Local Government Energy Audit:
Energy Audit Report

George L. Catrambone Elementary School

Long Branch Board of Education

240 Park Ave
Long Branch, NJ 07740

October 27, 2017

Draft Report by:
TRC Energy Services

Disclaimer

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

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services 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 George L. Catrambone Elementary School.

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

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

George L. Catrambone Elementary School is a 108,000 square foot facility. It includes classroom space, office areas, a gymnasium, a cafeteria/auditorium, prep kitchen and a media center. The building was built in 2014, opened about 2 years ago and is in good condition. The school is in operation 10 months out of the year and open between 6AM and 6PM, Monday through Friday with little to no use on the weekends. There are about 810 students and 110 staff/visitors who occupy the building. The kitchen warms two (2) meals a day for the students.

The building is 100% heated and cooled. The energy systems throughout the George L. Catrambone Elementary School are mostly in good condition with the exception of the exterior lighting. Per discussions with facility personnel, the ballasts burn out quickly in wall pack and pole mounted area light fixtures. It was also noted that the main electrical switch gear is in need of replacement. We recommend moving forward with remediating this issue to ensure protection of large equipment. 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 12 measures which together represent an opportunity for George L. Catrambone Elementary School to reduce annual energy costs by roughly $47,226 and annual greenhouse gas emissions by 452,030 lbs CO_2e. We estimate that if all measures were implemented (including the PV System), the project would pay for itself in roughly 20.0 years, with individual measure paybacks ranging from <1 year to 27 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 George L. Catrambone Elementary School's annual energy use by 43%.

We estimate if all recommended measures were implemented, (excluding the PV System) the project will pay for itself in roughly 11.4 years. Together these measures represent an opportunity to reduce the school's annual energy use by 15%.

Figure 1 – Previous 12 Month Utility Costs

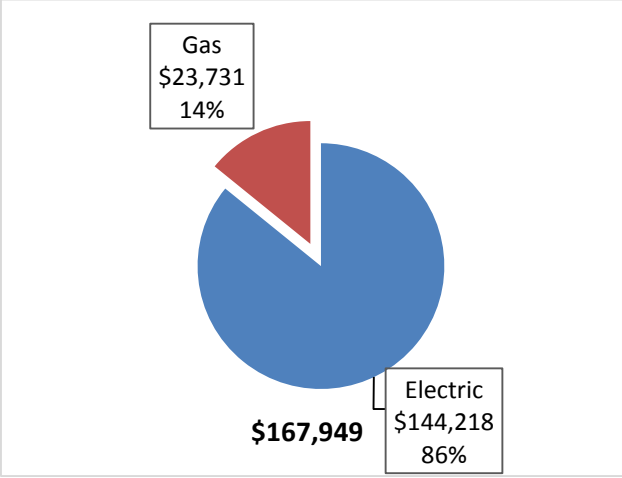
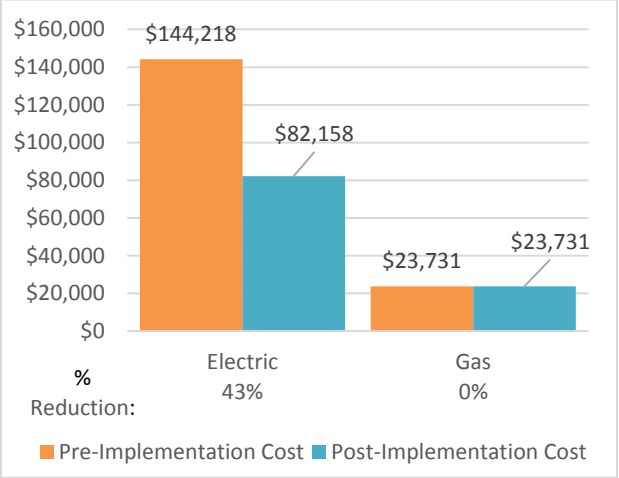


Figure 2 – Potential Post-Implementation Costs



A detailed description of George L. Catrambone Elementary School'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 Natural Gas 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			**92,998**	**18.7**	**0.0**	**$12,857.07**	**$194,950.49**	**$16,455.00**	**$178,495.49**	**13.9**	**93,648**
ECM 1	Install LED Fixtures	Yes	46,368	4.8	0.0	$6,410.47	$112,684.96	$9,500.00	$103,184.96	16.1	46,692
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	44,170	13.1	0.0	$6,106.53	$77,159.00	$6,805.00	$70,354.00	11.5	44,479
ECM 3	Retrofit Fixtures with LED Lamps	Yes	2,460	0.9	0.0	$340.08	$5,106.54	$150.00	$4,956.54	14.6	2,477
Lighting Control Measures			**303**	**0.0**	**0.0**	**$41.89**	**$484.00**	**$80.00**	**$404.00**	**9.6**	**305**
ECM 4	Lighting Control Upgrades	Yes	303	0.0	0.0	$41.89	$464.00	$80.00	$384.00	9.2	305
Motor Upgrades			**11,365**	**3.8**	**0.0**	**$1,571.24**	**$45,318.28**	**$0.00**	**$45,318.28**	**28.8**	**11,445**
ECM 5	Install ECM Motors for Heat Pumps	Yes	17,363	6.4	0.0	$2,400.51	$49,126.23	$0.00	$49,126.23	20.5	17,485
Variable Frequency Drive (VFD) Measures			**34,580**	**2.6**	**0.0**	**$4,780.78**	**$12,280.00**	**$2,786.67**	**$9,493.33**	**2.0**	**34,822**
ECM 6	Install VFDs on Cooling Tower Fans	Yes	28,582	0.0	0.0	$3,951.52	$8,472.05	$1,800.00	$6,672.05	1.7	28,782
HVAC System Improvements			**8,871**	**0.0**	**0.0**	**$1,226.49**	**$17,651.96**	**$5,550.00**	**$12,101.96**	**9.9**	**8,934**
ECM 7	Install Occupancy-Controlled Thermostats	Yes	8,871	0.0	0.0	$1,226.49	$17,651.96	$5,550.00	$12,101.96	9.9	8,934
Plug Load Equipment Control - Vending Machine			**1,028**	**0.0**	**0.0**	**$142.06**	**$690.00**	**$0.00**	**$690.00**	**4.9**	**1,035**
ECM 8	Vending Machine Control	Yes	1,028	0.0	0.0	$142.06	$690.00	$0.00	$690.00	4.9	1,035
Custom Measures			**299,746**	**243.4**	**0.0**	**$26,606.13**	**$699,330.00**	**$0.00**	**$699,330.00**	**26.3**	**301,842**
	Roof Mounted PV System Installation	No	289,503	243.0	0.0	$25,190.00	$695,000.00	$0.00	$695,000.00	27.6	291,527
ECM 9	Computer Power Management Software	Yes	4,837	0.0	0.0	$668.75	$2,980.00	$0.00	$2,980.00	4.5	4,871
ECM 10	Replace Refrigerators with Compact Energy Star Equipment	Yes	3,425	0.4	0.0	$473.48	$350.00	$0.00	$350.00	0.7	3,449
ECM 11	Weatherstrip Exterior Doors	Yes	1,981	0.0	0.0	$273.90	$1,000.00	$0.00	$1,000.00	3.7	1,995
TOTALS			**448,892**	**268.5**	**0.0**	**$47,225.67**	**$970,704.74**	**$24,871.67**	**$945,833.07**	**20.0**	**452,030**

* - 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).

