Local Government Energy Audit:
Energy Audit Report

Holly Glen Elementary School

Monroe Township Board of Education

900 Main Street
Williamstown, NJ 08094

February 2, 2018

Final Report by:
TRC Energy Services

Disclaimer

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

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

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

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

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Holly Glen 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 Monroe Township Board of Education in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Holly Glen Elementary School is a 79,055 square foot facility comprised of various space types within a single buildings. The building is single story and includes classrooms, offices, gym, cafeteria, and kitchen.

Lighting at Holly Glen Elementary School consists primarily of 4-foot linear fluorescent fixtures with T8 lamps. Heating and cooling for most of the campus is provided by unit ventilators. Chilled water and heating hot water for the unit ventilators are provided by a hybrid absorption chiller. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC Energy Services (TRC) evaluated nine (9) measures which together represent an opportunity for Holly Glen Elementary School to reduce annual energy costs by roughly $21,762 and annual greenhouse gas emissions by 155,916 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 4.0 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 Holly Glen Elementary School's annual energy use by 8%.

Figure 1 – Previous 12 Month Utility Costs

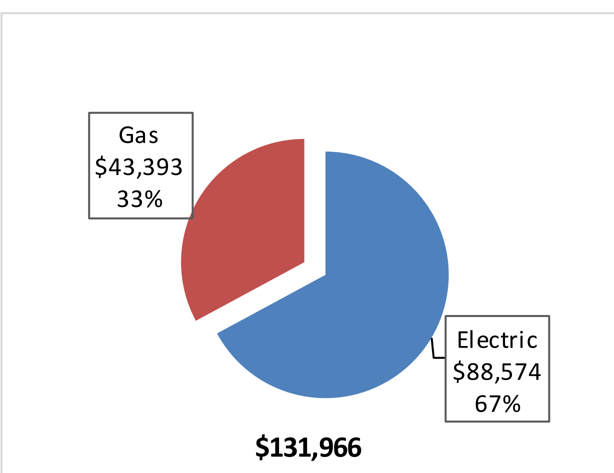
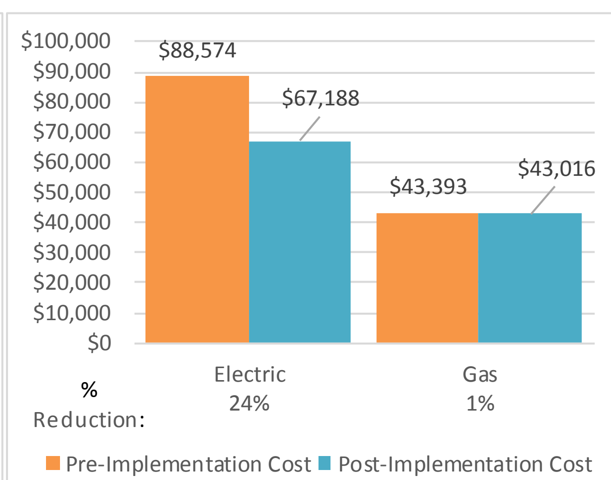


Figure 2 – Potential Post-Implementation Costs



A detailed description of Holly Glen 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			**77,759**	**20.6**	**0.0**	**$11,087.40**	**$69,288.58**	**$12,290.00**	**$56,998.58**	**5.1**	**78,303**
ECM 1	Install LED Fixtures	Yes	12,702	1.7	0.0	$1,811.13	$7,813.54	$2,000.00	$5,813.54	3.2	12,791
ECM 2	Retrofit Fixtures with LED Lamps	Yes	65,057	18.9	0.0	$9,276.28	$61,475.04	$10,290.00	$51,185.04	5.5	65,512
Lighting Control Measures			**16,157**	**4.6**	**0.0**	**$2,303.75**	**$13,850.00**	**$1,845.00**	**$12,005.00**	**5.2**	**16,270**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	16,157	4.6	0.0	$2,303.75	$13,850.00	$1,845.00	$12,005.00	5.2	16,270
Motor Upgrades			**1,807**	**0.2**	**0.0**	**$257.72**	**$3,447.46**	**$0.00**	**$3,447.46**	**13.4**	**1,820**
ECM 4	Premium Efficiency Motors	Yes	1,807	0.2	0.0	$257.72	$3,447.46	$0.00	$3,447.46	13.4	1,820
Variable Frequency Drive (VFD) Measures			**54,259**	**4.6**	**0.0**	**$7,737.09**	**$16,772.95**	**$1,700.00**	**$15,072.95**	**1.9**	**54,645**
ECM 5	Install VFDs on Constant Volume (CV) HVAC	Yes	21,677	2.8	0.0	$3,090.80	$6,551.70	$800.00	$5,751.70	1.9	21,828
ECM 6	Install VFDs on Chilled Water Pumps	Yes	11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706
ECM 7	Install VFDs on Hot Water Pumps	Yes	11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706
ECM 8	Install VFDs on Single-Speed Kitchen Hoods	Yes	9,333	0.0	0.0	$1,331.16	$3,007.65	$900.00	$2,107.65	1.6	9,404
Domestic Water Heating Upgrade			**0**	**0.0**	**41.7**	**$375.86**	**$344.16**	**$0.00**	**$344.16**	**0.9**	**4,878**
ECM 9	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	41.7	$375.86	$344.16	$0.00	$344.16	0.9	4,878
TOTALS			**149,983**	**30.1**	**41.7**	**$21,761.82**	**$103,703.15**	**$15,835.00**	**$87,868.15**	**4.0**	**155,916**

