Local Government Energy Audit:
Energy Audit Report

Mary F. Janvier Elementary School

1532 Pennsylvania Avenue

Franklinville, NJ 08322

Franklin Township BOE

July 13, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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1 EXECUTIVE SUMMARY

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

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

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

1.1 Facility Summary

Mary F. Janvier Elementary School is a 66,500 square foot, single-story facility comprised of various space types such as classrooms, hallways, gym, kitchen, and a mechanical room. During the weekdays, the building operates from 6:30 AM – 4:30 PM. There are some basketball activities on Saturdays and no operation on Sundays.

Heating in the building is provided by gas-fired hot water boilers which are 28 years old. The space cooling in the classrooms is provided using window ACs and other areas are served by the rooftop units. Lighting consists of old and inefficient lighting (predominantly consisting of linear T8 fixtures) that need replacement. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated nine measures which together represent an opportunity for Mary F. Janvier Elementary School to reduce annual energy costs by $20,312 and annual greenhouse gas emissions by 152,678 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 10.8 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Mary F. Janvier Elementary School's annual energy use by 13%.

Figure 1 – Previous 12 Month Utility Costs

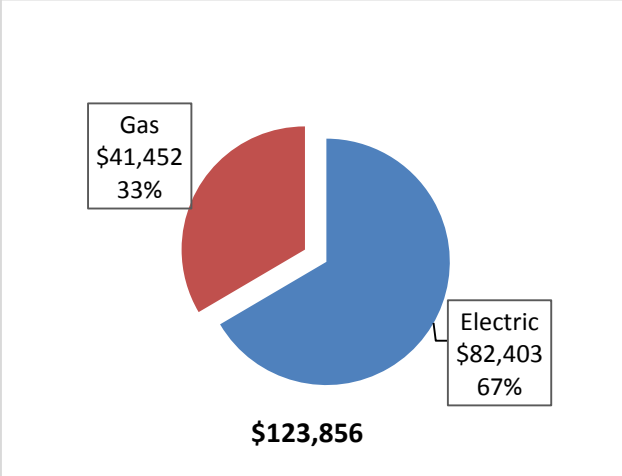
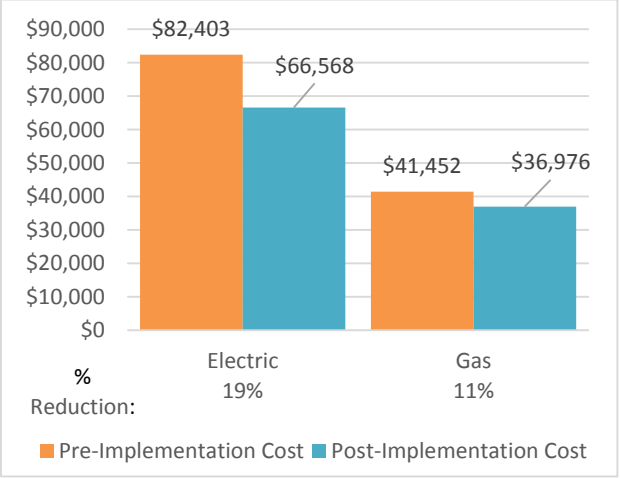


Figure 2 – Potential Post-Implementation Costs



A detailed description of Mary F. Janvier Elementary School's existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**79,999**	**19.6**	**0.0**	**$12,502.69**	**$109,783.12**	**$12,435.00**	**$97,348.12**	**7.8**	**80,558**
ECM 1	Install LED Fixtures	Yes	15,826	2.1	0.0	$2,473.41	$12,501.66	$3,200.00	$9,301.66	3.8	15,937
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	62,713	17.4	0.0	$9,801.19	$94,216.17	$9,230.00	$84,986.17	8.7	63,152
ECM 3	Retrofit Fixtures with LED Lamps	Yes	49	0.0	0.0	$7.66	$53.75	$5.00	$48.75	6.4	49
ECM 4	Install LED Exit Signs	Yes	1,410	0.1	0.0	$220.42	$3,011.54	$0.00	$3,011.54	13.7	1,420
Lighting Control Measures			**11,260**	**2.9**	**0.0**	**$1,759.81**	**$9,798.00**	**$1,285.00**	**$8,513.00**	**4.8**	**11,339**
ECM 5	Install Occupancy Sensor Lighting Controls	Yes	11,260	2.9	0.0	$1,759.81	$9,798.00	$1,285.00	$8,513.00	4.8	11,339
Variable Frequency Drive (VFD) Measures			**10,065**	**1.3**	**0.0**	**$1,573.06**	**$6,551.70**	**$0.00**	**$6,551.70**	**4.2**	**10,136**
ECM 6	Install VFDs on Hot Water Pumps	Yes	10,065	1.3	0.0	$1,573.06	$6,551.70	$0.00	$6,551.70	4.2	10,136
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**296.2**	**$3,065.91**	**$83,120.25**	**$9,574.40**	**$73,545.85**	**24.0**	**34,687**
ECM 7	Install High Efficiency Hot Water Boilers	Yes	0	0.0	296.2	$3,065.91	$83,120.25	$9,574.40	$73,545.85	24.0	34,687
Domestic Water Heating Upgrade			**0**	**0.0**	**136.3**	**$1,410.49**	**$35,213.23**	**$1,225.00**	**$33,988.23**	**24.1**	**15,958**
ECM 8	Install High Efficiency Gas Water Heater	Yes	0	0.0	109.2	$1,130.13	$35,077.00	$1,225.00	$33,852.00	30.0	12,786
ECM 9	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	27.1	$280.36	$136.23	$0.00	$136.23	0.5	3,172
TOTALS			**101,325**	**23.7**	**432.5**	**$20,311.96**	**$244,466.31**	**$24,519.40**	**$219,946.91**	**10.8**	**152,678**

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

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

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

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

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.

