.00	$20.00	4.66
Hallway - main interconnecting	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.17	724	0.0	$82.76	$1,230.80	$60.00	14.15
Stairwell	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.09	386	0.0	$44.19	$287.20	$40.00	5.59
Stairwell	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	8	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.09	386	0.0	$44.19	$287.20	$40.00	5.59

	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
Stairwell entrance	7	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	7	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.07	301	0.0	$34.47	$752.54	$0.00	21.83
Stairwell entrance	1	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	1	LED Screw-In Lamps: Ceiling Mount - 4 Lamps	Wall Switch	73	2,400	0.02	86	0.0	$9.85	$215.01	$0.00	21.83
A hallway - up	32	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	32	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,680	0.46	1,930	0.0	$220.68	$6,148.80	$160.00	27.14
A201	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A225	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A202	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A224	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A203	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A223	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A204	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A205	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
A206	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
A221	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
A220	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
Electrical 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	$20.83	$117.00	$20.00	4.66
Tech 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	$20.83	$117.00	$20.00	4.66
Faculty restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
Faculty restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.03	115	0.0	$13.16	$174.50	$10.00	12.50
Girls' restroom	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	$65.81	$562.50	$85.00	7.26
Boys' restroom	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	$65.81	$562.50	$85.00	7.26
A209	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A213	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A210	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A212	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A211	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04

	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
A hallway vest - down	4	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	No	4	LED Screw-In Lamps: Recessed - 2 Lamps	Wall Switch	36	2,400	0.04	172	0.0	$19.69	$430.02	$0.00	21.83
A hallway vest - down	1	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	1	LED Screw-In Lamps: Ceiling Mount - 4 Lamps	Wall Switch	73	2,400	0.02	86	0.0	$9.85	$215.01	$0.00	21.83
A hallway	38	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	38	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.54	2,292	0.0	$262.06	$8,564.20	$190.00	31.95
A111	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A112	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A110	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A109	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A113	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A108	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A114 Storage	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	$26.32	$233.00	$20.00	8.09
Faculty restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,680	0.01	60	0.0	$6.90	$151.90	$5.00	21.30
Faculty restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,680	0.01	60	0.0	$6.90	$151.90	$5.00	21.30
Girls' restroom	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	$65.81	$562.50	$85.00	7.26
Boys' restroom	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	$65.81	$562.50	$85.00	7.26
A105	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
A106	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.25	1,036	0.0	$118.45	$721.20	$125.00	5.03
A120	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A119 - Custodial closet	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	$26.32	$233.00	$20.00	8.09
Electrical 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	$20.83	$117.00	$20.00	4.66
A105 - hall	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.06	241	0.0	$27.59	$343.60	$20.00	11.73
A104	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A103	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A123	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A102	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A124	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04

	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
A101	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.49	2,072	0.0	$236.91	$1,172.40	$215.00	4.04
A hallway	5	Compact Fluorescent: Recessed - 2 lamps	Wall Switch	52	2,400	Relamp	Yes	5	LED Screw-In Lamps: Recessed - 2 Lamps	High/Low Control	36	1,680	0.09	366	0.0	$41.85	$737.53	$0.00	17.62
A hallway	1	Compact Fluorescent: Ceiling mount - 4 Lamps	Wall Switch	104	2,400	Relamp	No	1	LED Screw-In Lamps: Ceiling Mount - 4 Lamps	Wall Switch	73	2,400	0.02	86	0.0	$9.85	$215.01	$0.00	21.83
A hallway vestibule down	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,400	0.02	97	0.0	$11.05	$71.80	$10.00	5.59
VP office secretary	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	$59.23	$341.60	$65.00	4.67
VP office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,400	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,680	0.08	345	0.0	$39.48	$266.40	$50.00	5.48
A126 - storage	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	$52.65	$350.00	$40.00	5.89
A127 - reading 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	$78.97	$467.00	$80.00	4.90
Reading room hall	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,400	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,680	0.17	724	0.0	$82.76	$1,230.80	$60.00	14.15
Pole with 1 fixture	36	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	36	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	89	4,380	4.87	37,445	0.0	$4,282.09	$70,307.75	$3,600.00	15.58
Pole with 2 fixtures	2	Metal Halide: (1) 250W Lamp	Wall Switch	500	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	150	4,380	0.46	3,526	0.0	$403.21	$3,905.99	$200.00	9.19
Wall packs	46	Metal Halide: (1) 100W Lamp	Wall Switch	128	4,380	Fixture Replacement	No	46	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	38	4,380	2.70	20,760	0.0	$2,374.10	$17,971.14	$4,600.00	5.63
All school	22	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	22	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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
Pump room	DCW	2	Condenser Water Pump	5.0	85.5%	No	2,745	Yes	88.5%	No		0.16	609	0.0	$69.63	$1,708.02	$0.00	24.53
Pump room	Boiler	2	Other	0.8	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Pump room	Boiler	2	Heating Hot Water Pump	5.0	87.5%	No	2,745	Yes	89.5%	Yes	2	1.35	10,306	0.0	$1,178.54	$8,393.82	$0.00	7.12
Pump room	DHW	1	Other	0.1	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Chiller room	Chilled water pump	3	Chilled Water Pump	15.0	91.0%	No	3,391	Yes	92.4%	Yes	3	5.76	54,871	0.0	$6,274.86	$21,257.61	$0.00	3.39
Chiller room	Chilled water pump	1	Chilled Water Pump	15.0	93.0%	No	3,391	No	93.0%	Yes	1	1.81	17,749	0.0	$2,029.67	$5,194.45	$0.00	2.56
Roof - AHU	Kitchen	1	Supply Fan	3.0	89.5%	No	4,380	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof - AHU	Kitchen	1	Exhaust Fan	1.5	86.5%	No	4,380	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU 3	1	Supply Fan	2.0	86.5%	No	4,380	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Cooling tower	1	Cooling Tower Fan	20.0	93.0%	No	3,391	No	93.0%	Yes	1	0.00	23,665	0.0	$2,706.23	$6,334.30	$1,200.00	1.90
Roof	AHU 2	1	Supply Fan	10.0	91.7%	No	4,000	No	91.7%	Yes	1	1.32	5,857	0.0	$669.83	$3,807.95	$800.00	4.49
Roof	AHU 2	1	Return Fan	7.5	91.7%	No	3,391	No	91.7%	Yes	1	0.99	3,724	0.0	$425.89	$3,606.80	$600.00	7.06
Roof	AHU 1	1	Supply Fan	2.0	86.5%	No	4,000	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	AHU 5	1	Supply Fan	10.0	91.7%	No	4,000	No	91.7%	Yes	1	1.32	5,857	0.0	$669.83	$3,807.95	$800.00	4.49
Roof	AHU 5	1	Return Fan	5.0	89.5%	No	2,745	No	89.5%	Yes	1	0.68	2,059	0.0	$235.48	$3,275.85	$400.00	12.21
Roof	HRU - 2	1	Supply Fan	3.0	89.5%	No	4,000	No	89.5%	Yes	1	0.41	1,800	0.0	$205.89	$3,007.65	$240.00	13.44
Roof	HRU - 2	1	Return Fan	2.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	HRU - 1	1	Supply Fan	20.0	93.0%	No	3,391	No	93.0%	Yes	1	2.60	9,792	0.0	$1,119.82	$6,334.30	$1,600.00	4.23
Roof	HRU - 1	1	Exhaust Fan	10.0	91.7%	No	4,000	No	91.7%	Yes	1	1.32	5,857	0.0	$669.83	$3,807.95	$800.00	4.49
Elevator machine room	Elevator	1	Other	20.0	93.0%	No	3,391	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Classrooms	Fan coil units	36	Supply Fan	0.3	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Unknown	1	Split-System AC	3.50		Yes	1	Split-System AC	3.50		14.00		No	1.17	2,089	0.0	$238.84	$5,236.77	$322.00	20.58