* - 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).

Retro-commissioning is highly recommended for all of the schools in the district. Savings were not evaluated for this measure, however, based on historical utility bills the summer electricity use is much higher than expected for schools that are not in session during the summer (see Section 4.2).

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.

Motor Upgrades generally involve replacing older standard efficiency motors with high efficiency standard (IHP 2014). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient than using 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.

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 14 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 Holly Glen Elementary School include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Ensure Economizers are Functioning Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

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

On-Site Generation Measures

The district staff informed the TRC auditor that the district is committed to the installation of PV for on-site generation. Based on the configuration of the site and its loads there is a low potential for installing 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
- Direct Install
- Energy Savings Improvement Program (ESIP)

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

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
David Sullivan	Director of Plant Operations	dsullivan@monroetwp.k12.nj.us	856-629-6400
Designated Representative			
Annina Hogan	Director Engineering	annina.hogan@rve.com	856-216-1890
TRC Energy Services			
Smruti Srinivasan	Auditor	SSrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On February 22, 2017, TRC performed an energy audit at Holly Glen Elementary School located in Williamstown, New Jersey. TRC's team met with David Sullivan, Director of Plant Operations to review the facility operations and help focus our investigation on specific energy-using systems.

Holly Glen Elementary School is a 79,055 square foot facility comprised of various space types within a single building. The building is single story and includes classrooms, offices, gym, cafeteria, and kitchen.

The building was constructed in 1967. There have been numerous renovations and additions since then with the most recent project completed in 2010. The facility has replaced all of its existing T12 fluorescent fixtures with T8 fluorescent fixtures.

2.3 Building Occupancy

The school is open Monday through Friday and has very minimal weekend activity. The typical schedule is presented in the table below. School is in session from early September through the end of June. There are one (1) week breaks at the end of December and in the spring. During a typical day, the facility is occupied by approximately 83 staff and 560 students.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Holly Glen Elementary	Weekday	9:00 am - 3:30 pm
Holly Glen Elementary	Weekend	unoccupied

2.4 Building Envelope

The building is constructed of concrete block, and structural steel with a brick and stone facades. The building has mostly flat roofs. The windows are double pane.

2.5 On-Site Generation

Holly Glen Elementary School does not have any on-site electric generation capacity. The Monroe Township school district has been evaluating the use of photovoltaic arrays for on-site generation of electricity and is planning to install them throughout the district.

2.6 Energy-Using Systems

Lighting System

Lighting at the facility is provided mostly by 4-foot, linear fluorescent fixtures with T8 lamps. Most of the fixtures have two (2) or four (4) lamps. Exit signs have all been modified to use light emitting diodes (LEDs).

Wall switches provide lighting control in most spaces. A few areas, primarily restrooms, have occupancy sensor controls.

Exterior lighting is provided by fixtures with LED, compact fluorescent, and high-pressure sodium lamps. The exterior fixtures are controlled by either photocells or timers.

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

Chilled Water and Heating Water System

The campus has a single hybrid, natural gas-fired, 165-ton absorption chiller. The unit provides either heating water or chilled water for unit ventilators located throughout the campus. The system generally operates in heating mode from mid-October through mid-April and in cooling mode the rest of the year. Supply water is circulated by one (1) of two (2) 7.5 hp constant flow pumps. Heating water is supplied at 160°F and chilled water is supplied at 40°F. A cooling tower with a 15 hp fan and 15 hp circulation pump serves the chiller.

Ventilation Systems

The classrooms are conditioned by unit ventilators with constant speed supply fans and outside air dampers. The administration offices are conditioned by four pipe fan coils located above the ceiling. The gym and kitchen are conditioned by package units located on the roof. The package units have direct expansion cooling. The gym unit has a direct fired furnace and the kitchen unit has a hot water coil. The only ventilation systems that have variable flow supply fans are the kitchen package unit and the gym exhaust fans.

