Local Government Energy Audit:
Energy Audit Report

JMF Early Childhood Learning Center

Long Branch Board of Education

80 Avenel Boulevard
Long Branch, NJ 07740

October 27, 2017

Draft Report by:
TRC Energy Services

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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 and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

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

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

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for JMF Early Childhood Learning Center.

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, as part of a comprehensive effort to assist the Long Branch Board of Education in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Joseph M. Ferraina (JMF) Early Childhood Learning Center is a 42,478 square foot facility comprised of classroom space, office space, a multi-purpose room and break out area. The building was built in 1997 and is one floor. The school is occupied between 6AM and 6PM, Monday through Friday with little to no use on the weekends. The building is on a 10 month schedule with lower occupancy during the other 2 months. There are approximately 350 staff and students who occupy the building. There is after hours cleaning done from 6PM to 10PM. The facility has a kitchen used to prep and warm food without any major cooking.

The building is 100% heated and cooled. Per discussions with facility personnel the major concerns are the boilers and the RTUs that serve the hallway and common areas. All of this equipment is over 20 years old, in poor condition and in need of replacement. A thorough description of the facility and our observations are located in Section 2, "Facility Information and Existing Conditions".

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC Energy Services evaluated 14 measures which together represent an opportunity for JMF Early Childhood Learning Center to reduce annual energy costs by roughly $22,037 and annual greenhouse gas emissions by 189,818 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 10.8 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 JMF Early Childhood Learning Center's annual energy use by 21%.

Figure 1 – Previous 12 Month Utility Costs

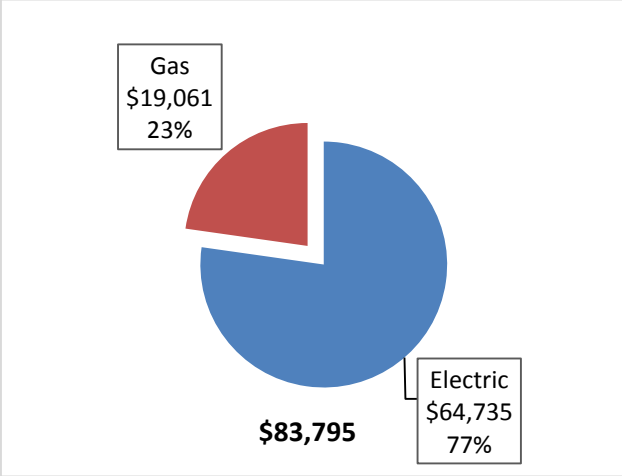
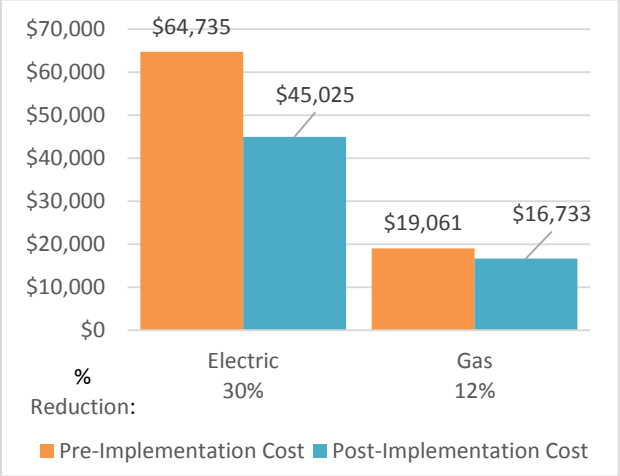


Figure 2 – Potential Post-Implementation Costs



A detailed description of JMF Early Childhood Learning Center's existing energy use can be found in Section 3 "Site Energy Use and Costs".

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, "Energy Conservation Measures".

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**108,115**	**15.4**	**0.0**	**$13,065.48**	**$151,776.49**	**$12,625.00**	**$139,151.49**	**10.7**	**108,871**
ECM 1	Install LED Fixtures	Yes	48,218	2.7	0.0	$5,827.08	$70,940.98	$5,530.00	$65,410.98	11.2	48,556
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	59,753	12.7	0.0	$7,220.99	$80,513.00	$7,095.00	$73,418.00	10.2	60,171
ECM 3	Retrofit Fixtures with LED Lamps	Yes	144	0.0	0.0	$17.40	$322.52	$0.00	$322.52	18.5	145
Lighting Control Measures			**15,022**	**3.2**	**0.0**	**$1,815.38**	**$7,728.00**	**$1,240.00**	**$6,488.00**	**3.6**	**15,127**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	15,022	3.2	0.0	$1,815.38	$7,728.00	$1,240.00	$6,488.00	3.6	15,127
Motor Upgrades			**894**	**0.3**	**0.0**	**$108.10**	**$3,394.32**	**$0.00**	**$3,394.32**	**31.4**	**901**
ECM 5	Premium Efficiency Motors	Yes	894	0.3	0.0	$108.10	$3,394.32	$0.00	$3,394.32	31.4	901
Variable Frequency Drive (VFD) Measures			**20,525**	**4.6**	**0.0**	**$2,480.38**	**$20,379.75**	**$1,640.00**	**$18,739.75**	**7.6**	**20,668**
ECM 6	Install VFDs on Constant Volume (CV) HVAC	Yes	6,921	2.8	0.0	$836.37	$13,166.15	$1,640.00	$11,526.15	13.8	6,969
ECM 7	Install VFDs on Hot Water Pumps	Yes	13,604	1.9	0.0	$1,644.01	$7,213.60	$0.00	$7,213.60	4.4	13,699
Electric Unitary HVAC Measures			**10,020**	**7.2**	**0.0**	**$1,210.88**	**$43,055.58**	**$2,197.50**	**$40,858.08**	**33.7**	**10,090**
ECM 8	Install High Efficiency Electric AC	Yes	10,020	7.2	0.0	$1,210.88	$43,055.58	$2,197.50	$40,858.08	33.7	10,090
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**131.6**	**$1,401.52**	**$14,402.05**	**$2,000.00**	**$12,402.05**	**8.8**	**15,403**
ECM 9	Install High Efficiency Hot Water Boilers	Yes	0	0.0	131.6	$1,401.52	$14,402.05	$2,000.00	$12,402.05	8.8	15,403
Domestic Water Heating Upgrade			**0**	**0.0**	**73.6**	**$784.42**	**$6,934.80**	**$240.00**	**$6,694.80**	**8.5**	**8,621**
ECM 10	Install High Efficiency Gas Water Heater	Yes	0	0.0	73.6	$784.42	$6,934.80	$240.00	$6,694.80	8.5	8,621
Plug Load Equipment Control - Vending Machine			**1,612**	**0.0**	**0.0**	**$194.79**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 11	Vending Machine Control	Yes	1,612	0.0	0.0	$194.79	$230.00	$0.00	$230.00	1.2	1,623
Custom Measures			**6,906**	**0.4**	**13.3**	**$976.44**	**$9,080.00**	**$0.00**	**$9,080.00**	**9.3**	**8,513**
ECM 12	Computer Power Management Software	Yes	3,266	0.0	0.0	$394.73	$2,905.00	$0.00	$2,905.00	7.4	3,289
ECM 13	Replace Refrigeration Equipment with Smaller Energy Star Equipment	Yes	2,818	0.4	0.0	$340.56	$4,050.00	$0.00	$4,050.00	11.9	2,838
ECM 14	Weather-Strip Exterior Doors	Yes	822	0.0	13.3	$241.14	$2,125.00	$0.00	$2,125.00	8.8	2,386
TOTALS			**163,094**	**31.1**	**218.5**	**$22,037.39**	**$256,980.99**	**$19,942.50**	**$237,038.49**	**10.8**	**189,818**

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

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

Lighting Upgrades generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These 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.