TOTALS (Recommended)			**159,389**	**25.5**	**0.0**	**$22,035.67**	**$275,704.74**	**$24,871.67**	**$250,833.07**	**11.4**	**160,503**

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.

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

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 12 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 George L. Catrambone Elementary School include:

- Reduce Air Leakage
- 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
- Install Destratification Fans
- 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 Water Heater Maintenance
- Install Plug Load Controls

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

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 Buildings
- 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 8.4 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 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	gvecchione@longbranch.k12.nj.us	732-600-7979
Peter Genovese III	Business	pgenovese@longbranch.k12.nj.us	
TRC Energy Services			
Aimee Lalonde	Auditor	alalonde@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On March 24, 2017, TRC Energy Services performed an energy audit at George L. Catrambone Elementary School located in Long Branch, NJ. TRC Energy Services' team met with the team to review the facility operations and help focus our investigation on specific energy-using systems.

George L. Catrambone Elementary School is a 108,000 square foot facility. It includes classroom space, office areas, a gymnasium, a cafeteria/auditorium, prep kitchen and a media center. The building opened about 2 years ago and is in good condition. It was built in 2014.

The building is 100% heated and cooled. The energy systems throughout the George L. Catrambone Elementary School are mostly in good condition with the exception of the exterior lighting. Per discussions with facility personnel the ballasts burn out quickly in wall pack and pole mounted area light fixtures. The site is therefore interested in new exterior lighting. The site is also interested in PV system installation, as the majority of other schools in the district already have existing PV systems.

2.3 Building Occupancy

The school is in operation 10 months out of the year and open between 6AM and 6PM, Monday through Friday with little to no use on the weekends. There are about 810 students and 110 staff/visitors who occupy the building. The kitchen warms 2 meals a day for the students. The typical schedule is presented in the table below.

Figure 5 - Building Schedule

Building Occupancy Schedule		
Building Name	**Weekday/Weekend**	**Operating Schedule**
George L. Catrambone Elementary School	Weekday	6:00 AM-6:00 PM
George L. Catrambone Elementary School	Weekend	No Use

2.4 Building Envelope

The building is constructed of concrete masonry units with a brick façade. The building has flat 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

George L. Catrambone Elementary School does not currently 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 some areas have 1L and 3L fixtures. Hallways also have recessed can fixtures with compact fluorescent plug in lamps. The gym and cafeteria/auditorium are 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 175W high pressure sodium lamps. There are also pole mounted area light fixtures in parking lot areas with 400W 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 controlled by occupancy based sensors and controls. There are a few rooms where the existing sensor was noted to be inoperable and a few rooms which are controlled manually via wall switches. The corridor areas are controlled by key switches and some hallways have occupancy sensors. There is an opportunity for energy savings by replacing the faulty sensors, adding some in conference rooms and removing the one in the nurse's office in order to effectively reduce run hours for fixtures. 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 high efficiency. These include primary pumps, water supply pumps, cooling tower fans, RTU and MUA unit supply and exhaust fans, general building exhaust fans and the blowers in each heat pump throughout the building. The primary pump motors, condenser water pump, RTU supply and exhaust fan motors are all driven by VFDs. All equipment appears to be in good condition. However, the triple duty valves at the primary pump motors appear to not be 100% open. Therefore, there may be potential for savings by fully opening them and adjusting the variable frequency drive logic. The cooling tower fan motors are constant speed. Based on the model number of

the heat pumps, they operate with the standard motor. There is an opportunity for energy savings by installing variable frequency drives for the cooling tower fans and replacing the heat pump blower motors with high efficiency ECM motors.

Domestic Hot Water – There are storage tank gas-fired domestic hot water heaters. These are in good condition and of standard efficiency. Once they reach the end of their useful life, we recommend considering the replacement with high efficiency condensing hot water heaters.

HVAC System & Controls – The classrooms and many areas are conditioned by a water source heat pumps. This loop is supplied by high efficiency gas-fired condensing hot water boilers in the heating season and heat is rejected from the loop by a cooling tower in the cooling season. There is also roof top equipment and make-up air units which are fit with heat wheels and in good condition. The hallways have cabinet unit electric heaters. 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 heat pumps have manual dial thermostat/temperature sensors and humidity sensors. There are a number of rooms which were unoccupied and overheated at the time of the energy audit. This provides an opportunity for energy

savings by integrating occupancy sensors in the space. The air handling systems area equipped with CO2 sensors and the amount of outdoor air controlled appropriately.








Plug Load Equipment – There is general office and café equipment throughout the building. There are also gas-fired and electric meal prep equipment, a dishwasher and a number of refrigeration equipment in the kitchen. The cooking equipment includes a stove and insulating holding cabinets. The building has an elevator as well. There are vending machines in the building that are 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 therefore are not recommended 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

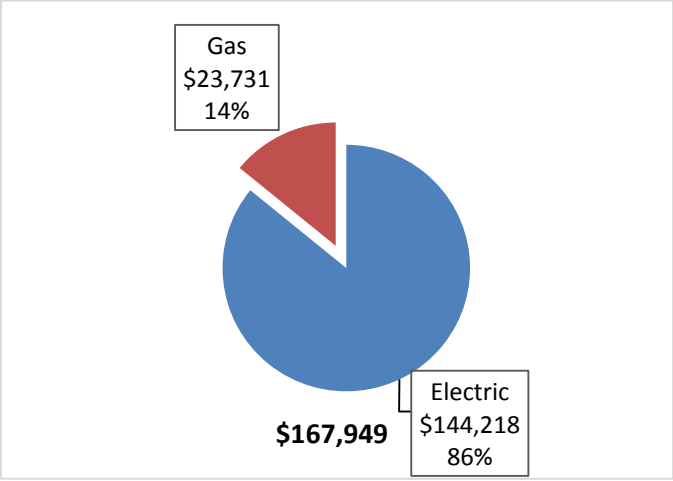
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for George L. Catrambone Elementary School		
Fuel	**Usage**	**Cost**
Electricity	1,043,160 kWh	$144,218
Natural Gas	25,359 Therms	$23,731
Total		**$167,949**

The current annual energy cost for this facility is $167,949 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 $0.138/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 building pays electrical demand costs. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Graph of 12 Months Electric Usage & Demand