All of the ventilation equipment is controlled by the campus building management system. The HVAC systems are enabled continuously but do utilize night setback control from 11:00 PM to 5:00 AM and on the weekends.

Domestic Hot Water Heating System

Domestic hot water is supplied primarily by the hybrid absorption chiller and a heat exchanger. There is also a 100 gallon, natural gas-fired storage water heater.

Food Service

The school has a kitchen to prepare meals for the students and staff. The kitchen equipment includes gas fired ovens, food warmers, steamers, and a dishwasher.

Refrigeration

The kitchen has free standing refrigerators and freezers for food storage and an ice machine.

Building Plug Load

The school has a typical range of office/education equipment. This includes televisions, projectors, printers, and approximately 70 computers including desktop and laptop units.

2.7 Water-Using Systems

A sampling of restroom and kitchen faucets found that many of the faucets are rated for 2.5 gallons per minute (gpm) or higher.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

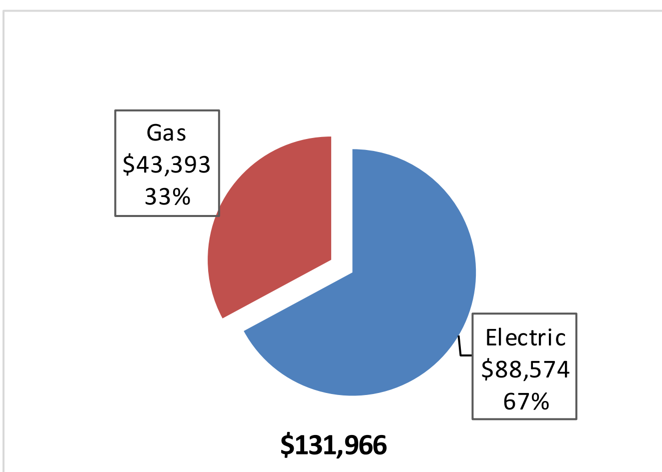
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Holly Glen Elementary School		
Fuel	**Usage**	**Cost**
Electricity	621,196 kWh	$88,574
Natural Gas	48,101 Therms	$43,393
Total		**$131,966**

The current annual energy cost for this facility is $131,966 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

The site purchases electricity from Constellation Electric and electric delivery is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.143/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 relatively flat annual electricity use profile is due to most of the comfort cooling at the campus being provided by a natural gas fired chiller. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