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

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

Energy Efficient Practices

TRC also identified 10 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 Mary F. Janvier Elementary School include:

- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Use Thermostat Schedules and Temperature Resets
- Clean and/or Replace HVAC Filters
- Perform Boiler Maintenance
- Perform Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Mary F. Janvier Elementary School. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart

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

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Elizabeth A DiPietro	School Business Administrator	edipietro@franklintwpschools.org	856-629-9500 Extn: 1203
Thomas Rambone	Maintenance department	trambone@franklintwpschools.org	(856) 697-0220
Jennifer Thies	Maintenance department	jthies@franklintwpschools.org	(856) 697-0220
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On January 11, 2017, TRC performed an energy audit at Mary F. Janvier Elementary School located in Franklinville, New Jersey. TRC's team met with George Ruczynski, School Business Administrator to review the facility operations and help focus our investigation on specific energy-using systems.

Mary F. Janvier Elementary School is a 66,500 square foot, single-story facility comprised of various space types such as classrooms, hallways, gym, kitchen, and a mechanical room. During the weekdays, the building operates from 6:30 AM – 4:30 PM. There are some basketball activities on Saturdays and no operation on Sundays.

Heating in the building is provided by gas-fired hot water boilers which are 28 years old. The space cooling in the classrooms is provided by window air conditioners and other areas are served by the rooftop units. Lighting consists of old and inefficient lighting (predominantly consisting of T8 linear fixtures) that need replacement.

2.3 Building Occupancy

The typical schedule is presented in the table below. Basketball activities are conducted at the school on Saturdays and no operation on Sundays. During a typical day, the facility is occupied by 68 full-time staff and 700 students.

Figure 5 - Building Schedule

Building Occupancy Schedule		
Building Name	**Weekday/Weekend**	**Operating Schedule**
Mary.F.Janvier Elementary School	Weekday	6AM - 4PM
Mary.F.Janvier Elementary School	Weekend	No operation

2.4 Building Envelope

The school is constructed of concrete block, and structural steel with a brick facade. The buildings have double pane windows and flat roofs that are in good condition. Due to inclement weather on the day of the audit, the auditor onsite was unable to access the roof. Upon acquiring data from various resources, the roof appears to be in a good condition. There was no sign of excessive infiltration observed onsite. The exterior doors are constructed of aluminum and in good condition.



Image 1 Building envelope

2.5 On-Site Generation

Mary F. Janvier Elementary School does not have any on-site electric generation.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting at the facility is provided mostly by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL). Most of the fixtures are 2-lamp or 4-lamp, 4-foot long troffers. Small areas such as laundry closet are primarily lit with 26-watt CFL lamps in recessed can ceiling fixtures.

Lighting control in most spaces is provided by manual switches. The building's exterior lighting is minimal and consists primarily of metal halide wall pack fixtures (100-watt and 150-watt) that are controlled by photocells. The exit signs at the facility (as mentioned by the site contact) are 11-watt CFL fixtures.

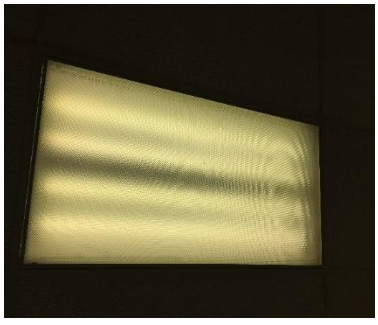



Image 2 Typical Lighting Fixtures

Hot Water (or Steam) Heating System

The hot water system consists of two Weil Mclain gas-fired hot water boilers with an output capacity of 2176 MBH and a combustion efficiency of 80%. The boilers are configured in a constant flow primary distribution with two hot water pumps (HHWP1 & 2). The boilers are served by four 5HP hot water pumps. Two of these pumps have VFDs on them and the other two are constant flow pumps. Heating hot water is supplied at 180°F when the outside air temperature is below 50°F and modulated accordingly until the outside air is 65°F. Above this temperature, the boilers are shut down. The heat is distributed using the fan coil units for common areas like the hallways and vent in the rooms.

The boilers are 28 years old are at the end of their useful life and due for replacement.



Image 3 Facility Boiler and terminal units

Direct Expansion Air Conditioning System (DX)

Space cooling is provided by windows AC units (2 ton) in the classrooms and packaged roof top units in the gym (18 ton), office areas (3 ton), kitchen (5 ton) and the library (7.5 ton). The packaged units are controlled by individual thermostats located in the respective zones. All the packaged units were newly installed, four years old and in good condition.


Image 4 Sample of AC systems and control units

Building Energy Management System (BEMS)

All of the building heat distribution has pneumatic controls. When the room temperature drops below the setpoint temperature, the pressure releases and opens the valve to let the hot water circulate through the coil. The blower fan in the unit vent then releases hot air into the room. When the temperature reaches the setpoint, the valve then closes.

Domestic Hot Water Heating System

The domestic hot water heating system consists of one gas-fired hot water heater with an input capacity of 700 MBH with an efficiency of 65%. Two 0.8 hp circulation pump distribute hot water throughout the building continuously to the classrooms, kitchen and restrooms.

Food Service & Laundry Equipment

The school has mostly gas-fired equipment in the kitchen that is used to prepare lunches and snacks for the students and staff. The kitchen is also used to prepare hot snacks for three fund raising events each year. Most of the cooking is done using the convection ovens, burners and griddle. There are also insulated food holding cabinets.

Refrigeration

The kitchen has a walk-in refrigerator and a walk-in freezer that are used to store food prepared for school lunches. The refrigerator has a single, 10-ton air cooled scroll compressor. The walk-in space temperature is maintained at 34°F and the freezer is maintained below -5°F. The kitchen also has a free-standing commercial stand-up glass door refrigerator.