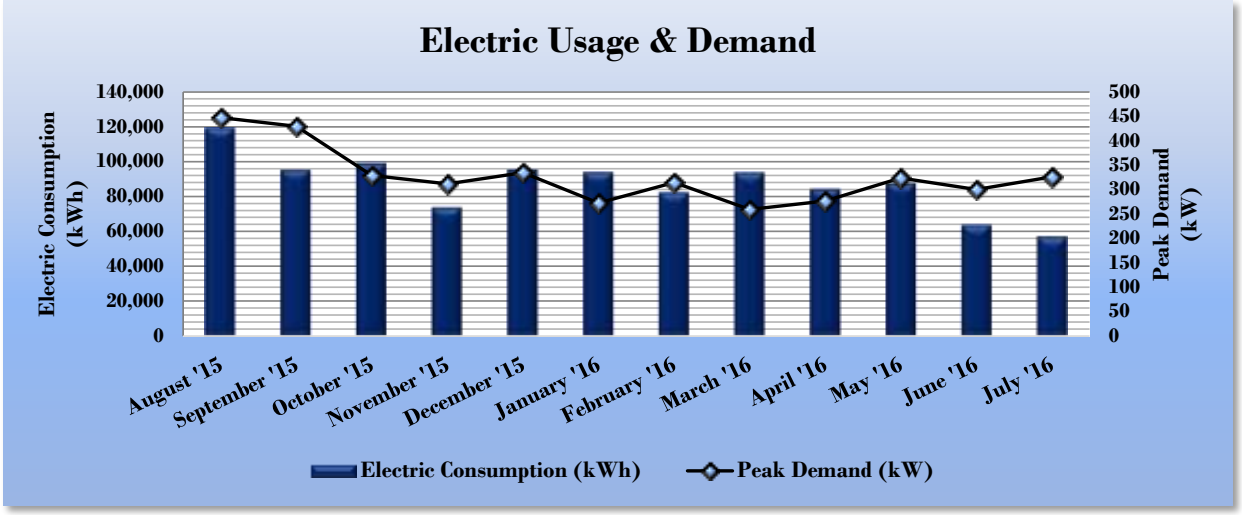


Figure 9 - Table of 12 Months Electric Usage & Demand

Electric Billing Data for George L. Catrambone Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/2/15	33	119,040	447	$2,688	$16,525
10/2/15	30	95,040	430	$2,411	$13,177
11/3/15	32	98,840	329	$1,845	$13,156
12/4/15	31	73,600	312	$1,749	$10,129
1/5/16	32	95,160	335	$1,877	$12,810
2/2/16	28	93,760	272	$1,527	$12,189
3/2/16	29	82,080	315	$1,765	$11,247
3/31/16	29	93,600	259	$1,455	$12,260
4/29/16	29	84,000	277	$1,552	$11,255
5/31/16	32	87,360	323	$1,944	$12,211
7/1/16	31	63,640	300	$1,802	$9,403
7/30/16	29	57,040	326	$1,960	$9,855
Totals	**365**	**1,043,160**	**447.3**	**$22,575**	**$144,218**
Annual	**365**	**1,043,160**	**447.3**	**$22,575**	**$144,218**

3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $0.936/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

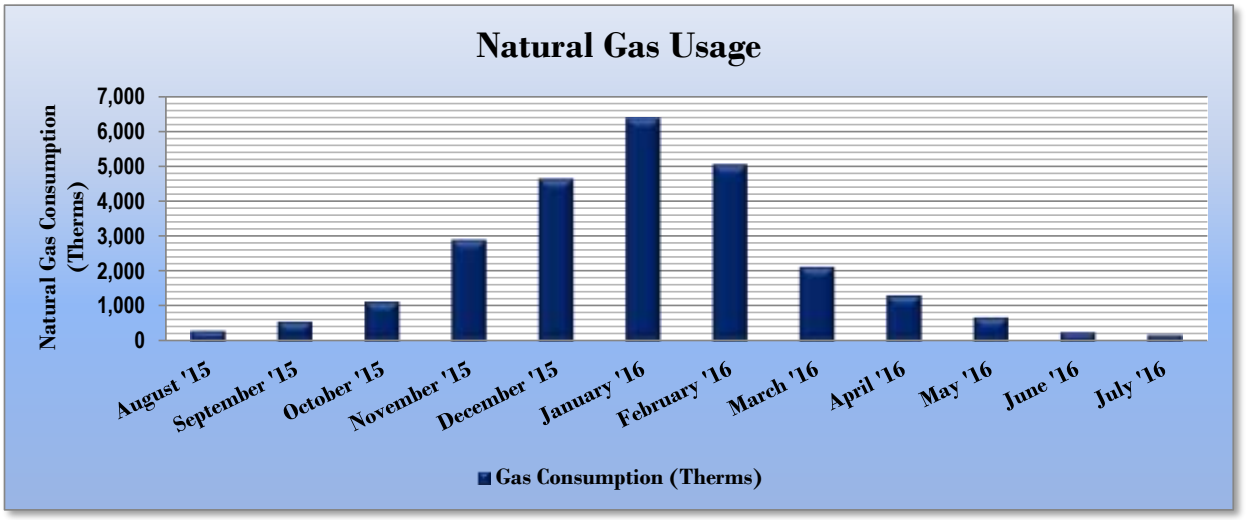


Figure 11 - Table of 12 Months Natural Gas Usage

Gas Billing Data for George L. Catrambone Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
9/10/15	30	291	$647
10/8/15	28	560	$840
11/9/15	32	1,134	$1,254
12/10/15	31	2,898	$2,571
1/12/16	33	4,640	$3,914
2/12/16	31	6,374	$5,122
3/15/16	32	5,051	$4,064
4/11/16	27	2,122	$1,930
5/11/16	30	1,312	$1,382
6/13/16	33	685	$936
7/14/16	31	251	$628
8/12/16	29	179	$572
Totals	**367**	**25,498**	**$23,861**
Annual	**365**	**25,359**	**$23,731**

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		
	George L. Catrambone Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	128.1	141.4
Site Energy Use Intensity (kBtu/ft^2)	56.4	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		
	George L. Catrambone Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	83.6	141.4
Site Energy Use Intensity (kBtu/ft^2)	42.3	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 79.