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 16 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 JMF Early Childhood Learning Center include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule

- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Furnace Maintenance
- Install Plug Load Controls

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

On-Site Generation Measures

TRC Energy Services evaluated the potential for installing on-Site generation for JMF Early Childhood Learning Center. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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)
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy Aggregator

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 SS 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 SS program. More details on this program and others are available in Section 8.

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 8.3 for additional information on the ESIP Program.

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

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

2 Facility Information and Existing Conditions

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Ann Degnan	Facilities Manager	adegnan@longbranch.k12.nj.us	732-733-3521
Gary Vecchione	Assistant Facilities Manager	gvecchione@longbranch.k12.nj.us	732-600-7979
Peter Genovese III	Business Administrator	pgenovese@longbranch.k12.nj.us	
TRC Energy Services			
Aimee Lalonde	Auditor	alalonde@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On March 30, 2017, TRC Energy Services performed an energy audit at JMF Early Childhood Learning Center located in Long Branch, NJ. TRC Energy Services' team met with Dean or Kenny to review the facility operations and help focus our investigation on specific energy-using systems.

JMF Early Childhood Learning Center is a 42,478 square foot facility comprised of classroom space, office space, a multi-purpose room and break out area. The facility has a kitchen used to prep and warm food without any major cooking. The building was built in 1997 and is one floor. The building is 100% heated and cooled. Per discussions with facility personnel the major concerns are the boilers and the RTUs that serve the hallway and common areas. All of this equipment is over 20 years old, in poor condition and in need of replacement.

2.3 Building Occupancy

The school is occupied between 6AM and 6PM, Monday through Friday with little to no use on the weekends. The building is on a 10 month schedule with lower occupancy during the other 2 months. There are approximately 350 staff and students who occupy the building. There is after hours cleaning done from 6PM to 10PM. The typical schedule is presented in the table below.

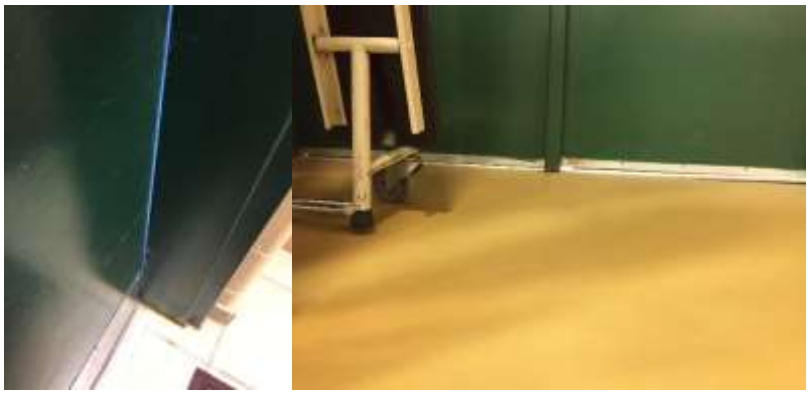
Figure 5 - Building Schedule

Building Occupancy Schedule		
Building Name	**Weekday/Weekend**	**Operating Schedule**
JMF Early Childhood Learning Center	Weekday	6AM - 6PM
JMF Early Childhood Learning Center	Weekend	No Use

2.4 Building Envelope

The building is constructed of concrete masonry units with a brick façade. The building has pitched roofs and is in good condition. The building has double pane operable windows with metal frames and interior shades. The exterior doors are typically metal with glass panes and metal frames. Corridor areas have large double pane fixed windows with metal frames. The sealant around these frames appears to be in good condition. However it is recommended that caulking frames be included in a maintenance schedule

every five (5) years. The main entrance doors have worn weather-stripping materials which show signs of excessive infiltration



2.5 On-Site Generation

JMF Early Childhood Learning Center does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

Lighting – The building is primarily lit by linear fluorescent fixtures which contain 32W T8 lamps. Majority of fixtures are 2 lamp while the kitchen and a restroom have 3L and 4L fixtures, respectively. Corridor areas also have recessed can fixtures with compact fluorescent plug in lamps. The all purpose room is lit by compact fluorescent high bay fixtures which each contain eight (8) 42W lamps. The exterior lighting includes wall pack fixtures and area light fixtures which contain 250W high pressure sodium lamps. There are also pole mounted area light fixtures in parking lot areas with 400W to 1000W high pressure sodium lamps. The main entrance and building mounted fixtures include compact fluorescent lamps. There is an opportunity for energy savings by upgrading to LED technology throughout the interior, high bay and exterior applications.

Lighting Controls – The lighting throughout majority of the rooms are manually controlled via wall switches. There are a few rooms that currently have occupancy based sensors and controls. There is an opportunity for energy savings by the installation of occupancy based sensors in beneficial locations. The exterior lighting is controlled by a timeclock.

Motors & Variable Frequency Drives (VFDs) – The HVAC systems that serve the building include fan and pump motors which are generally in good condition and of standard to high efficiency. These include hot water pumps, RTU and unit ventilator supply and return fans. Majority of equipment appears to be in fair condition. There is an opportunity for energy savings by replacing the hot water pump motors and air handling unit supply fan motors with premium efficient motors and installing variable frequency drives.

Domestic Hot Water – The building is supplied domestic hot water by a gas-fired storage tank water heater. This equipment is in good condition and of standard efficiency. The sink aerators throughout the building are already fit with low flow devices (0.5 gallon per minute). There is an opportunity for energy savings by replacing the existing water heater with a high efficiency gas-fired condensing hot water heater.

HVAC Systems and Equipment – The classrooms and many areas are conditioned by a self-contained unit ventilators equipped with heating and cooling coils. The corridor areas, all purpose room, office and break out room are conditioned by air-handling equipment which are equipped with heating and cooling coils. The building is heated by a hydronic system served by two (2) gas-fired non-condensing hot water boilers of standard efficiency. These boilers are said to be a maintenance concern. There is an opportunity for energy savings by replacing with gas-fired high efficiency condensing hot water boilers. In some areas there are hot water baseboard radiators and electric cabinet unit heaters. These appear in good condition.

The building is cooled by the use of outdoor condensing units which are in fair to poor condition. There is an opportunity for energy savings by replacing these with high efficiency outdoor condensing units. It was also noted that refrigerant piping had worn pipe insulation as seen in the photos below. We recommend installing pipe insulation as part of regular maintenance.

HVAC Controls – The HVAC systems and equipment are controlled by a Building Management System (BMS). All major mechanical equipment is tied into this. The rooms served by the self-contained unit ventilators have manual dial thermostat/temperature sensors. The air handling systems area equipped with CO2 sensors and the amount of outdoor air controlled appropriately. The boilers operate with outdoor air reset controls.

Plug Load Equipment – There is general office and café equipment throughout the building. There are also gas-fired and electric meal prep equipment, a clothes washer and dryer as well as a number of refrigeration equipment in the kitchen. There is a refrigerated vending machine in the building that is currently not controlled and run 24/7. The computers throughout the building also provide a potential for implementing energy management software.

2.7 Water-Using Systems

There are large restrooms and private restrooms throughout this facility. The fixtures in all of these restrooms are already low flow and there are no recommendations for improvement.