Building Plug Load

There are 200 computer work stations throughout the facility. Ninety percent of the computers are desktop units with LCD monitors. Other plug loads in the school include printers, projectors, smart boards, and ceiling fans. There is also kitchenette equipment such as microwaves, refrigerators, coffee machines and water dispensers. There is no centralized PC power management software installed.

2.7 Water-Using Systems

There are 20 restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.0 gallons per minute (gpm) or lower, the toilets are rated at 1.5 gallons per flush (gpf) and the urinals are rated at 2 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 0 for additional information.

3.1 Total Cost of Energy

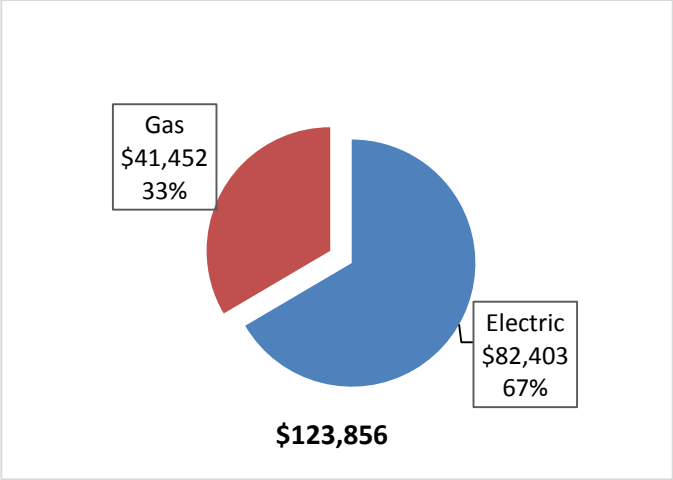
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Mary.F Janvier Elementary School		
Fuel	**Usage**	**Cost**
Electricity	527,262 kWh	$82,403
Natural Gas	40,054 Therms	$41,452
Total		**$123,856**

The current annual energy cost for this facility is $123,856 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.156/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The third party electric supply for the facility is provide by First Energy Sol. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Usage & Demand

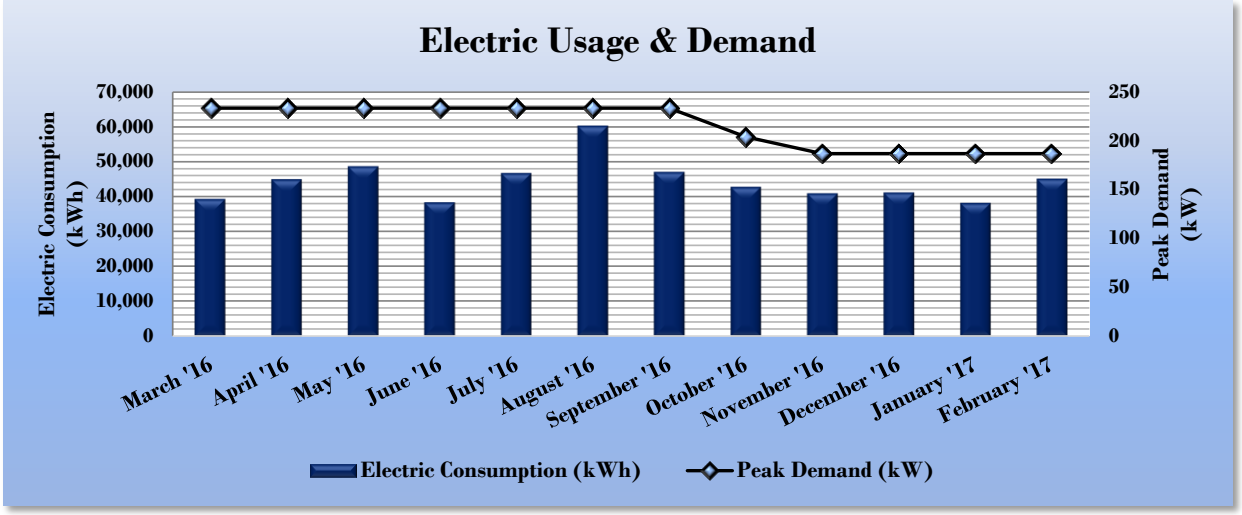


Figure 9 - Usage & Demand

Electric Billing Data for Mary.F Janvier Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
4/8/16	30	39,280	234		$6,365
5/11/16	33	44,880	234		$7,191
6/10/16	30	48,640	234		$7,424
7/13/16	33	38,320	234		$6,448
8/10/16	28	46,720	234		$7,079
9/12/16	33	60,240	234		$9,124
10/12/16	30	47,040	234		$7,483
11/10/16	29	42,720	204		$6,601
12/12/16	32	40,880	187		$6,432
1/12/17	31	41,120	187		$6,395
2/9/17	28	38,160	187		$5,883
3/13/17	32	45,040	187		$6,881
Totals	**369**	**533,040**	**233.6**	**$0**	**$83,306**
Annual	**365**	**527,262**	**233.6**	**$0**	**$82,403**

3.3 Natural Gas Usage

Natural gas is provided by South Jersey Gas. The average gas cost for the past 12 months is $1.035/therm, which is the blended rate used throughout the analyses in this report. The third party gas supply for the facility is provided by direct energy. The monthly gas consumption is shown in the chart below.