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

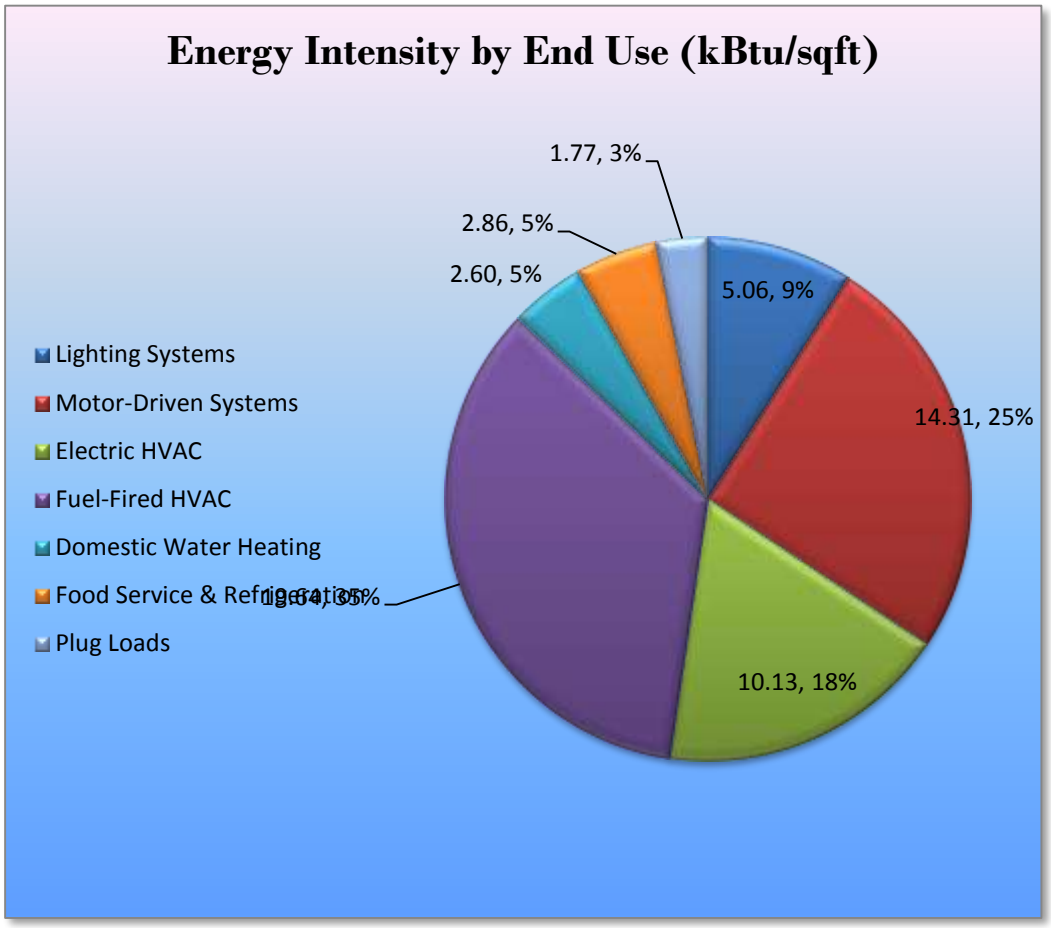
For more information on Energy Star certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	*Annual Natural Gas 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		**92,998**	**18.7**	**0.0**	**$12,857.07**	**$194,950.49**	**$16,455.00**	**$178,495.49**	**13.9**	**93,648**
ECM 1	Install LED Fixtures	46,368	4.8	0.0	$6,410.47	$112,684.96	$9,500.00	$103,184.96	16.1	46,692
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	44,170	13.1	0.0	$6,106.53	$77,159.00	$6,805.00	$70,354.00	11.5	44,479
ECM 3	Retrofit Fixtures with LED Lamps	2,460	0.9	0.0	$340.08	$5,106.54	$150.00	$4,956.54	14.6	2,477
Lighting Control Measures		**303**	**0.0**	**0.0**	**$41.89**	**$484.00**	**$80.00**	**$404.00**	**9.6**	**305**
ECM 4	Lighting Control Upgrades	303	0.0	0.0	$41.89	$464.00	$80.00	$384.00	9.2	305
Motor Upgrades		**11,365**	**3.8**	**0.0**	**$1,571.24**	**$45,318.28**	**$0.00**	**$45,318.28**	**28.8**	**11,445**
ECM 5	Install ECM Motors for Heat Pumps	17,363	6.4	0.0	$2,400.51	$49,126.23	$0.00	$49,126.23	20.5	17,485
Variable Frequency Drive (VFD) Measures		**34,580**	**2.6**	**0.0**	**$4,780.78**	**$12,280.00**	**$2,786.67**	**$9,493.33**	**2.0**	**34,822**
ECM 6	Install VFDs on Cooling Tower Fans	28,582	0.0	0.0	$3,951.52	$8,472.05	$1,800.00	$6,672.05	1.7	28,782
HVAC System Improvements		**8,871**	**0.0**	**0.0**	**$1,226.49**	**$17,651.96**	**$5,550.00**	**$12,101.96**	**9.9**	**8,934**
ECM 7	Install Occupancy-Controlled Thermostats	8,871	0.0	0.0	$1,226.49	$17,651.96	$5,550.00	$12,101.96	9.9	8,934
Plug Load Equipment Control - Vending Machine		**1,028**	**0.0**	**0.0**	**$142.06**	**$690.00**	**$0.00**	**$690.00**	**4.9**	**1,035**
ECM 8	Vending Machine Control	1,028	0.0	0.0	$142.06	$690.00	$0.00	$690.00	4.9	1,035
Custom Measures		**10,243**	**0.4**	**0.0**	**$1,416.13**	**$4,330.00**	**$0.00**	**$4,330.00**	**3.1**	**10,315**
	Roof Mounted PV System Installation	289,503	243.0	0.0	$25,190.00	$695,000.00	$0.00	$695,000.00	27.6	291,527
ECM 9	Computer Power Management Software	4,837	0.0	0.0	$668.75	$2,980.00	$0.00	$2,980.00	4.5	4,871
ECM 10	Replace Refrigerators with Compact Energy Star Equipment	3,425	0.4	0.0	$473.48	$350.00	$0.00	$350.00	0.7	3,449
ECM 11	Weatherstrip Exterior Doors	1,981	0.0	0.0	$273.90	$1,000.00	$0.00	$1,000.00	3.7	1,995
TOTALS		**159,389**	**25.5**	**0.0**	**$22,035.67**	**$275,704.74**	**$24,871.67**	**$250,833.07**	**11.4**	**160,503**

* - 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		**92,998**	**18.7**	**0.0**	**$12,857.07**	**$194,950.49**	**$16,455.00**	**$178,495.49**	**13.9**	**93,648**
ECM 1	Install LED Fixtures	46,368	4.8	0.0	$6,410.47	$112,684.96	$9,500.00	$103,184.96	16.1	46,692
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	44,170	13.1	0.0	$6,106.53	$77,159.00	$6,805.00	$70,354.00	11.5	44,479
ECM 3	Retrofit Fixtures with LED Lamps	2,460	0.9	0.0	$340.08	$5,106.54	$150.00	$4,956.54	14.6	2,477

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	22,068	4.8	0.0	$3,050.97	$96,667.20	$5,400.00	$91,267.20	29.9	22,223
Exterior	24,300	0.0	0.0	$3,359.50	$16,017.76	$4,100.00	$11,917.76	3.5	24,470

Measure Description

We recommend replacing the compact fluorescent lamp high bay fixtures 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 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 fixtures one-for-one with new LED wall pack 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	43,642	13.1	0.0	$6,033.53	$76,691.00	$6,765.00	$69,926.00	11.6	43,947
Exterior	528	0.0	0.0	$73.00	$468.00	$40.00	$428.00	5.9	532

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	2,100	0.9	0.0	$290.31	$4,569.01	$150.00	$4,419.01	15.2	2,115
Exterior	360	0.0	0.0	$49.77	$537.53	$0.00	$537.53	10.8	363

Measure Description

We recommend retrofitting existing incandescent and compact fluorescent technologies with LED lamps. Existing fixtures in the interior and exterior applications are included within this measure. 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 and more than 10 times longer than many incandescent 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		**303**	**0.0**	**0.0**	**$41.89**	**$464.00**	**$80.00**	**$384.00**	**9.2**	**305**
ECM 4	Install Occupancy Sensor Lighting Controls	303	0.0	0.0	$41.89	$464.00	$80.00	$384.00	9.2	305

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)
303	0.0	0.0	$41.89	$464.00	$80.00	$384.00	9.2	305

Measure Description

We recommend replacing the faulty occupancy sensors (storage room and restroom). Many times sensors fail in the 'On' mode and contribute to excessive energy use when unneeded. We recommend installing wall mounted occupancy based sensors in the conference rooms. We also recommend removing the existing sensor in the Nurse's Room. Using a manual wall switch will allow for the lights to be off majority of the time. As it is now, harsh lighting bothers the sick kids and wastes energy.