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

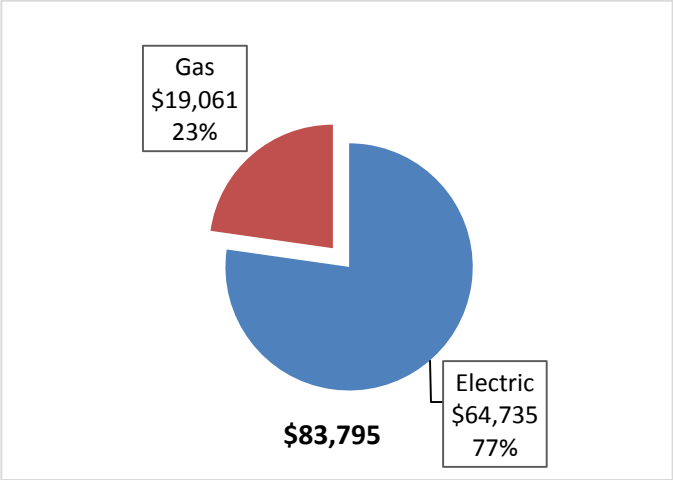
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for JMF Early Childhood Learning Center		
Fuel	**Usage**	**Cost**
Electricity	535,670 kWh	$64,735
Natural Gas	17,891 Therms	$19,061
Total		**$83,795**

The current annual energy cost for this facility is $83,795 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.121/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 facility pays demand charges. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Graph of 12 Months Electric Usage & Demand

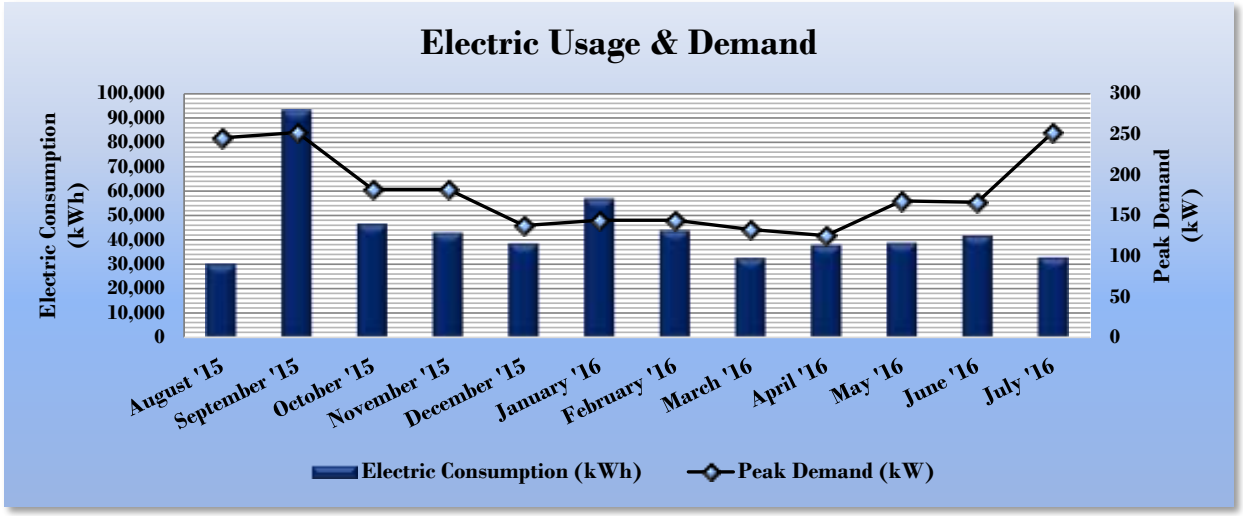


Figure 9 - Table of 12 Months Electric Usage & Demand

Electric Billing Data for JMF Early Childhood Learning Center					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/2/15	33	30,080	246	$1,477	$4,478
10/2/15	30	93,280	252	$1,414	$10,595
11/3/15	32	46,560	182	$1,022	$5,641
12/4/15	31	42,880	182	$1,022	$5,280
1/5/16	32	38,550	138	$771	$4,606
2/2/16	28	56,960	144	$808	$6,447
3/2/16	29	43,840	144	$808	$5,161
3/31/16	29	32,480	133	$744	$3,983
4/29/16	29	37,760	125	$701	$4,467
5/31/16	32	38,720	168	$1,009	$5,674
7/1/16	31	41,760	166	$999	$4,313
7/30/16	29	32,800	252	$688	$4,090
Totals	**365**	**535,670**	**252.1**	**$11,465**	**$64,735**
Annual	**365**	**535,670**	**252.1**	**$11,465**	**$64,735**

3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.065/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 10 - Graph of 12 Months Natural Gas Usage

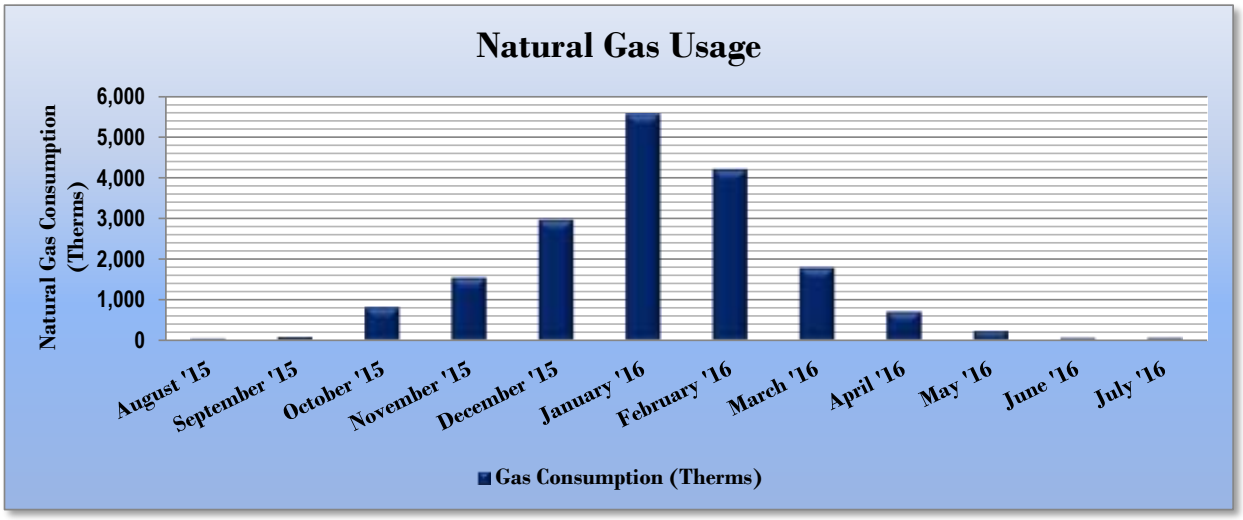


Figure 11 - Table of 12 Months Natural Gas Usage

Gas Billing Data for JMF Early Childhood Learning Center			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
9/10/15	30	42	$434
10/8/15	28	79	$463
11/9/15	32	811	$1,039
12/10/15	31	1,537	$1,628
1/12/16	33	2,962	$2,766
2/12/16	31	5,557	$4,838
3/15/16	32	4,196	$3,751
4/11/16	27	1,779	$1,821
5/11/16	30	702	$961
6/13/16	33	223	$579
7/14/16	31	49	$440
8/12/16	29	53	$443
Totals	**367**	**17,989**	**$19,165**
Annual	**365**	**17,891**	**$19,061**

3.4 Benchmarking

This facility was benchmarked using *Portfolio Manager*, an online tool created and managed by the U.S. 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.

Energy Use Intensity 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 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	JMF Early Childhood Learning Center	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	179.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	85.1	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 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	JMF Early Childhood Learning Center	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	132.8	141.4
Site Energy Use Intensity (kBtu/ft^2)	66.9	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. Your building is not is one of the building categories that are eligible to receive a score.

This facility has a current score of 15.