Figure 10 Natural Gas Usage

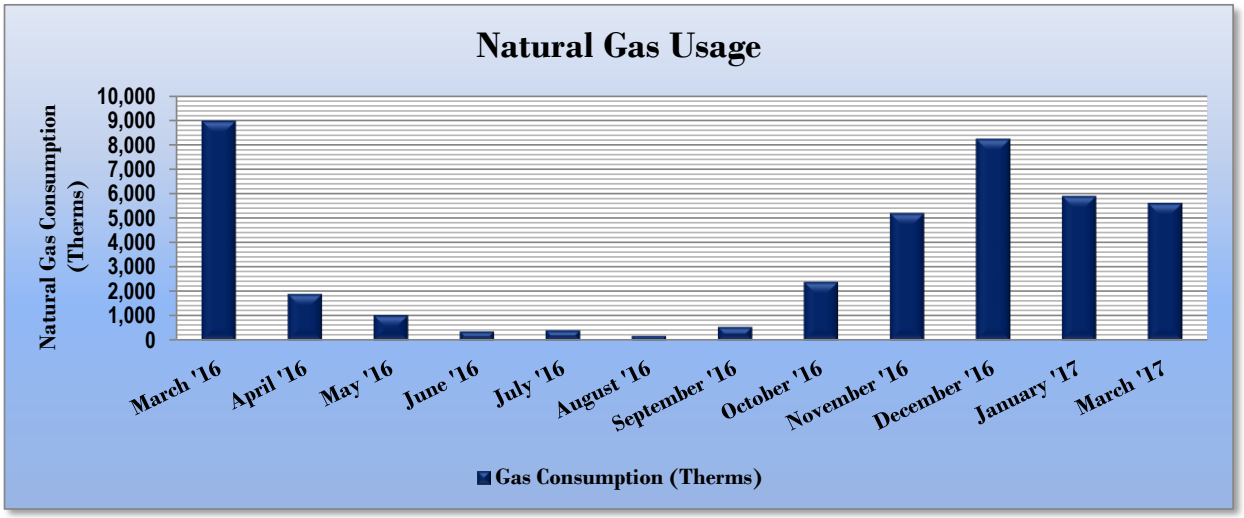


Figure 11 - Natural Gas Usage

Gas Billing Data for Mary.F Janvier Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/12/16	32	8,965	$5,134
5/11/16	29	1,891	$1,490
6/10/16	30	1,031	$861
7/13/16	33	360	$237
8/10/16	28	414	$328
9/12/16	33	183	$180
10/12/16	30	549	$470
11/10/16	29	2,391	$2,279
12/12/16	32	5,196	$4,988
1/12/17	31	8,230	$10,913
2/9/17	28	5,893	$7,813
3/17/17	36	5,608	$7,440
Totals	**371**	**40,712**	**$42,134**
Annual	**365**	**40,054**	**$41,452**

3.4 Benchmarking

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

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

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Mary.F Janvier Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	148.2	141.4
Site Energy Use Intensity (kBtu/ft^2)	87.3	58.2

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

Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Mary.F Janvier Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	125.0	141.4
Site Energy Use Intensity (kBtu/ft^2)	75.6	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 73.

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

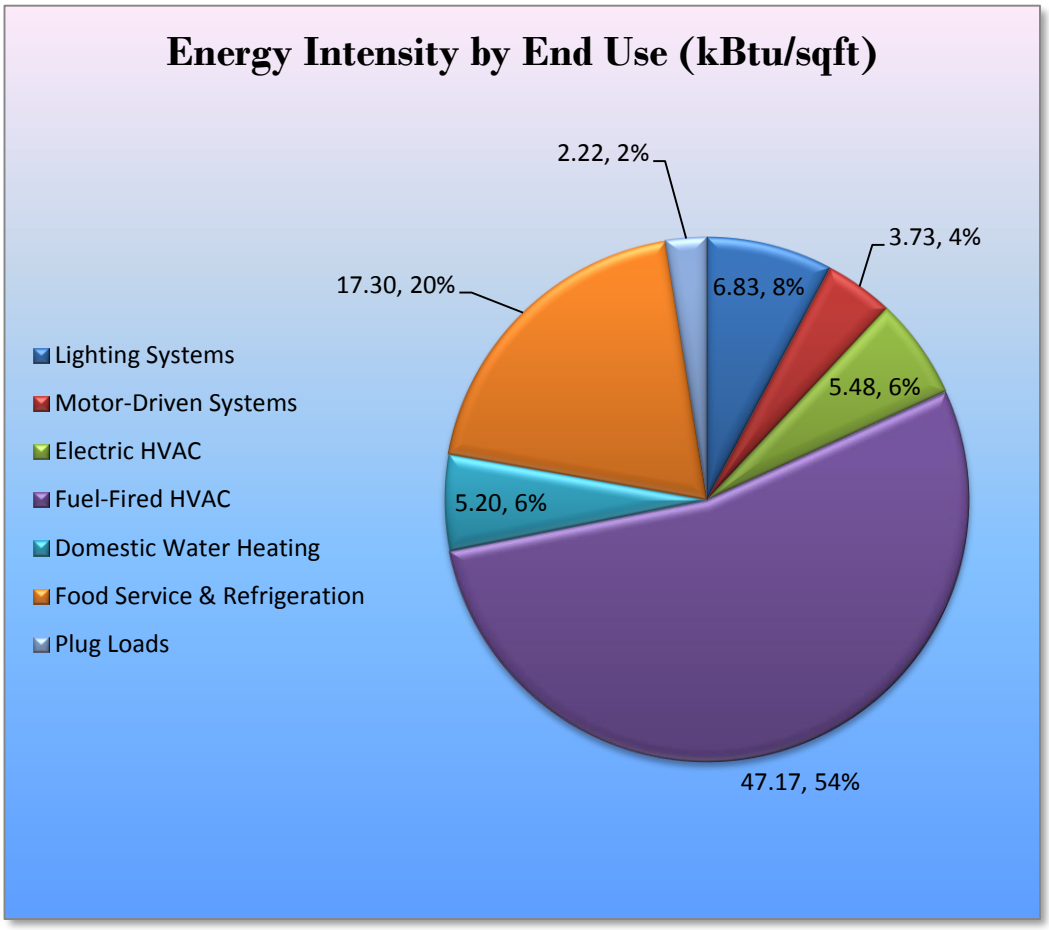
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 14 - Energy Balance (kBtu/Sqft)