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: Install ECM Motors for Heat Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
17,363	6.4	0.0	$2,400.51	$49,126.23	$0.00	$49,126.23	20.5	17,485

Measure Description

We recommend replacing standard efficiency motors with high efficiency ECM motors in the heat pumps throughout the building. 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 ECM motors in the market today which have capabilities to vary in speed to meet the needs of the space with less energy consumption. Savings are based on the difference between baseline and proposed efficiencies, variable speed impacts 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		**28,582**	**0.0**	**0.0**	**$3,951.52**	**$8,472.05**	**$1,800.00**	**$6,672.05**	**1.7**	**28,782**
ECM 6	Install VFDs on Cooling Tower Fans	28,582	0.0	0.0	$3,951.52	$8,472.05	$1,800.00	$6,672.05	1.7	28,782

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

ECM 6: Install VFDs on Cooling Tower Fans

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
28,582	0.0	0.0	$3,951.52	$8,472.05	$1,800.00	$6,672.05	1.7	28,782

Measure Description

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

4.1.5 HVAC System Upgrades

Our recommendation for HVAC system improvement are summarized in Figure 19 below.

Figure 19 - Summary of HVAC System Improvement ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**8,871**	**0.0**	**0.0**	**$1,226.49**	**$17,651.96**	**$5,550.00**	**$12,101.96**	**9.9**	**8,934**
ECM 7	Install Occupancy-Controlled Thermostats	8,871	0.0	0.0	$1,226.49	$17,651.96	$5,550.00	$12,101.96	9.9	8,934

ECM 7: Install Occupancy-Controlled Thermostats

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)
8,871	0.0	0.0	$1,226.49	$17,651.96	$5,550.00	$12,101.96	9.9	8,934

Measure Description

We recommend replacing manual thermostats with occupancy-based thermostats in the spaces served by the heat pumps. This will allow for the automatic adjustment to the setback temperature when the space is unoccupied for a period of time. Many times occupants manually adjust the temperature set points and forget to change it back once they leave the space. Many types of facilities use manually controlled thermostats set by occupants to regulate temperature within the facility, or in certain areas.

An occupancy controlled-thermostat is a thermostat paired with a sensor and/or door detector to identify movement and determine if a room is occupied or unoccupied. If occupancy is sensed by the sensor, the thermostat goes into an occupied mode and enables programmed temperature set point. If no occupancy is sensed, the thermostat switches to unoccupied mode after a set period of time. By reducing heating temperature set points and increasing cooling temperature set points, when the space is occupied, the operation of the HVAC equipment is reduced while still maintaining reasonable space temperatures for building usage at all times. Occupancy controlled thermostats are most often used in residence facilities such as hotels and dormitories to conserve energy.

Occupancy controlled thermostats provide energy savings by reducing heating and cooling energy usage when rooms are unoccupied.

4.1.6 Plug Load Equipment Control - Vending Machines

ECM 8: 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)
1,028	0.0	0.0	$142.06	$690.00	$0.00	$690.00	4.9	1,035

Measure Description

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

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

4.1.7 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 20 below.

Figure 20 - Summary of Custom ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**10,243**	**0.4**	**$1,416.13**	**$4,330.00**	**$0.00**	**$4,330.00**	**3.1**	**10,315**
	Roof Mounted PV System Installation	289,503	243.0	$25,190.00	$695,000.00	$0.00	$695,000.00	27.6	291,527
ECM 9	Computer Power Management Software	4,837	0.0	$668.75	$2,980.00	$0.00	$2,980.00	4.5	4,871
ECM 10	Replace Refrigerators with Compact Energy Star Equipment	3,425	0.4	$473.48	$350.00	$0.00	$350.00	0.7	3,449
ECM 11	Weatherstrip Exterior Doors	1,981	0.0	$273.90	$1,000.00	$0.00	$1,000.00	3.7	1,995

Roof Mounted PV System Installation

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)
289,503	243.0	0.0	$25,190.00	$695,000.00	$0.00	$695,000.00	27.6	291,527

Measure Description

TRC Energy Services evaluated the potential for installing on-Site generation for George L. Catrambone Elementary School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

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

This measure is not recommended based on the economic results.

ECM 9: 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)
4,837	0.0	0.0	$668.75	$2,980.00	$0.00	$2,980.00	4.5	4,871

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 overnight, 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 10: Replace Refrigerators with Compact 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)
3,425	0.4	0.0	$473.48	$350.00	$0.00	$350.00	0.7	3,449

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 11: 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)
1,981	0.0	0.0	$273.90	$1,000.00	$0.00	$1,000.00	3.7	1,995

Measure Description

We recommend weather-stripping the three (3) main entrance double doors and the other two (2) double doors on the other end of the building hallway. These were all noted to have worn 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.

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.

Install Destratification Fans

Allowing air to thermally stratify in spaces with high ceilings results in additional energy consumption by requiring the heating system to heat a volume of space much larger than the actual occupied space. Additional inefficiencies also occur because there are higher temperatures at the ceiling level than at the floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, requiring additional energy consumption by the heating equipment in order to compensate for the accelerated heat transfer.

Destratification fans are specially designed to deliver a columnar, laminar flow of air balancing the air temperature from floor to ceiling. In addition to fuel savings, the use of destratification fans will reduce the recovery time necessary to warm the space after nightly temperature setbacks and will increase the comfort level of the occupants.

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 Water Heater Maintenance

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

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "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 and our recommendation for consideration is below. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

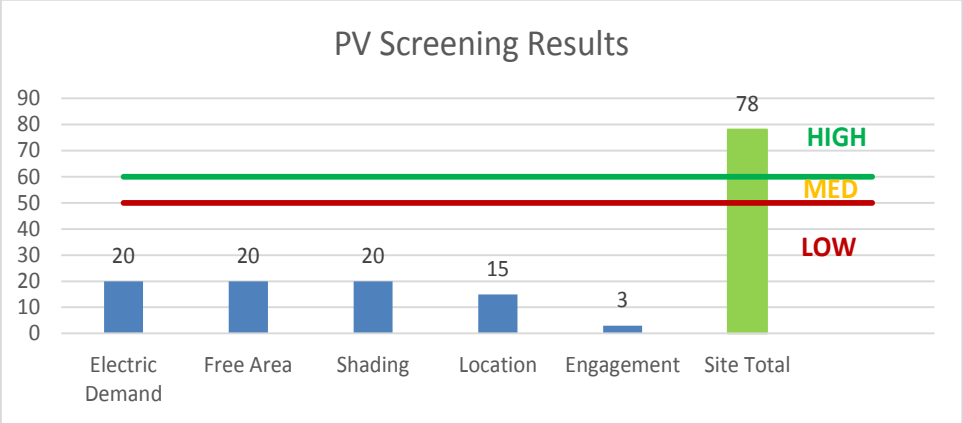
6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential for PV at the site. A PV array located on the roof of the main building may be feasible. If George L. Catrambone Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 21 - Photovoltaic Screening



Potential	High	
System Potential	243	kW DC STC
Electric Generation	289,503	kWh/yr
Displaced Cost	$25,190	/yr
Installed Cost	$695,000	

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. Refer to Section 8.3 for additional information.