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

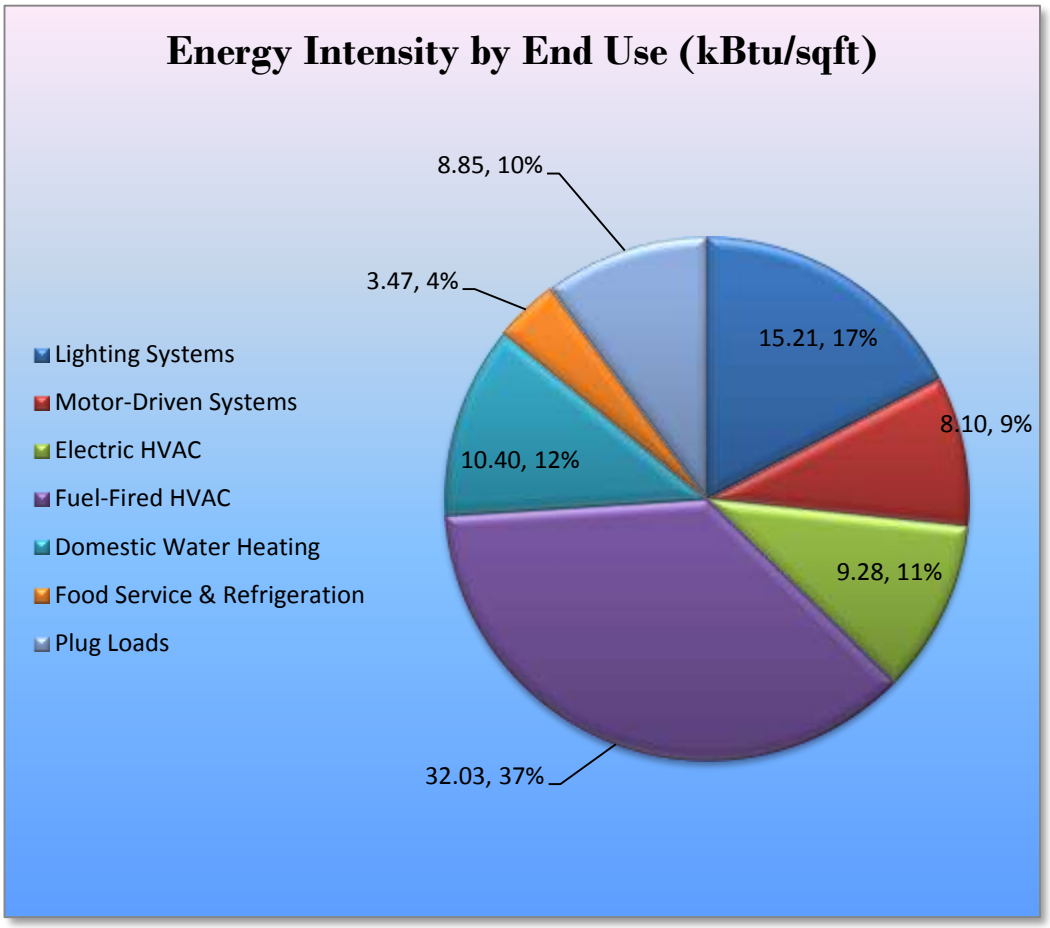
For more information on Energy Star certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1

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 14 - 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 JMF Early Childhood Learning Center 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.

Figure 15 – 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		**108,115**	**15.4**	**0.0**	**$13,065.48**	**$151,776.49**	**$12,625.00**	**$139,151.49**	**10.7**	**108,871**
ECM 1	Install LED Fixtures	48,218	2.7	0.0	$5,827.08	$70,940.98	$5,530.00	$65,410.98	11.2	48,556
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	59,753	12.7	0.0	$7,220.99	$80,513.00	$7,095.00	$73,418.00	10.2	60,171
ECM 3	Retrofit Fixtures with LED Lamps	144	0.0	0.0	$17.40	$322.52	$0.00	$322.52	18.5	145
Lighting Control Measures		**15,022**	**3.2**	**0.0**	**$1,815.38**	**$7,728.00**	**$1,240.00**	**$6,488.00**	**3.6**	**15,127**
ECM 4	Install Occupancy Sensor Lighting Controls	15,022	3.2	0.0	$1,815.38	$7,728.00	$1,240.00	$6,488.00	3.6	15,127
Motor Upgrades		**894**	**0.3**	**0.0**	**$108.10**	**$3,394.32**	**$0.00**	**$3,394.32**	**31.4**	**901**
ECM 5	Premium Efficiency Motors	894	0.3	0.0	$108.10	$3,394.32	$0.00	$3,394.32	31.4	901
Variable Frequency Drive (VFD) Measures		**20,525**	**4.6**	**0.0**	**$2,480.38**	**$20,379.75**	**$1,640.00**	**$18,739.75**	**7.6**	**20,668**
ECM 6	Install VFDs on Constant Volume (CV) HVAC	6,921	2.8	0.0	$836.37	$13,166.15	$1,640.00	$11,526.15	13.8	6,969
ECM 7	Install VFDs on Hot Water Pumps	13,604	1.9	0.0	$1,644.01	$7,213.60	$0.00	$7,213.60	4.4	13,699
Electric Unitary HVAC Measures		**10,020**	**7.2**	**0.0**	**$1,210.88**	**$43,055.58**	**$2,197.50**	**$40,858.08**	**33.7**	**10,090**
ECM 8	Install High Efficiency Electric AC	10,020	7.2	0.0	$1,210.88	$43,055.58	$2,197.50	$40,858.08	33.7	10,090
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**131.6**	**$1,401.52**	**$14,402.05**	**$2,000.00**	**$12,402.05**	**8.8**	**15,403**
ECM 9	Install High Efficiency Hot Water Boilers	0	0.0	131.6	$1,401.52	$14,402.05	$2,000.00	$12,402.05	8.8	15,403
Domestic Water Heating Upgrade		**0**	**0.0**	**73.6**	**$784.42**	**$6,934.80**	**$240.00**	**$6,694.80**	**8.5**	**8,621**
ECM 10	Install High Efficiency Gas Water Heater	0	0.0	73.6	$784.42	$6,934.80	$240.00	$6,694.80	8.5	8,621
Plug Load Equipment Control - Vending Machine		**1,612**	**0.0**	**0.0**	**$194.79**	**$230.00**	**$0.00**	**$230.00**	**1.2**	**1,623**
ECM 11	Vending Machine Control	1,612	0.0	0.0	$194.79	$230.00	$0.00	$230.00	1.2	1,623
Custom Measures		**6,906**	**0.4**	**13.3**	**$976.44**	**$9,080.00**	**$0.00**	**$9,080.00**	**9.3**	**8,513**
ECM 12	Computer Power Management Software	3,266	0.0	0.0	$394.73	$2,905.00	$0.00	$2,905.00	7.4	3,289
ECM 13	Replace Refrigeration Equipment with Smaller Energy Star Equipment	2,818	0.4	0.0	$340.56	$4,050.00	$0.00	$4,050.00	11.9	2,838
ECM 14	Weather-Strip Exterior Doors	822	0.0	13.3	$241.14	$2,125.00	$0.00	$2,125.00	8.8	2,386
TOTALS		**163,094**	**31.1**	**218.5**	**$22,037.39**	**$256,980.99**	**$19,942.50**	**$237,038.49**	**10.8**	**189,818**

* - 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

Recommended upgrades to existing lighting fixtures are summarized in Figure 16 below.

Figure 16 – 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		**108,115**	**15.4**	**0.0**	**$13,065.48**	**$151,776.49**	**$12,625.00**	**$139,151.49**	**10.7**	**108,871**
ECM 1	Install LED Fixtures	48,218	2.7	0.0	$5,827.08	$70,940.98	$5,530.00	$65,410.98	11.2	48,556
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	59,753	12.7	0.0	$7,220.99	$80,513.00	$7,095.00	$73,418.00	10.2	60,171
ECM 3	Retrofit Fixtures with LED Lamps	144	0.0	0.0	$17.40	$322.52	$0.00	$322.52	18.5	145

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. Please see **Appendix A: Equipment Inventory & Recommendations** for a detailed list of the locations and recommended upgrades for each lighting measure.