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 Mary F. Janvier 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 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		**79,999**	**19.6**	**0.0**	**$12,502.69**	**$109,783.12**	**$12,430.00**	**$97,353.12**	**7.8**	**80,558**
ECM 1	Install LED Fixtures	15,826	2.1	0.0	$2,473.41	$12,501.66	$3,200.00	$9,301.66	3.8	15,937
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	62,713	17.4	0.0	$9,801.19	$94,216.17	$9,230.00	$84,986.17	8.7	63,152
ECM 3	Retrofit Fixtures with LED Lamps	49	0.0	0.0	$7.66	$53.75	$0.00	$53.75	7.0	49
ECM 4	Install LED Exit Signs	1,410	0.1	0.0	$220.42	$3,011.54	$0.00	$3,011.54	13.7	1,420
Lighting Control Measures		**11,260**	**2.9**	**0.0**	**$1,759.81**	**$9,798.00**	**$1,285.00**	**$8,513.00**	**4.8**	**11,339**
ECM 5	Install Occupancy Sensor Lighting Controls	11,260	2.9	0.0	$1,759.81	$9,798.00	$1,285.00	$8,513.00	4.8	11,339
Variable Frequency Drive (VFD) Measures		**10,065**	**1.3**	**0.0**	**$1,573.06**	**$6,551.70**	**$0.00**	**$6,551.70**	**4.2**	**10,136**
ECM 6	Install VFDs on Hot Water Pumps	10,065	1.3	0.0	$1,573.06	$6,551.70	$0.00	$6,551.70	4.2	10,136
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**296.2**	**$3,065.91**	**$83,120.25**	**$9,574.40**	**$73,545.85**	**24.0**	**34,687**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	296.2	$3,065.91	$83,120.25	$9,574.40	$73,545.85	24.0	34,687
Domestic Water Heating Upgrade		**0**	**0.0**	**136.3**	**$1,410.49**	**$35,213.23**	**$1,225.00**	**$33,988.23**	**24.1**	**15,958**
ECM 8	Install High Efficiency Gas Water Heater	0	0.0	109.2	$1,130.13	$35,077.00	$1,225.00	$33,852.00	30.0	12,786
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	27.1	$280.36	$136.23	$0.00	$136.23	0.5	3,172
TOTALS		**101,325**	**23.7**	**432.5**	**$20,311.96**	**$244,466.31**	**$24,514.40**	**$219,951.91**	**10.8**	**152,678**

* - 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		**79,999**	**19.6**	**0.0**	**$12,502.69**	**$109,783.12**	**$12,430.00**	**$97,353.12**	**7.8**	**80,558**
ECM 1	Install LED Fixtures	15,826	2.1	0.0	$2,473.41	$12,501.66	$3,200.00	$9,301.66	3.8	15,937
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	62,713	17.4	0.0	$9,801.19	$94,216.17	$9,230.00	$84,986.17	8.7	63,152
ECM 3	Retrofit Fixtures with LED Lamps	49	0.0	0.0	$7.66	$53.75	$0.00	$53.75	7.0	49
ECM 4	Install LED Exit Signs	1,410	0.1	0.0	$220.42	$3,011.54	$0.00	$3,011.54	13.7	1,420

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	15,826	2.1	0.0	$2,473.41	$12,501.66	$3,200.00	$9,301.66	3.8	15,937

Measure Description

We recommend replacing existing fixtures containing HID metal halide (100-watt or 150-watt) lamps on the exterior with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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

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	62,713	17.4	0.0	$9,801.19	$94,216.17	$9,230.00	$84,986.17	8.7	63,152
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing T8 fluorescent fixtures (2-lamp and 4-lamp) 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 and more than ten times longer than many incandescent lamps.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	49	0.0	0.0	$7.66	$53.75	$5.00	$48.75	6.4	49
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

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

ECM 4: Install LED EXIT Signs

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	1,410	0.1	0.0	$220.42	$3,011.54	$0.00	$3,011.54	13.7	1,420
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing all compact fluorescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

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		**11,260**	**2.9**	**0.0**	**$1,759.81**	**$9,798.00**	**$1,285.00**	**$8,513.00**	**4.8**	**11,339**
ECM 5	Install Occupancy Sensor Lighting Controls	11,260	2.9	0.0	$1,759.81	$9,798.00	$1,285.00	$8,513.00	4.8	11,339

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

ECM 5: 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)
11,260	2.9	0.0	$1,759.81	$9,798.00	$1,285.00	$8,513.00	4.8	11,339

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms, offices areas etc., Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled

when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

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

4.1.3 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 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		**10,065**	**1.3**	**0.0**	**$1,573.06**	**$6,551.70**	**$0.00**	**$6,551.70**	**4.2**	**10,136**
ECM 6	Install VFDs on Hot Water Pumps	10,065	1.3	0.0	$1,573.06	$6,551.70	$0.00	$6,551.70	4.2	10,136

ECM 6: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
10,065	1.3	0.0	$1,573.06	$6,551.70	$0.00	$6,551.70	4.2	10,136

Measure Description

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

4.1.4 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 19 below.