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

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

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

Figure 22 - 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	Lighting Control Upgrades	x			x		
ECM 5	Install ECM Motors for Heat Pumps				x		
ECM 6	Install VFDs on Cooling Tower Fans	x			x		
ECM 7	Install Occupancy-Controlled Thermostats				x		
ECM 8	Vending Machine Control				x		
ECM 9	Computer Power Management Software				x		
ECM 10	Replace Refrigerators with Compact Energy Star Equipment				x		
ECM 11	Weatherstrip 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 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

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

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

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

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

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

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

8.5 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
Boiler Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp & Reballast	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.22	193	0.0	$26.69	$1,521.00	$130.00	52.12
Main Office 161	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.11	411	0.0	$56.85	$702.00	$60.00	11.29
Office 164	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Office 165	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Copy Room 165	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	500	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	500	0.04	38	0.0	$5.25	$234.00	$20.00	40.79
Office 162	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,806	0.06	206	0.0	$28.43	$263.00	$30.00	8.20
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,580	Relamp & Reballast	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,806	0.01	65	0.0	$8.96	$214.00	$25.00	21.09
Back Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,580	Relamp & Reballast	No	7	LED - Linear Tubes: (2) 4' Lamps	None	29	2,580	0.13	685	0.0	$94.75	$819.00	$70.00	7.90
Office 166	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Office 167	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Office 168	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Office 169	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Office 170	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Conference Room 171	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.10	495	0.0	$68.42	$584.00	$60.00	7.66
Conference Room 172	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.10	495	0.0	$68.42	$584.00	$60.00	7.66
Men's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.02	69	0.0	$9.48	$117.00	$10.00	11.29
Women's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.02	69	0.0	$9.48	$117.00	$10.00	11.29
Mechanical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Vestibule	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,580	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	None	29	2,580	0.06	294	0.0	$40.61	$351.00	$30.00	7.90
Lobby	16	Compact Fluorescent: <Enter Fixture Description>	None	23	2,580	Relamp	No	16	LED Screw-In Lamps: Vertical Plug In Lamp	None	9	2,580	0.13	665	0.0	$91.88	$860.05	$0.00	9.36
Lobby	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,580	Relamp & Reballast	No	24	LED - Linear Tubes: (1) 4' Lamp	None	15	2,580	0.24	1,246	0.0	$172.28	$2,352.00	$120.00	12.96
Restroom Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,580	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	None	29	2,580	0.04	196	0.0	$27.07	$234.00	$20.00	7.90
Girl's Restroom	2	Compact Fluorescent: <Enter Fixture Description>	None	23	2,580	Relamp	No	2	LED Screw-In Lamps: Vertical Plug In Lamp	None	9	2,580	0.02	83	0.0	$11.49	$107.51	$0.00	9.36
Girl's Restroom	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,580	Relamp & Reballast	No	7	LED - Linear Tubes: (1) 4' Lamp	None	15	2,580	0.07	363	0.0	$50.25	$686.00	$35.00	12.96
Boy's Restroom	2	Compact Fluorescent: <Enter Fixture Description>	None	23	2,580	Relamp	No	2	LED Screw-In Lamps: Vertical Plug In Lamp	None	9	2,580	0.02	83	0.0	$11.49	$107.51	$0.00	9.36

	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
Boy's Restroom	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	2,580	Relamp & Reballast	No	7	LED - Linear Tubes: (1) 4' Lamp	None	15	2,580	0.07	363	0.0	$50.25	$686.00	$35.00	12.96
Gym	16	Compact Fluorescent: <Enter Fixture Description>	Wall Switch	336	2,580	Fixture Replacement	No	16	LED - Fixtures: High-Bay	Wall Switch	72	2,580	2.44	12,533	0.0	$1,732.65	$42,963.20	$2,400.00	23.41
Storage Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,580	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.12	619	0.0	$85.52	$701.00	$70.00	7.38
Office 177	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,580	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	None	29	2,580	0.04	196	0.0	$27.07	$234.00	$20.00	7.90
Hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.34	1,234	0.0	$170.56	$2,106.00	$180.00	11.29
Music Classroom 158	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 157	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.27	960	0.0	$132.66	$1,638.00	$140.00	11.29
Mechanical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	250	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	250	0.02	9	0.0	$1.31	$117.00	$10.00	81.58
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.02	69	0.0	$9.48	$117.00	$10.00	11.29
Girl's Restroom	1	Compact Fluorescent: <Enter Fixture Description>	Occupancy Sensor	23	1,806	Relamp	No	1	LED Screw-In Lamps: Vertical Plug In Lamp	Occupancy Sensor	9	1,806	0.01	29	0.0	$4.02	$53.75	$0.00	13.37
Girl's Restroom	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,806	Relamp & Reballast	No	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,806	0.07	254	0.0	$35.17	$686.00	$35.00	18.51
Boy's Restroom	1	Compact Fluorescent: <Enter Fixture Description>	Occupancy Sensor	23	1,806	Relamp	No	1	LED Screw-In Lamps: Vertical Plug In Lamp	Occupancy Sensor	9	1,806	0.01	29	0.0	$4.02	$53.75	$0.00	13.37
Boy's Restroom	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,806	Relamp & Reballast	No	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,806	0.07	254	0.0	$35.17	$686.00	$35.00	18.51
Women's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,806	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,806	0.01	36	0.0	$5.02	$98.00	$5.00	18.51
Men's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,806	Relamp & Reballast	No	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,806	0.01	36	0.0	$5.02	$98.00	$5.00	18.51
Electrical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	250	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	250	0.06	28	0.0	$3.93	$263.00	$30.00	59.21
Classroom Entryways	2	Compact Fluorescent: <Enter Fixture Description>	Wall Switch	23	2,580	Relamp	No	2	LED Screw-In Lamps: Vertical Plug In Lamp	Wall Switch	9	2,580	0.02	83	0.0	$11.49	$107.51	$0.00	9.36
Cafeteria / Aud	20	Compact Fluorescent: <Enter Fixture Description>	Wall Switch	336	2,580	Fixture Replacement	No	20	LED - Fixtures: High-Bay	Wall Switch	72	2,580	3.05	15,666	0.0	$2,165.81	$53,704.00	$3,000.00	23.41
Kitchen	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,806	Relamp & Reballast	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,806	0.46	1,645	0.0	$227.41	$2,104.00	$240.00	8.20
Storage Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	250	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	250	0.08	38	0.0	$5.25	$468.00	$40.00	81.58
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	2,580	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	2,580	0.02	98	0.0	$13.54	$117.00	$10.00	7.90
Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,580	0.02	98	0.0	$13.54	$117.00	$10.00	7.90
Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,580	0.04	196	0.0	$27.07	$234.00	$20.00	7.90
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	250	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	250	0.04	19	0.0	$2.62	$234.00	$20.00	81.58
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	800	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	800	0.02	30	0.0	$4.20	$117.00	$10.00	25.49