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	15,206	2.7	0.0	$1,837.66	$48,333.60	$2,700.00	$45,633.60	24.8	15,313
Exterior	33,012	0.0	0.0	$3,989.43	$22,607.38	$2,830.00	$19,777.38	5.0	33,243

Measure Description

We recommend replacing the compact fluorescent lamp high bay fixtures in the All Purpose Room one-for-one with new LED high bay fixtures. This measure includes the replacement of fixtures and assumes the ability to reuse the existing mounting configuration. The existing lamps frequently burn out and the maintenance is problematic due to the need to use a lift. The proposed fixtures are new high performance LEDs which have much longer lifespans. Therefore this measure saves energy by reducing the electrical demand and use of the gymnasium light fixtures, improves light output as well as significantly reduces required maintenance.

This measure also recommends replacing the exterior high pressure sodium and metal halide lamp fixtures with LED fixtures. This measure includes the replacement of the area head fixtures while re-using the existing poles. A detailed evaluation will need to be conducted to ensure proper spread of light in parking lot areas. This measure also includes the replacement of exterior wall mounted and flood fixtures one-for-one with new LED wall pack and flood fixtures. This measure saves energy by installing LEDs which use

less power than other technologies with a comparable or improved light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice than older technologies.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	59,753	12.7	0.0	$7,220.99	$80,513.00	$7,095.00	$73,418.00	10.2	60,171
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

For the purpose of this report, we recommend retrofitting the existing fixtures rather than just replacing the lamps. It should be noted that the existing T8 electronic ballasts may be compatible with turn-key LED lamp replacements which would reduce the estimated installation costs and provide comparable energy savings.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	144	0.0	0.0	$17.40	$322.52	$0.00	$322.52	18.5	145

Measure Description

WWe recommend replacing the existing compact fluorescent lamps in exterior wall mounted fixtures with reduced wattage LED lamps. 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 lamps.

4.1.2 Lighting Control Measures

Figure 17 – 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		**15,022**	**3.2**	**0.0**	**$1,815.38**	**$7,728.00**	**$1,240.00**	**$6,488.00**	**3.6**	**15,127**
ECM 4	Install Occupancy Sensor Lighting Controls	15,022	3.2	0.0	$1,815.38	$7,728.00	$1,240.00	$6,488.00	3.6	15,127

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. Please see **Appendix A: Equipment Inventory & Recommendations** for a detailed list of the locations and recommended lighting controls upgrades for each lighting measure.

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
15,022	3.2	0.0	$1,815.38	$7,728.00	$1,240.00	$6,488.00	3.6	15,127

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms and hallways. 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 Motor Upgrades

ECM 5: 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)
894	0.3	0.0	$108.10	$3,394.32	$0.00	$3,394.32	31.4	901

Measure Description

We recommend replacing the 7.5HP hot water heating pumps and the 7.5HP supply fan motors in the air-handling unit serving the All Purpose Room with *NEMA Premium™* efficiency motors. The existing motors have an efficiency of 88.5% and the new motors will have an efficiency of 91%.

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.

Please see **Appendix A: Equipment Inventory & Recommendations** for more information on existing and proposed motor upgrades.

4.1.4 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 18 below.

Figure 18 – 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		**20,525**	**4.6**	**0.0**	**$2,480.38**	**$20,379.75**	**$1,640.00**	**$18,739.75**	**7.6**	**20,668**
ECM 6	Install VFDs on Constant Volume (CV) HVAC	6,921	2.8	0.0	$836.37	$13,166.15	$1,640.00	$11,526.15	13.8	6,969
ECM 7	Install VFDs on Hot Water Pumps	13,604	1.9	0.0	$1,644.01	$7,213.60	$0.00	$7,213.60	4.4	13,699

Please see **Appendix A: Equipment Inventory & Recommendations** for more information about current motors systems and VFD recommendations.

ECM 6: 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)
6,921	2.8	0.0	$836.37	$13,166.15	$1,640.00	$11,526.15	13.8	6,969

Measure Description

We recommend installing VFDs to control the supply fan motors in the proposed RTU's that serve the East and West Hallway as well as the air handling unit that serves the All Purpose Room and Cafeteria. We recommend installing variable frequency drives (VFDs) to control supply fan motor speeds to convert a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated return fan motor. 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.

Air handling 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 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 7: 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)
13,604	1.9	0.0	$1,644.01	$7,213.60	$0.00	$7,213.60	4.4	13,699

Measure Description

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

4.1.5 Electric Unitary HVAC Measures

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

Figure 19 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**10,020**	**7.2**	**0.0**	**$1,210.88**	**$43,055.58**	**$2,197.50**	**$40,858.08**	**33.7**	**10,090**
ECM 8	Install High Efficiency Electric AC	10,020	7.2	0.0	$1,210.88	$43,055.58	$2,197.50	$40,858.08	33.7	10,090

Please see **Appendix A: Equipment Inventory & Recommendations** for more information about existing HVAC equipment and proposed upgrades.

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)
10,020	7.2	0.0	$1,210.88	$43,055.58	$2,197.50	$40,858.08	33.7	10,090

Measure Description

We recommend replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. This measure includes the two (2) RTU's which swerve the East and West Hallways. We also recommend replacing standard efficiency split system AC outdoor condensing unit which serve the Break Out Room and the Office Area. 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.

4.1.6 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 20 below.

Figure 20 - 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**	**131.6**	**$1,401.52**	**$14,402.05**	**$2,000.00**	**$12,402.05**	**8.8**	**15,403**
ECM 9	Install High Efficiency Hot Water Boilers	0	0.0	131.6	$1,401.52	$14,402.05	$2,000.00	$12,402.05	8.8	15,403

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed replaced measure.

ECM 9: 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	131.6	$1,401.52	$14,402.05	$2,000.00	$12,402.05	8.8	15,403

Measure Description

We recommend replacing older inefficient hot water boilers with high efficiency gas-fired condensing 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 existing boilers have reached the end of their useful life and in need of replacement. This measure is recommended based on the energy savings potential, economic justification and the current condition of the boilers.

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

4.1.7 Domestic Hot Water Heating System Upgrades

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

Figure 21 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**73.6**	**$784.42**	**$6,934.80**	**$240.00**	**$6,694.80**	**8.5**	**8,621**
ECM 10	Install High Efficiency Gas Water Heater	0	0.0	73.6	$784.42	$6,934.80	$240.00	$6,694.80	8.5	8,621

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on the facility's existing domestic hot water equipment and recommended system upgrades.

ECM 10: Install High Efficiency Gas-Fired Water Heater

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	73.6	$784.42	$6,934.80	$240.00	$6,694.80	8.5	8,621

Measure Description

We recommend replacing the existing tank water heater with a high efficiency gas-fired condensing storage tank water heater. Improvements in combustion efficiency and reductions in heat losses have improved the overall efficiency of storage water heaters. Energy savings results from using less gas to heat water, due to higher unit efficiency, and fewer run hours to maintain the tank water temperature. The proposed equipment may reach efficiencies up to 96% through proper control through lower return water temperatures.

4.1.8 Plug Load Equipment Control - Vending Machines

ECM 11: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,612	0.0	0.0	$194.79	$230.00	$0.00	$230.00	1.2	1,623

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use of the refrigerated drink machine. 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.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed measures.

4.1.9 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 22 below.