Electric Chiller Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	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
Chiller room	All school	2	Water-Cooled Screw Chiller	250.00	Yes	2	Water-Cooled Screw Chiller	Variable	250.00	0.68	0.43	71.59	251,104	0.0	$28,715.45	$362,990.00	$21,500.00	11.89

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	All school	2	Non-Condensing Hot Water Boiler	2,010.00	Yes	2	Condensing Hot Water Boiler	2,010.00	91.00%	Et	0.00	0	722.9	$8,517.21	$76,779.28	$8,844.00	7.98

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	Restrooms and kitchen	2	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Teachers lounge	1	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	0.4	$4.77	$7.17	$0.00	1.50
KGB210, B209, B211, B212	4	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	1.6	$19.08	$28.68	$0.00	1.50
B206, B205, B204, B208, B207, B203, Main office copy room	7	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	2.8	$33.39	$50.19	$0.00	1.50
OT/PT, 201, 202, 203, 204, 225, 224, 223	8	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	3.2	$38.16	$57.36	$0.00	1.50

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Cooler (35F to 55F)	No	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	6	Insulated Food Holding Cabinet (1/2 Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	3	Gas Fryer	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	4	Gas Convection Oven (Half Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Crawford Rodriguez ES	60	Computer	150.0	Yes
Crawford Rodriguez ES	47	Laptop	45.0	Yes
Crawford Rodriguez ES	5	Printer - small	20.0	Yes
Crawford Rodriguez ES	3	Printer - medium	40.0	Yes
Crawford Rodriguez ES	5	Printer - big	200.0	Yes
Crawford Rodriguez ES	2	Paper shredder	150.0	Yes
Crawford Rodriguez ES	4	Projector	200.0	Yes
Crawford Rodriguez ES	13	Microwave	900.0	Yes
Crawford Rodriguez ES	1	Refrigerator - Small	20.0	Yes
Crawford Rodriguez ES	1	Refrigerator - medium	40.0	Yes
Crawford Rodriguez ES	5	Refrigerator - Large	218.0	Yes
Crawford Rodriguez ES	5	Coffee machine	400.0	Yes
Crawford Rodriguez ES	1	Toaster oven	1,200.0	Yes
Crawford Rodriguez ES	1	Clothes washer	900.0	Yes
Crawford Rodriguez ES	2	Television CRT	100.0	Yes
Crawford Rodriguez ES	35	Smart Board	5.0	Yes
Crawford Rodriguez ES	2	Induction stove	1,500.0	

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
Teachers' lounge	2	Refrigerated	Yes	0.00	3,224	0.0	$368.65	$460.00	$0.00	1.25

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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4

ENERGY STAR® Score[1]

Crawford-Rodriguez Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 107,400
Built: 2000

For Year Ending: December 31, 2016
Date Generated: March 26, 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
Crawford-Rodriguez Elementary School 1025 Larsen Road Jackson, New Jersey 08527	Jackson Township BOE 151 Don Connor Boulevard Jackson, NJ 08527 (732) 833-4600	Michelle Richardson 151 Don Connor Boulevard Jackson, NJ 08527 (732) 833-4600 sstewart@trcsolutions.com

Property ID: 2552295

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
128.8 kBtu/ft²

Source EUI
246.6 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	8,114,168 (59%)
Electric - Grid (kBtu)	5,722,606 (41%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	72.9
National Median Source EUI (kBtu/ft²)	139.6
% Diff from National Median Source EUI	77%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,066

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)