	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
Stage	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.23	455	0.0	$62.96	$1,404.00	$120.00	20.39
Stage	8	Compact Fluorescent: <Enter Fixture Description>	Wall Switch	26	250	Relamp	No	8	LED Screw-In Lamps: Horizontal Plug In Lamps	Wall Switch	7	250	0.09	44	0.0	$6.04	$860.05	$0.00	142.35
Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,580	0.04	196	0.0	$27.07	$234.00	$20.00	7.90
Dressing Room 148	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,580	0.08	392	0.0	$54.15	$468.00	$40.00	7.90
Dressing Room 148	30	Incandescent: <Enter Fixture Description>	Wall Switch	40	1,000	Relamp	No	30	LED Screw-In Lamps: Globe Lamps	Wall Switch	4	1,000	0.62	1,242	0.0	$171.71	$1,612.59	$150.00	8.52
Hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.27	960	0.0	$132.66	$1,638.00	$140.00	11.29
Electric Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	250	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	250	0.04	19	0.0	$2.62	$234.00	$20.00	81.58
Mechanical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.04	137	0.0	$18.95	$234.00	$20.00	11.29
Classroom Cove Lights	27	LED - Fixtures: Cove Mount	Wall Switch	14	2,580	None	No	27	LED - Fixtures: Cove Mount	Wall Switch	14	2,580	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classroom Restrooms	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.32	1,165	0.0	$161.08	$1,989.00	$170.00	11.29
Classroom Storage	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	200	Relamp & Reballast	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	200	0.17	68	0.0	$9.44	$1,053.00	$90.00	101.97
Classroom 145	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.21	754	0.0	$104.23	$1,287.00	$110.00	11.29
Classroom 143	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 140	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 141	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 136	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 137	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 138	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 139	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Classroom 131	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.23	822	0.0	$113.70	$1,404.00	$120.00	11.29
Server Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	250	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	250	0.08	38	0.0	$5.25	$468.00	$40.00	81.58
Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,806	0.29	1,028	0.0	$142.13	$1,755.00	$150.00	11.29
Hallway	3	Compact Fluorescent: <Enter Fixture Description>	Occupancy Sensor	23	1,806	Relamp	No	3	LED Screw-In Lamps: <Enter Fixture Description>	Occupancy Sensor	9	1,806	0.02	87	0.0	$12.06	$161.26	$0.00	13.37
Café Room 130	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,580	0.10	534	0.0	$73.83	$428.00	$40.00	5.26
Teacher's Room 128	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.16	561	0.0	$77.53	$642.00	$60.00	7.51

	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
Teacher's Room 126	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.16	561	0.0	$77.53	$642.00	$60.00	7.51
Mechanical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	250	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	250	0.05	26	0.0	$3.58	$214.00	$20.00	54.23
Stairwells	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	15	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,580	0.39	2,003	0.0	$276.88	$1,605.00	$150.00	5.26
Library	63	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,580	Relamp & Reballast	No	63	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,580	1.64	8,411	0.0	$1,162.89	$6,741.00	$630.00	5.26
Storage Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	250	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	250	0.08	39	0.0	$5.37	$321.00	$30.00	54.23
Hallway	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.31	1,122	0.0	$155.05	$1,284.00	$120.00	7.51
Teacher's Room 200	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	5	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.13	467	0.0	$64.61	$535.00	$50.00	7.51
Classroom 201	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 202	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 203	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 204	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.31	1,122	0.0	$155.05	$1,284.00	$120.00	7.51
Classroom 205	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 206	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.31	1,122	0.0	$155.05	$1,284.00	$120.00	7.51
Classroom 207	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 208	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.31	1,122	0.0	$155.05	$1,284.00	$120.00	7.51
Classroom 209	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	7	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.18	654	0.0	$90.45	$749.00	$70.00	7.51
Classroom 210	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Hallway	6	Compact Fluorescent: <Enter Fixture Description>	None	26	2,580	Relamp	No	6	LED Screw-In Lamps: Horizontal Plug In Lamps	None	7	2,580	0.07	338	0.0	$46.76	$645.04	$0.00	13.79
Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.10	374	0.0	$51.68	$428.00	$40.00	7.51
Classroom Storage	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	250	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	250	0.26	129	0.0	$17.89	$1,070.00	$100.00	54.23
Classroom Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.03	93	0.0	$12.92	$107.00	$10.00	7.51
Classroom 218	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 219	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 220	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Classroom 221	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51

	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 222	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,806	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,806	0.26	935	0.0	$129.21	$1,070.00	$100.00	7.51
Meeting Room 102	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None	93	2,580	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 2' Lamps	None	26	2,580	0.23	1,202	0.0	$166.13	$711.00	$90.00	3.74
Nurse's Office 100	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	None	93	2,580	Relamp & Reballast	Yes	6	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	2,580	0.23	1,202	0.0	$166.13	$731.00	$90.00	3.86
Exam Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,806	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,806	0.08	280	0.0	$38.76	$237.00	$30.00	5.34
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	250	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	250	0.08	39	0.0	$5.37	$237.00	$30.00	38.58
Transition Areas	25	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	25	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Entrance	22	Compact Fluorescent: <Enter Fixture Description>	None	52	4,000	None	No	22	Compact Fluorescent: <Enter Fixture Description>	None	52	4,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Main Entrance	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	4,000	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	None	29	4,000	0.08	607	0.0	$83.95	$468.00	$40.00	5.10
Main Entrance	5	Compact Fluorescent: <Enter Fixture Description>	None	36	4,000	Relamp	No	5	LED Screw-In Lamps: Horizontal Plug In Lamps	None	18	4,000	0.05	414	0.0	$57.24	$537.53	$0.00	9.39
Exterior	10	High-Pressure Sodium: (1) 175W Lamp	None	225	4,000	Fixture Replacement	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	100	4,000	0.72	5,750	0.0	$794.94	$3,906.77	$1,000.00	3.66
Exterior	8	High-Pressure Sodium: (1) 175W Lamp	None	225	4,000	Fixture Replacement	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	100	4,000	0.58	4,600	0.0	$635.96	$3,125.42	$800.00	3.66
Exterior	3	High-Pressure Sodium: (1) 400W Lamp	None	465	4,000	Fixture Replacement	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	190	4,000	0.48	3,795	0.0	$524.66	$1,172.03	$300.00	1.66
Exterior	14	High-Pressure Sodium: (1) 175W Lamp	None	225	4,000	Fixture Replacement	No	14	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	75	4,000	1.21	9,660	0.0	$1,335.51	$5,469.48	$1,400.00	3.05
Exterior	6	High-Pressure Sodium: (1) 175W Lamp	None	225	4,000	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	75	4,000	0.52	4,140	0.0	$572.36	$2,344.06	$600.00	3.05