Figure 22 - Summary of Custom 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)
Custom Measures		**6,906**	**0.4**	**13.3**	**$976.44**	**$9,080.00**	**$0.00**	**$9,080.00**	**9.3**	**8,513**
ECM 12	Computer Power Management Software	3,266	0.0	0.0	$394.73	$2,905.00	$0.00	$2,905.00	7.4	3,289
ECM 13	Replace Refrigeration Equipment with Smaller Energy Star Equipment	2,818	0.4	0.0	$340.56	$4,050.00	$0.00	$4,050.00	11.9	2,838
ECM 14	Weather-Strip Exterior Doors	822	0.0	13.3	$241.14	$2,125.00	$0.00	$2,125.00	8.8	2,386

ECM 12: Computer Power Management Software

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)
3,266	0.0	0.0	$394.73	$2,905.00	$0.00	$2,905.00	7.4	3,289

Measure Description

We recommend the implementation of computer power management software. The computing environment in most school and office facilities includes desktops, which are typically left on over nights, weekends and holidays. Screen savers are commonly confused as a power management strategy. This contributes to excessive electrical energy consumption, which may be avoided by proper management. There are innovative software packages available in the market today that are designed to deliver significant energy saving and provide ongoing tracking measurements. Operational and maintenance benefits are captured through the use of a central power management platform where issues may be diagnosed and problematic devices may be isolated. Energy savings policies may be enforced as well as identifying and eliminating underutilized devices. This measure investigates the potential benefits to implementing computer power management software to better match the energy use to user needs. The image to the right is for demonstration purposes only and represents the difference between potential duration of devices being in Power-On States vs. the duration of User Activity. This difference provides an opportunity for energy savings by implementing power management software.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed measures.

ECM 13: Replace Refrigeration Equipment with Smaller Energy Star Equipment

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)
2,818	0.4	0.0	$340.56	$4,050.00	$0.00	$4,050.00	11.9	2,838

Measure Description

There were a few stand-up solid door refrigerators which were noted to be 90% empty during the site visit. There is an opportunity for energy savings by replacing these with half the size refrigerators that are compact and Energy Star units. We also recommend ensuring refrigeration equipment consolidation when the opportunity presents itself in the kitchen.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed measures.

ECM 14: Weather-Strip Exterior Doors

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)
822	0.0	13.3	$241.14	$2,125.00	$0.00	$2,125.00	8.8	2,386

Measure Description

We recommend weather-stripping a total of seventeen (17) exterior doors. These were all noted to have worn or missing weather-stripping with clear air gaps. Building envelopes that limit air infiltration and that have adequate insulation play a key role in optimizing heating and cooling efficiency, controlling moisture, and providing occupant comfort. Cracks and gaps throughout your building – around windows and doors, through utility openings, at the foundation and roof – may not seem significant, but their effects add up. Reducing uncontrolled air infiltration through air sealing is a cost effective way to improve the performance and energy efficiency of your facility. The proper sealing of sources for air infiltration and exfiltration will mitigate the air through the building and thus reduce the load on the facility's heating and cooling equipment. Exterior doors should be properly weather-stripped which may include the installation of a bottom sweep, center sweep and weather-stripping around the perimeter of the door.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed measures.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

Use Window Treatments/Coverings

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

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.

Develop a Lighting Maintenance Schedule

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

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.

Use Fans to Reduce Cooling Load

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5-10 °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.

Ensure Economizers are Functioning Properly

Economizers, when properly configured, can be used to significantly reduce mechanical cooling. However, if the outdoor thermostat or enthalpy control is malfunctioning or the damper is stuck or improperly adjusted, benefits from the economizer may not be fully realized. As such, periodic inspection and maintenance is required to ensure proper operation. This maintenance should be scheduled with maintenance of the facility's air conditioning system and should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position. A malfunctioning economizer can significantly increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Check for and Seal Duct Leakage

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

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 Furnace Maintenance

Preventative furnace maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should include tasks such as checking for gas / carbon monoxide leaks; changing the air and fuel filters; checking components for cracks, corrosion, dirt, or debris build-up; ensuring the ignition system is working properly; testing and adjusting operation and safety controls; inspecting the electrical connections; and ensuring proper lubrication for motors and bearings.

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 "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices

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.

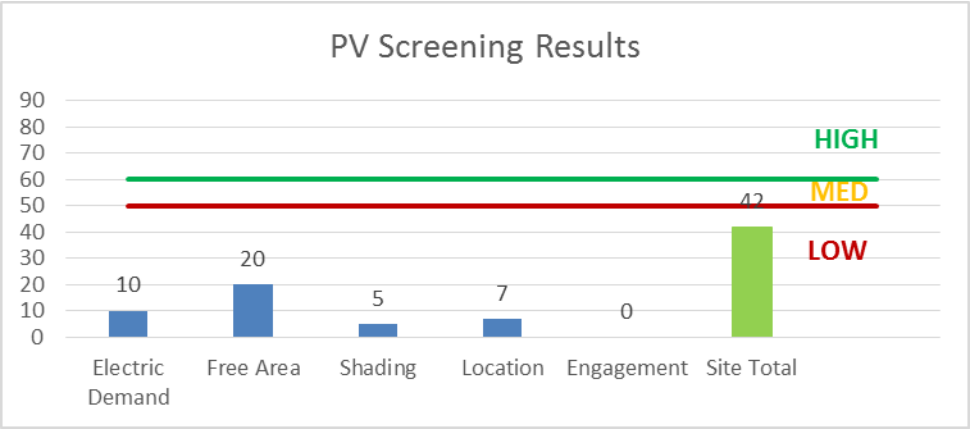
6.1 Photovoltaic

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 **Low** potential for installing a PV array.

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear not meet these minimum criteria for cost-effective PV installation.

Figure 23 - Photovoltaic Screening



Solar projects must register their projects in the SREC Registration Program 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.

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

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 (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 (www.pjm.com/training/trainingmaterial.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.

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

Figure 244 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x			x		
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x			x		
ECM 3	Retrofit Fixtures with LED Lamps	x			x		
ECM 4	Install Occupancy Sensor Lighting Controls	x			x		
ECM 5	Premium Efficiency Motors				x		
ECM 6	Install VFDs on Constant Volume (CV) HVAC	x			x		
ECM 7	Install VFDs on Hot Water Pumps	x			x		
ECM 8	Install High Efficiency Electric AC	x			x		
ECM 9	Install High Efficiency Hot Water Boilers	x			x		
ECM 10	Install High Efficiency Gas Water Heater	x			x		
ECM 11	Vending Machine Control				x		
ECM 12	Computer Power Management Software				x		
ECM 13	Replace Refrigeration Equipment with Smaller Energy Star Equipment				x		
ECM 14	Weather-Strip Exterior Doors				x		

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

Generally, the incentive values provided throughout the report assume the SS 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 (SS) 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 SS prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SS 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 $0.10/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 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.

8.4 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (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 (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 (www.pjm.com/training/trainingmaterial.aspx), along with a variety of other 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 the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

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
Main Office Area 303	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,400	None	No	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,400	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Entrance Lobby	11	Compact Fluorescent: <Enter Fixture Description>	Wall Switch	40	3,200	Delamp & Add Reflectors	No	11	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	3,200	0.10	587	0.0	$70.93	$440.00	$165.00	3.88
Entrance Lobby	5	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,200	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,240	0.07	388	0.0	$46.92	$805.00	$85.00	15.35
Office 302	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$55.63	$584.00	$60.00	9.42
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,000	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,000	0.19	683	0.0	$82.55	$789.00	$90.00	8.47
All Purpose Room	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,200	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,200	0.13	707	0.0	$85.39	$1,284.00	$120.00	13.63
All Purpose Room	18	Compact Fluorescent: <Enter Fixture Description>	Wall Switch	336	3,200	Fixture Replacement	No	18	LED - Fixtures: High-Bay	Wall Switch	72	3,200	3.11	17,487	0.0	$2,113.31	$48,333.60	$2,700.00	21.59
Mechanical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Stage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	None	No	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Common Area	8	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,200	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,240	0.11	621	0.0	$75.07	$1,126.00	$115.00	13.47
Common Area	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.22	1,228	0.0	$148.36	$1,206.00	$115.00	7.35
Common Area	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,200	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,240	0.08	466	0.0	$56.30	$912.00	$95.00	14.51
Common Area	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.33	1,841	0.0	$222.54	$1,674.00	$155.00	6.83
Common Area	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.16	921	0.0	$111.27	$972.00	$95.00	7.88
Common Area	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.16	921	0.0	$111.27	$972.00	$95.00	7.88
Server Room 306	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	None	No	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 304	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$55.63	$584.00	$60.00	9.42
Room 304	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$55.63	$584.00	$60.00	9.42
Bathrooms	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Nurse's Room 305	10	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,400	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,400	0.10	442	0.0	$53.37	$1,070.00	$100.00	18.18
Bathrooms	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 101	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 101	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 102	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 102	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 106	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 106	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,560	0.02	59	0.0	$7.15	$117.00	$10.00	14.96
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 107	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 107	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 111	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 111	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 112	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 112	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 113	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75