Figure 19 - Summary of Gas-Fired Heating Replacement ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**296.2**	**$3,065.91**	**$83,120.25**	**$9,574.40**	**$73,545.85**	**24.0**	**34,687**
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	296.2	$3,065.91	$83,120.25	$9,574.40	$73,545.85	24.0	34,687

ECM 7: Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	296.2	$3,065.91	$83,120.25	$9,574.40	$73,545.85	24.0	34,687

Measure Description

The existing non-condensing hot water boiler is 28 years old. We recommend replacing these older inefficient hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 90% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F and can go as high as 96%.

4.1.5 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 20 below.

Figure 20 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**136.3**	**$1,410.49**	**$35,213.23**	**$1,225.00**	**$33,988.23**	**24.1**	**15,958**
ECM 8	Install High Efficiency Gas Water Heater	0	0.0	109.2	$1,130.13	$35,077.00	$1,225.00	$33,852.00	30.0	12,786
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	27.1	$280.36	$136.23	$0.00	$136.23	0.5	3,172

ECM 8: Install High Efficiency Gas-Fired Water Heater

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	109.2	$1,130.13	$35,077.00	$1,225.00	$33,852.00	30.0	12,786

Measure Description

We recommend replacing the existing tank water heater (29 years old) with a high efficiency tank water heater. Improvements in combustion efficiency and reductions in heat losses have improved the overall efficiency of storage water heaters. Energy savings results from using less gas to heat water, due to higher unit efficiency, and fewer run hours to maintain the tank water temperature.

ECM 9: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	27.1	$280.36	$136.23	$0.00	$136.23	0.5	3,172

Measure Description

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

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

5 ENERGY EFFICIENT PRACTICES

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

Close Doors and Windows

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

Use Window Treatments/Coverings

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

Perform 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.

Use Thermostat Schedules and Temperature Resets

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

Clean and/or Replace HVAC Filters

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

Perform 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 Water Heater Maintenance

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

Plug Load Controls

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

Water Conservation

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

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

Refer to Section 4.1.5 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

6.1 Photovoltaic

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

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

If Mary F. Janvier Elementary School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 21 - Photovoltaic Screening

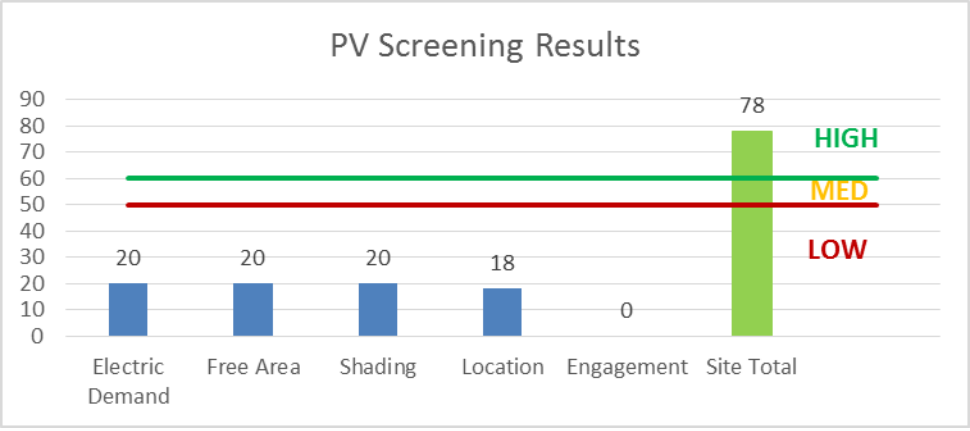


Figure 22 Identified roof areas for solar panel installation

Potential	High	
System Potential	190	kW DC STC
Electric Generation	226,360	kWh/yr
Displaced Cost	$19,690	/yr
Installed Cost	$494,000	

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 Section 8.2 for additional information.

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

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

6.2 Combined Heat and Power

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

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

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

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

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

7 DEMAND RESPONSE

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

Typically an electric customer needs to be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with a greater capability to quickly curtail their demand during peak hours will receive higher payments. Customers with back-up generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature set points on thermostats, so that air conditioning units run less frequently, or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, in order to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a demand response activity in most situations.

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

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

Figure 23 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive
ECM 1	Install LED Fixtures	x
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x
ECM 3	Retrofit Fixtures with LED Lamps	
ECM 4	Install LED Exit Signs	
ECM 5	Install Occupancy Sensor Lighting Controls	x
ECM 6	Install VFDs on Hot Water Pumps	x
ECM 7	Install High Efficiency Hot Water Boilers	x
ECM 8	Install High Efficiency Gas Water Heater	x
ECM 9	Install Low-Flow Domestic Hot Water Devices	

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

Generally, the incentive values provided throughout the report assume the 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 program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

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

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

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

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple 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
Hallway	13	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	13	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.14	537	0.0	$83.89	$1,391.00	$130.00	15.03
Faculty Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.43	1,705	0.0	$266.43	$1,572.50	$200.00	5.15
Multi Purpose Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.22	867	0.0	$135.51	$971.00	$120.00	6.28
Multi Purpose Room	14	Linear Fluorescent - T8: 4' T8 (32W) - 6L	Wall Switch	176	2,244	Relamp & Reballast	No	14	LED - Linear Tubes: (6) 4' Lamps	Wall Switch	87	2,244	0.82	3,215	0.0	$502.52	$3,077.67	$420.00	5.29
Closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.06	6	0.0	$0.93	$351.00	$30.00	346.94
Kitchen	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.30	1,192	0.0	$186.33	$1,638.00	$140.00	8.04
Kitchen	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.04	165	0.0	$25.81	$428.00	$40.00	15.03
Dishwasher room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.04	170	0.0	$26.62	$234.00	$20.00	8.04
Kitchen office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.07	289	0.0	$45.17	$323.67	$40.00	6.28
Supply Closet	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.11	10	0.0	$1.54	$585.00	$50.00	346.94
Stage side	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	520	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	520	0.04	39	0.0	$6.17	$234.00	$20.00	34.69
CR 15	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 14	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 13	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.04	4	0.0	$0.62	$234.00	$20.00	346.94
Girls' restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.03	49	0.0	$7.59	$321.00	$30.00	38.33
Boys' restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.03	49	0.0	$7.59	$321.00	$30.00	38.33
Custodian	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.04	4	0.0	$0.62	$234.00	$20.00	346.94
Music Room	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	21	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.45	1,788	0.0	$279.49	$2,457.00	$210.00	8.04
Closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.06	6	0.0	$0.93	$351.00	$30.00	346.94
CR 11	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
Hallway	10	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.10	413	0.0	$64.53	$1,070.00	$100.00	15.03
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.04	170	0.0	$26.62	$234.00	$20.00	8.04
CR 10	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 9	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14