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
Mechanical Room	Hot Water System	2	Heating Hot Water Pump	40.0	94.1%	Yes	3,254	No	94.1%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Domestic Hot Water	2	Water Supply Pump	0.2	60.0%	No	2,196	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Domestic Cold Water	2	Water Supply Pump	7.5	87.5%	No	1,290	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Outside	Cooling Tower Fan	2	Cooling Tower Fan	15.0	92.4%	No	2,713	No	92.4%	Yes	1	0.00	28,582	0.0	$3,951.52	$8,472.05	$1,800.00	1.69
Outside	Make up Water Pump	1	Water Supply Pump	5.0	87.5%	No	2,196	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Room	Condenser Pump	1	Condenser Water Pump	5.0	87.5%	Yes	2,196	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Heat Pumps	Fans	74	Supply Fan	0.2	40.0%	No	2,196	Yes	60.0%	Yes	1	6.41	17,363	0.0	$2,400.51	$49,126.23	$986.67	20.05
Roof	Roof Top Units	9	Supply Fan	3.0	89.5%	Yes	2,196	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	2	Supply Fan	2.0	86.5%	Yes	2,196	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	1	Supply Fan	1.0	85.5%	Yes	2,196	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	1	Supply Fan	7.5	91.7%	Yes	2,713	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Make up Air Units	3	Supply Fan	15.0	92.4%	No	2,713	No	92.4%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Make up Air Units	2	Supply Fan	2.0	86.5%	No	2,196	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Make up Air Units	2	Supply Fan	1.0	85.5%	No	2,196	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	9	Exhaust Fan	1.0	85.5%	Yes	2,196	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	2	Exhaust Fan	0.8	60.0%	Yes	2,196	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	1	Exhaust Fan	0.5	60.0%	Yes	2,196	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Roof Top Units	1	Exhaust Fan	2.0	86.5%	Yes	2,196	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Make up Air Units	3	Exhaust Fan	3.0	89.5%	No	2,196	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Make up Air Units	2	Exhaust Fan	0.8	60.0%	No	2,196	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Make up Air Units	2	Exhaust Fan	0.5	60.0%	No	2,196	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust Fans	9	Exhaust Fan	0.3	60.0%	No	2,196	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Elevator	Elevator	1	Other	20.0	93.0%	No	108	No	93.0%	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
Mechanical Rooms	Heat Pumps	74	Water Source HP	0.75	18.30	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Outside	Condensing Units for IT Rooms	4	Split-System AC	1.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-1	1	Packaged AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-2	1	Packaged AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-3	1	Packaged AC	11.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-4	1	Packaged AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-5	1	Packaged AC	11.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-6	1	Packaged AC	11.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-7	1	Packaged AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-8	1	Packaged AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-9	1	Packaged AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-10	1	Packaged AC	7.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-11	1	Packaged AC	6.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-12	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	RTU-13	1	Packaged AC	25.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MUA-1	1	Packaged AC	25.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MUA-2	1	Packaged AC	25.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MUA-3	1	Packaged AC	25.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MUA-4	1	Packaged AC	7.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	MUA-5	1	Packaged AC	7.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MUA-6	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	MUA-7	1	Packaged AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	KMAU-1	1	Packaged AC	15.00		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
Mechanical Room	Hydronic Heating	2	Condensing Hot Water Boiler	1,999.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Occupancy Controlled Thermostat Recommendations

		Recommendation Inputs						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	Thermostat Quantity	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Cooling Setpoint Temp (deg F)	Heating Setpoint Temp (deg F)	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
Individual Rooms	Heat Pumps	74	55.50	1,354.20	1,354.20	74	68	0.00	8,871	0.0	$1,226.49	$17,651.96	$5,550.00	9.87

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
Mechanical Room	Domestic Hot Water	2	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Reach-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 Energy Efficient Doors?	Install Door Heater Control?	Install Aluminum Night Covers?	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	Cooler (35F to 55F)	No	No	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

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
Various	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
Various	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
Kitchen	1	Refrigerator Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Rack Oven (Single)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	4	Insulated Food Holding Cabinet (3/4 Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Door Type (High Temp)	Natural Gas	N/A	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Various	23	Computers	120.0	
Various	20	Printers	250.0	
Classrooms	5	Projectors	350.0	
Various	3	Large Scanner	1,500.0	
Server Room	1	IT Equipment	75,000.0	
Various	3	Microwave	1,500.0	
Various	2	TV	120.0	
Various	1	Coffee Maker	1,100.0	
Various	3	Mini Fridge	260.0	
Gym & Aud	12	Large Speakers	700.0	
Music Room	8	Small Speakers	250.0	
Library	8	Medium Speakers	500.0	
Computer Lab	26	Computers	120.0	

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
Teacher's Room	1	Non-Refrigerated	Yes	0.00	343	0.0	$47.35	$230.00	$0.00	4.86
Teacher's Room	2	Non-Refrigerated	Yes	0.00	685	0.0	$94.71	$460.00	$0.00	4.86

Custom Measures

Computer Power Management Software

# of Desktops	Normal Running Mode					Idle Running Mode					Suspended/Off Mode				
32	*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**	0.05	0.2	0.10	80	**23**	0.05	1	0.85	5	**87**
Proposed Conditions	85%	5%	0%	120	**38**	0.05	0	0.00	80	**2**	0.1	1	1	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	398	90%	4,837	$669	$15.00	$2,500.0	$2,980	4.46
43	230							

Replace Refrigerators with Compact Energy Star Equipment

Existing Conditions					Proposed Conditions					Energy Impact & Financial Analysis					
Qty	*Volume per Unit (cu. ft.)*	*Total kW*	*Total Annual kWh*	% Empty as Noted on Site	Qty	Description	Volume per Unit (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)
3	18	0.5	4,205	90%	3	Replace	7	0.09	780	0.4	3,425	$473	$350.00	$1,050	2.22

Weather-Strip Exterior Doors

# of Doors: 4

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 (kWh)	Cooling Season Energy Savings (kWh)	Total Energy Savings (kWh)	Total Annual kWh Savings	Total Annual Energy Cost Savings	*Cost per Door*	Total Installation Cost	Simple Payback Period (Years)
55	69	78.0	72	54,600	0.4	5,504	2,359	800	1,000	1,290	691	1,981	1,981	$274	$250.00	$1,000	3.65

Appendix B: EPA Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

George L Catrambone Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 108,000
Built: 2014

For Year Ending: July 31, 2016
Date Generated: May 02, 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
George L Catrambone Elementary School 240 Park Avenue 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: 5242086

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
57.5 kBtu/ft²

Source EUI
130.9 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	2,572,021 (41%)
Electric - Grid (kBtu)	3,640,977 (59%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	77.5
National Median Source EUI (kBtu/ft²)	176.2
% Diff from National Median Source EUI	-26%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	554

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

Ann Degnan
540 Broadway
Long Branch, NJ 07740
732-571-2868 x 40710
adegnan@longbranch.k12.nj.us

Professional Engineer Stamp (if applicable)

ENERGY STAR® Scorecard

LEARN MORE AT energystar.gov

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ENERGY STAR® Score

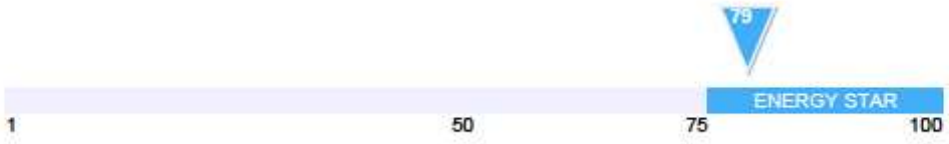
George L Catrambone Elementary School

Primary Function: K-12 School
Gross Floor Area (ft²): 108,000
Built: 2014

For Year Ending: July 31, 2016
Date Generated: May 02, 2017

Property Address:
George L Catrambone Elementary School
240 Park Avenue
Long Branch, New Jersey 07740

For the year ending in July 2016, this building used 130.9 (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

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ENERGY STAR ® Score[1]

George L Catrambone Elementary School

Registry Name: George L Catrambone Elementary School
Property Type: K-12 School
Gross Floor Area (ft²): 108,000
Built: 2014

For Year Ending: 07/31/2016
Date Generated: 05/02/2017

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
George L Catrambone Elementary School 240 Park Avenue 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: 5242086

1. Review of Whole Property Characteristics

Basic Property Information

1) **Property Name:** George L Catrambone Elementary School
Is this the official name of the property? ☐ Yes ☐ No

If "No", please specify: _____

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

3) **Location:**
240 Park Avenue
Long Branch, New Jersey 07740

Is this correct and complete? ☐ Yes ☐ No