	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
Classroom 113	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 114	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 114	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
End Classroom 117	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.60	3,017	0.0	$364.64	$2,690.00	$240.00	6.72
End Classroom 117	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.25	926	0.0	$111.88	$1,169.00	$110.00	9.47
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
End Classroom 118	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.60	3,017	0.0	$364.64	$2,690.00	$240.00	6.72
End Classroom 118	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.25	926	0.0	$111.88	$1,169.00	$110.00	9.47
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office 103	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.11	549	0.0	$66.30	$584.00	$60.00	7.90
Conference Room 104	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.11	411	0.0	$49.72	$584.00	$60.00	10.54
Hallway	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.60	3,376	0.0	$407.99	$2,690.00	$240.00	6.01
End of Halllway	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,200	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,200	0.02	118	0.0	$14.23	$214.00	$20.00	13.63
Observation Room 110	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.08	460	0.0	$55.63	$467.00	$50.00	7.50
Hallway	5	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,200	Relamp & Reballast	No	5	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,200	0.05	294	0.0	$35.58	$535.00	$50.00	13.63
Attic	10	Compact Fluorescent: <Enter Fixture Description>	None	13	1,000	None	No	10	Compact Fluorescent: <Enter Fixture Description>	None	13	1,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lunch Room 308	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.14	575	0.0	$69.54	$701.00	$70.00	9.07
Lunch Room 308	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.14	575	0.0	$69.54	$701.00	$70.00	9.07
Restroom 314	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,560	Relamp & Reballast	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,560	0.10	266	0.0	$32.19	$394.50	$45.00	10.86

	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
Café 315	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.16	691	0.0	$83.45	$818.00	$80.00	8.84
Storage 313	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Resstroom 312	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,560	Relamp & Reballast	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,560	0.10	266	0.0	$32.19	$394.50	$45.00	10.86
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,200	Relamp & Reballast	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,240	0.41	2,302	0.0	$278.17	$2,025.00	$185.00	6.61
Classroom 201	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 201	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 202	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 202	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 205	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 205	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 206	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 206	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 207	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 207	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 208	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75

	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
Classroom 208	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 211	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 211	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom 212	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,860	Relamp & Reballast	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,002	0.55	2,743	0.0	$331.49	$2,456.00	$220.00	6.75
Classroom 212	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,145	Relamp & Reballast	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,502	0.22	823	0.0	$99.45	$1,052.00	$100.00	9.57
Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,560	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Office 202	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$55.63	$584.00	$60.00	9.42
Office 204	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,400	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,680	0.11	460	0.0	$55.63	$584.00	$60.00	9.42
Exterior	28	High-Pressure Sodium: (1) 250W Lamp	None	295	4,000	Fixture Replacement	No	28	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	110	4,000	3.40	23,828	0.0	$2,879.56	$10,938.96	$2,800.00	2.83
Exterior	3	Compact Fluorescent: <Enter Fixture Description>	None	26	4,000	Relamp	No	3	LED Screw-In Lamps: <Enter Fixture Description>	None	14	4,000	0.02	166	0.0	$20.01	$322.52	$0.00	16.12
Exterior	5	Metal Halide: (1) 250W Lamp	None	295	4,000	Fixture Replacement	No	5	LED - Fixtures: Other	None	80	4,000	0.70	4,945	0.0	$597.59	$1,411.20	$25.00	2.32
Exterior	3	Metal Halide: (1) 1000W Lamp	None	1,080	4,000	Fixture Replacement	No	3	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	None	450	4,000	1.24	8,694	0.0	$1,050.65	$9,974.98	$0.00	9.49
Exterior	1	High-Pressure Sodium: (1) 100W Lamp	None	138	4,000	Fixture Replacement	No	1	LED - Fixtures: Other	None	30	4,000	0.07	497	0.0	$60.04	$282.24	$5.00	4.62
Parking Lot near LCW	6	Metal Halide: (1) 1000W Lamp	None	1,080	50	None	No	6	Metal Halide: (1) 1000W Lamp	None	1,080	50	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Parking Lot near LCW	3	Metal Halide: (1) 400W Lamp	None	458	50	None	No	3	Metal Halide: (1) 400W Lamp	None	458	50	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
Boiler Room	Hydronic Heating System	2	Heating Hot Water Pump	7.5	88.5%	No	2,543	Yes	91.0%	Yes	2	2.04	14,200	0.0	$1,716.08	$9,476.48	$0.00	5.52
AHU-1	All Purpose Room	1	Supply Fan	7.5	88.5%	No	2,543	Yes	91.0%	Yes	1	1.09	3,113	0.0	$376.17	$4,738.24	$600.00	11.00
AHU-1	All Purpose Room	1	Return Fan	2.0	85.0%	No	2,059	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
RTU-1	East Hallways	1	Supply Fan	3.0	88.5%	No	2,059	No	88.5%	Yes	1	0.41	937	0.0	$113.25	$3,007.65	$240.00	24.44
RTU-1	East Hallways	1	Return Fan	1.0	85.0%	No	2,059	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
RTU-2	West Hallways	1	Supply Fan	5.0	88.5%	No	2,059	No	88.5%	Yes	1	0.68	1,562	0.0	$188.75	$3,275.85	$400.00	15.24
RTU-2	West Hallways	1	Return Fan	1.0	85.0%	No	2,059	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU-2	Offices	1	Supply Fan	1.5	84.0%	No	2,059	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU-2	Offices	1	Return Fan	0.5	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU-3	Café	1	Supply Fan	5.0	86.0%	No	2,059	No	86.0%	Yes	1	0.70	1,607	0.0	$194.23	$3,275.85	$400.00	14.81
AHU-3	Café	1	Return Fan	1.5	84.0%	No	2,059	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Unit Ventilators	Majority of Building	19	Supply Fan	0.8	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Unit Ventilators	Majority of Building	19	Exhaust Fan	0.3	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Domestic Hot Water	1	Water Supply Pump	0.2	60.0%	No	2,059	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Hot Water Unit Heater	1	Supply Fan	0.2	60.0%	No	2,059	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
Outdoor	All Purpose Room - Outdoor Condensing Unit	2	Split-System AC	15.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Outdoor	Break Out Room - Outdoor Condensing Unit	1	Split-System AC	10.00		Yes	1	Split-System AC	10.00		11.50		No	2.14	2,953	0.0	$356.89	$11,637.70	$730.00	30.56
Outdoor	Offices - Outdoor Condensing Unit	1	Split-System AC	7.50		Yes	1	Split-System AC	7.50		11.50		No	1.60	2,215	0.0	$267.67	$8,728.28	$547.50	30.56
RTU-1	East Hallways	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		No	1.75	2,426	0.0	$293.16	$11,344.80	$460.00	37.13
RTU-2	West Hallways	1	Packaged AC	5.00		Yes	1	Packaged AC	5.00		14.00		No	1.75	2,426	0.0	$293.16	$11,344.80	$460.00	37.13
Classroom	Classroom	2	Packaged Terminal AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Unit Ventilators	Majority of Building	19	Packaged AC	2.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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	Majority of Building	2	Non-Condensing Hot Water Boiler	300.00	Yes	2	Condensing Hot Water Boiler	300.00	91.00%	Et	0.00	0	131.6	$1,401.52	$14,402.05	$2,000.00	8.85