	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
CR 8	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 7	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 6	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 5	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 4	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.57	2,260	0.0	$353.18	$2,727.00	$245.00	7.03
CR 3	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.57	2,260	0.0	$353.18	$2,727.00	$245.00	7.03
Hallway	14	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	14	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.15	578	0.0	$90.34	$1,498.00	$140.00	15.03
Main office	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	8	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.29	1,156	0.0	$180.68	$1,294.67	$160.00	6.28
Main office	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.04	165	0.0	$25.81	$428.00	$40.00	15.03
Mail room	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.07	289	0.0	$45.17	$323.67	$40.00	6.28
Conference room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.15	578	0.0	$90.34	$647.33	$80.00	6.28
Women staff restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,040	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	728	0.01	25	0.0	$3.94	$223.00	$30.00	48.94
Principal office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.15	578	0.0	$90.34	$647.33	$80.00	6.28
Men staff restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,040	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	728	0.01	25	0.0	$3.94	$223.00	$30.00	48.94
Hallway	3	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	151	0.0	$23.62	$322.67	$0.00	13.66
Multi Purpose Room	3	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	151	0.0	$23.62	$322.67	$0.00	13.66
Kitchen	1	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	50	0.0	$7.87	$107.56	$0.00	13.66
Hallway	4	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	201	0.0	$31.49	$430.22	$0.00	13.66
Councelor	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.15	578	0.0	$90.34	$647.33	$80.00	6.28
Main office	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.02	83	0.0	$12.91	$214.00	$20.00	15.03
Storage	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.01	41	0.0	$6.45	$107.00	$10.00	15.03
Entrance Hall	7	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	7	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.07	289	0.0	$45.17	$749.00	$70.00	15.03
CR 2	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.49	1,937	0.0	$302.72	$2,376.00	$215.00	7.14
CR 2 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 1	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	18	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.39	1,533	0.0	$239.57	$2,106.00	$180.00	8.04

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Nurse's office	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	No	12	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,244	0.44	1,734	0.0	$271.02	$1,942.00	$240.00	6.28
Nurse's office - laundary	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.02	85	0.0	$13.31	$117.00	$10.00	8.04
Nurse's office - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.01	41	0.0	$6.45	$107.00	$10.00	15.03
CR 47	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.16	646	0.0	$100.91	$972.00	$95.00	8.69
Girls' restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.03	49	0.0	$7.59	$321.00	$30.00	38.33
Boys' restroom	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.03	49	0.0	$7.59	$321.00	$30.00	38.33
Hallway	15	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	15	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.16	619	0.0	$96.79	$1,605.00	$150.00	15.03
CR 31	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 31 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 31 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 32	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 32 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 32 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 33	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 33 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 33 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 34	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 34 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 34 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
Boys' restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
Girls' restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.09	8	0.0	$1.23	$468.00	$40.00	346.94
CR 35	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 35 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 35 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33

	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
CR 36	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 36 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 36 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 37	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 37 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 37 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 38	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 38 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 38 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
Custodian	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.04	4	0.0	$0.62	$234.00	$20.00	346.94
Room 300 - OT/PT	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.13	511	0.0	$79.86	$702.00	$60.00	8.04
CR 29	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.16	646	0.0	$100.91	$972.00	$95.00	8.69
CR 28	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.16	646	0.0	$100.91	$972.00	$95.00	8.69
Computer Lab 27	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.57	2,260	0.0	$353.18	$2,727.00	$245.00	7.03
Library	35	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	No	35	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,244	0.76	2,981	0.0	$465.82	$4,095.00	$350.00	8.04
Library	3	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.03	124	0.0	$19.36	$321.00	$30.00	15.03
CR 26	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.16	646	0.0	$100.91	$972.00	$95.00	8.69
CR 25	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,571	0.16	646	0.0	$100.91	$972.00	$95.00	8.69
Custodian closet	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	104	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	104	0.09	16	0.0	$2.47	$468.00	$40.00	173.47
Store room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	104	Relamp & Reballast	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	104	0.09	16	0.0	$2.47	$468.00	$40.00	173.47
Hallway	10	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.10	413	0.0	$64.53	$1,070.00	$100.00	15.03
Boiler room	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	520	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	520	0.22	197	0.0	$30.84	$1,170.00	$100.00	34.69
Entrance Hall	2	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	101	0.0	$15.74	$215.11	$0.00	13.66
Hallway	4	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	201	0.0	$31.49	$430.22	$0.00	13.66
Library	2	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	101	0.0	$15.74	$215.11	$0.00	13.66