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	Whole Building	1	Storage Tank Water Heater (> 50 Gal)	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	96.00%	Et	0.00	0	73.6	$784.42	$6,934.80	$240.00	8.53

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	Cooler (35F to 55F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

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

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lunch Room	1	Electric Convection Oven (Full Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Various	27	Computers	120.0	
Various	4	Printers	250.0	
Various	20	Projectors	240.0	
Various	2	TV	90.0	
Various	1	Radio	10.0	
Various	2	Microwave	1,400.0	
Various	2	Toaster	1,100.0	
Various	2	Coffee Maker	1,200.0	
Various	1	Mini Fridge	260.0	
Observation Room	1	Washer	2,500.0	
Observation Room	1	Dryer	3,500.0	
Misc Loads	1	Misc Loads	30,000.0	
Server Room	1	IT Equipment	30,000.0	
Kitchen	1	Cooking Equipment	2,000.0	

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
Lunch Room	1	Refrigerated	Yes	0.00	1,612	0.0	$194.79	$230.00	$0.00	1.18

Custom Recommendations

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
27	*Mon - Fri 8AM-5PM*	*Mon - Fri 5PM-8AM*	*Weekends & Holidays*	Energy Rate (W)*	Weekly Run Hours	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	*Weekends & Holidays*	*Energy Rate (W)**	*Weekly Run Hours*	Mon - Fri 8AM-5PM	Mon - Fri 5PM-8AM	Weekends & Holidays	Energy Rate (W)*	*Weekly Run Hours*
Existing Conditions	90%	25%	5%	120	**58**	5%	10%	5%	80	**12**	5%	65%	90%	5	**97**
Proposed Conditions	85%	5%	0%	120	**38**	5%	0%	0%	80	**2**	10%	95%	100%	5	**128**

Usage per Device			Energy Impact & Financial Analysis					
Weeks of Use	Annual kWh Usage	*Diversity Factor***	Total Annual kWh Savings	Total Annual Energy Cost Savings	*Cost per Desktop*	*Add'l Hardware Cost*	Total Installation Cost	Simple Payback Period (Years)
43	365	90%	3,266	$395	$15.00	$2,500.0	$2,905	7.36
43	230							

Replace Refrigeration Equipment with Smaller Energy Star Equipment

Existing Conditions					Proposed Conditions					Energy Impact & Financial Analysis					
Description	*Total Volume (cu. ft.)*	*Total kW*	*Total Annual kWh*	% Empty as Noted on Site	Qty of Compact Energy Star Fridges	Qty of Refrigerator Chests	Total Volume (cu. ft.)	Total kW	Total Annual kWh	Total Annual kW Savings	Total Annual kWh Savings	Total Annual Energy Cost Savings	*Cost per Compact Energy Star Fridge*	Total Installation Cost	Simple Payback Period (Years)
Replace	62	0.6	3,827	80%	2	1	40	0.15	1008.9	0.4	2,818	$341	$500.00	$4,050	11.89

Weather-Strip Exterior Doors

# of Doors: 17

Existing Conditions										Proposed Conditions		Energy Impact & Financial Analysis			
Average Heating Season OAT (degF)	Average Heating Season IAT (degF)	Average Cooling Season OAT (degF)	Average Cooling Season IAT (degF)	Volume of Main Corridor (cubic ft)	ACH	Heating Season Infiltration (Btu/hr)	Cooling Season Infiltration (Btu/hr)	Annual Heating EFLH	Annual Cooling EFLH	Heating Season Energy Savings (mmBtu)	Cooling Season Energy Savings (kWh)	Total Annual Energy Cost Savings	*Cost per Single Door*	Total Installation Cost	Simple Payback Period (Years)
55	71	78.0	72	6,372	4	7,340	2,753	1,814	1,019	13.3	822	$241	$125.00	$2,125	8.81

Appendix B: EPA Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

15

ENERGY STAR® Score[1]

JMF Pre School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 42,478
Built: 2004

For Year Ending: December 31, 2016
Date Generated: May 23, 2017

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
JMF Pre School 80 Avenel Blvd Long Branch, New Jersey 07740	Long Branch Public Schools 540 Broadway Long Branch, NJ 07740 732-571-2868 x 40710	Ann Degnan 540 Broadway Long Branch, NJ 07740 732-571-2868 x 40710 adegnan@longbranch.k12.nj.us

Property ID: 3551365

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
86.4 kBtu/ft²

Source EUI
172.9 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,669,150 (46%)
Natural Gas (kBtu)	2,001,680 (54%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	61.5
National Median Source EUI (kBtu/ft²)	123
% Diff from National Median Source EUI	40%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	298

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

Aimee Lalonde
900 Route 9 North
Suite 404
Woodbridge, NY 07095
3479132422
alalonde@trcsolutions.com

Professional Engineer Stamp (if applicable)

ENERGY STAR® Scorecard

LEARN MORE AT energystar.gov

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ENERGY STAR® Score

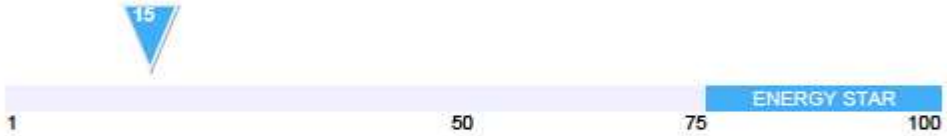
JMF Pre School

Primary Function: K-12 School
Gross Floor Area (ft²): 42,478
Built: 2004

For Year Ending: December 31, 2016
Date Generated: May 23, 2017

Property Address:
JMF Pre School
80 Avenel Blvd
Long Branch, New Jersey 07740

For the year ending in December 2016, this building used 172.9 (kBtu/ft²) on a source energy basis. The Environmental Protection Agency's (EPA's) 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.



Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

Signature of Verifying Professional

I_____ (Name) verify that the information regarding energy use and property use details is true and correct to the best of my knowledge.

Signature: _____Date: _____

ENERGY STAR® Data Verification Checklist

LEARN MORE AT energystar.gov

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ENERGY STAR ® Score[1]

JMF Pre School

Registry Name: JMF Pre School
Property Type: K-12 School
Gross Floor Area (ft²): 42,478
Built: 2004

For Year Ending: 12/31/2016
Date Generated: 05/23/2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
JMF Pre School 80 Avenel Blvd Long Branch, New Jersey 07740 **Property ID:** 3551365	Long Branch Public Schools 540 Broadway Long Branch, NJ 07740 732-571-2868 x 40710	Ann Degnan 540 Broadway Long Branch, NJ 07740 732-571-2868 x 40710 adegnan@longbranch.k12.nj.us

1. Review of Whole Property Characteristics

Basic Property Information

1) **Property Name:** JMF Pre School ☐ Yes ☐ No
   Is this the official name of the property?

   If "No", please specify: _____

2) **Property Type:** K-12 School ☐ Yes ☐ No
   Is this an accurate description of the primary use of this property?

3) **Location:** ☐ Yes ☐ No
   80 Avenel Blvd
   Long Branch, New Jersey 07740

   Is this correct and complete?

4) **Gross Floor Area:** 42,478 ft² ☐ Yes ☐ No

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