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Hallway	2	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	101	0.0	$15.74	$215.11	$0.00	13.66
Boiler room	2	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	101	0.0	$15.74	$215.11	$0.00	13.66
Nurse's office laundry	1	Compact Fluorescent: Wall mount fixture - 1 lamp	Wall Switch	26	2,244	Relamp	No	1	LED Screw-In Lamps: Wall mount fixture	Wall Switch	7	2,244	0.01	49	0.0	$7.66	$53.75	$0.00	7.01
Hallway red	14	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	14	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.15	578	0.0	$90.34	$1,498.00	$140.00	15.03
CR 16	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 16 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 16 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 17	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 17 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 17 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 18	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 18 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 18 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 19	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 19 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 19 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	520	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	520	0.02	20	0.0	$3.08	$117.00	$10.00	34.69
Hallway	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,244	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,244	0.02	83	0.0	$12.91	$214.00	$20.00	15.03
Storage	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.11	10	0.0	$1.54	$585.00	$50.00	346.94
CR 20	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 20 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 20 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 21	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 21 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94

	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
CR 21 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 22	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 22 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 22 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
CR 23	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,244	Relamp & Reballast	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,571	0.29	1,136	0.0	$177.62	$1,241.00	$155.00	6.11
CR 23 - closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.31	$117.00	$10.00	346.94
CR 23 - restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	880	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	880	0.01	16	0.0	$2.53	$107.00	$10.00	38.33
Hallway	5	Exit Signs: Fluorescent	None	11	8,760	Fixture Replacement	No	5	LED Exit Signs: 2 W Lamp	None	6	8,760	0.02	252	0.0	$39.36	$537.78	$0.00	13.66
Exterior lights	22	Metal Halide: (1) 150W Lamp	Daylight Dimming	190	4,380	Fixture Replacement	No	22	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	89	4,380	1.46	11,192	0.0	$1,749.18	$8,594.89	$2,200.00	3.66
Exterior lights	10	Metal Halide: (1) 100W Lamp	Daylight Dimming	128	4,380	Fixture Replacement	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	36	4,380	0.60	4,634	0.0	$724.23	$3,906.77	$1,000.00	4.01

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Boiler	2	Water Supply Pump	0.8	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Boiler	2	Heating Hot Water Pump	5.0	88.5%	Yes	2,745	No	88.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Air compressors	2	Air Compressor	3.0	86.5%	No	4,957	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Boiler	2	Heating Hot Water Pump	5.0	88.5%	No	2,745	No	88.5%	Yes	2	1.27	10,065	0.0	$1,573.06	$6,551.70	$0.00	4.16
Kitchen	Blender	1	Other	2.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Restrooms and kitchen	15	Exhaust Fan	0.3	77.0%	No	2,745	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU	Gym, Hallways	4	Supply Fan	3.0	86.5%	No	2,745	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallways	Hallways	10	Supply Fan	0.2	60.0%	No	2,745	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Classrooms	Classroom 15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,31,32,33,34,35,36,37,38,27,16,17,18,19,20,21,22,23	32	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classrooms 30,29,28,26,25,24	6	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof top	Gym	1	Packaged AC	18.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof top	Office	1	Packaged AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof top	Kitchen	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof top	Library	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Mary.F.Janvier Elementary School	2	Non-Condensing Hot Water Boiler	2,176.00	Yes	2	Condensing Hot Water Boiler	2,176.00	91.00%	Et	0.00	0	296.2	$3,065.91	$83,120.25	$9,574.40	23.99
Storage rooms	Storage rooms	2	Warm Air Unit Heater	33.60	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	Restrooms and classroom sinks	1	Storage Tank Water Heater (> 50 Gal)	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	95.00%	Et	0.00	0	109.2	$1,130.13	$35,077.00	$1,225.00	29.95

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Lunch room	1	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	0.4	$3.84	$7.17	$0.00	1.87
Classrooms 2,31,32,33,34,35,36,37,38, 16,17,18,19,20,21,22,23, Nurse's office	18	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	26.7	$276.52	$129.06	$0.00	0.47

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	Low Temp Freezer (-35F to -5F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	4	Stand-Up Refrigerator, Glass Door (16 - 30 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	4	Insulated Food Holding Cabinet (1/2 Size)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Gas Rack Oven (Single)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	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?
Mary.F.Janvier School	200	Computer	75.0	
Mary.F.Janvier School	4	Laptops	40.0	
Mary.F.Janvier School	1	Printer - Small	20.0	
Mary.F.Janvier School	7	Printer - Medium	40.0	
Mary.F.Janvier School	3	Printer - Large	100.0	
Mary.F.Janvier School	37	Projectors	200.0	
Mary.F.Janvier School	4	Microwave Oven	900.0	
Mary.F.Janvier School	2	Refrigerator - Medium	50.0	
Mary.F.Janvier School	1	Refrigetaror - Large (with freezer)	100.0	
Mary.F.Janvier School	1	Washer	1,600.0	
Mary.F.Janvier School	1	Dryer	1,500.0	
Mary.F.Janvier School	3	Televisions - CRT	120.0	
Mary.F.Janvier School	2	Water dispenser	12.5	
Mary.F.Janvier School	37	Ceiling fans	100.0	
Mary.F.Janvier School	37	Smart Boards	5.0	

Appendix B: ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Mary F. Janvier Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 66,500
Built: 1989

For Year Ending: March 31, 2017
Date Generated: June 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
Mary F. Janvier Elementary School 3228 Coles Mill Road Franklinville, New Jersey 08322	_____ , (___)___-_____	____ _____ , (___)___-_____ _____

Property ID: 5907892

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
80.3 kBtu/ft²

Source EUI
141.6 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,822,926 (34%)
Natural Gas (kBtu)	3,519,435 (66%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	101.5
National Median Source EUI (kBtu/ft²)	178.9
% Diff from National Median Source EUI	-21%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	396

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

____ _____
,
(___)___-_____
_____

Professional Engineer Stamp (if applicable)