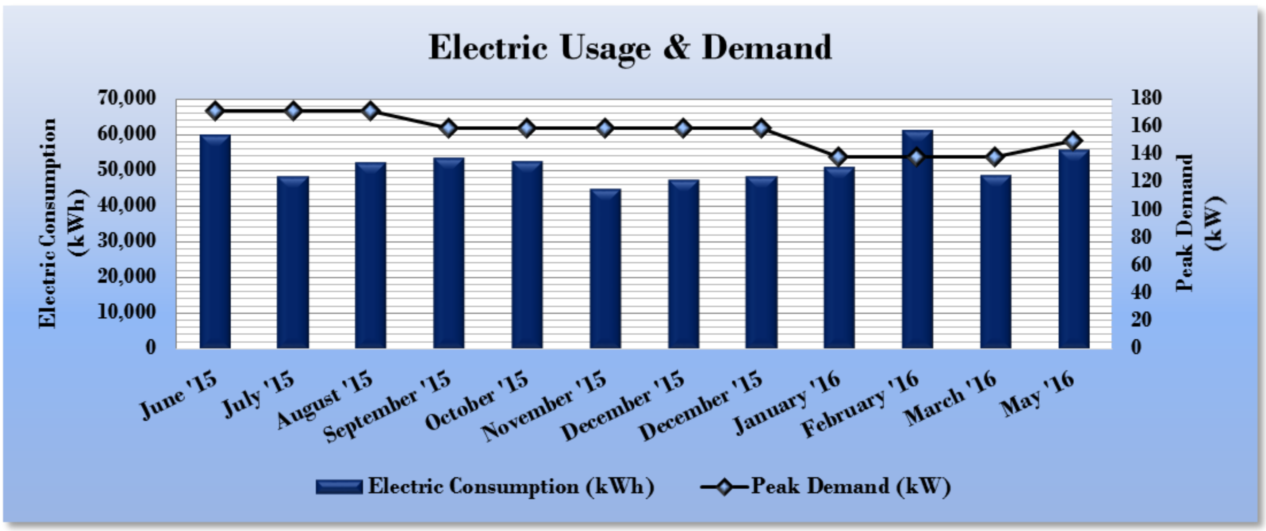


Figure 9 - Electric Usage & Demand

Electric Billing Data for Holly Glen Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/15/15	31	60,000	171	$1,397	$8,301
7/16/15	31	48,300	171	$1,397	$7,162
8/17/15	32	52,200	171	$1,397	$7,668
9/17/15	31	53,700	159	$1,299	$7,701
10/16/15	29	52,500	159	$1,299	$7,443
11/16/15	31	45,000	159	$1,299	$6,637
12/16/15	30	47,400	159	$1,299	$6,877
1/15/16	30	48,300	159	$1,299	$6,987
2/12/16	28	51,000	138	$1,128	$7,062
3/15/16	32	61,500	138	$1,128	$8,446
4/14/16	30	48,900	138	$1,128	$6,896
5/16/16	32	55,800	150	$1,226	$7,879
Totals	**367**	**624,600**	**171**	**$15,295**	**$89,059**
Annual	**365**	**621,196**	**171**	**$15,212**	**$88,574**

3.3 Natural Gas Usage

The campus purchases natural gas from Direct Energy and natural gas delivery is provided by South Jersey Gas. The average gas cost for the past 12 months is $0.902/therm, which is the blended rate used throughout the analyses in this report. Natural gas is used to provide both space heating and space cooling which accounts for the two peaks in use during the year. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

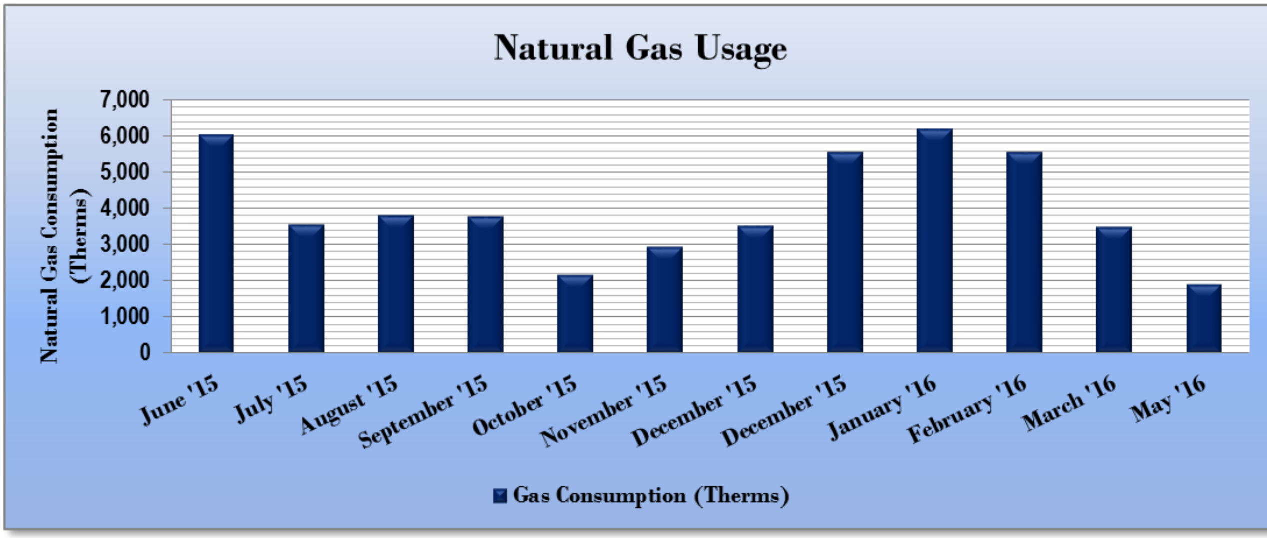


Figure 11 - Natural Gas Usage

Gas Billing Data for Holly Glen Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/15/15	31	6,012	$5,595
7/16/15	31	3,550	$3,303
8/17/15	32	3,797	$3,470
9/17/15	31	3,776	$3,460
10/16/15	29	2,169	$1,972
11/16/15	31	2,921	$2,613
12/16/15	30	3,518	$3,140
1/15/16	30	5,533	$4,921
2/12/16	28	6,183	$5,494
3/15/16	32	5,533	$4,924
4/14/16	30	3,474	$3,078
5/16/16	32	1,898	$1,661
Totals	**367**	**48,365**	**$43,630**
Annual	**365**	**48,101**	**$43,393**

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		
	Holly Glen Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	148.1	141.4
Site Energy Use Intensity (kBtu/ft^2)	87.7	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		
	Holly Glen Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	127.2	141.4
Site Energy Use Intensity (kBtu/ft^2)	80.7	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is one of the building categories that are eligible to receive a score. This facility has a current score of 68.

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

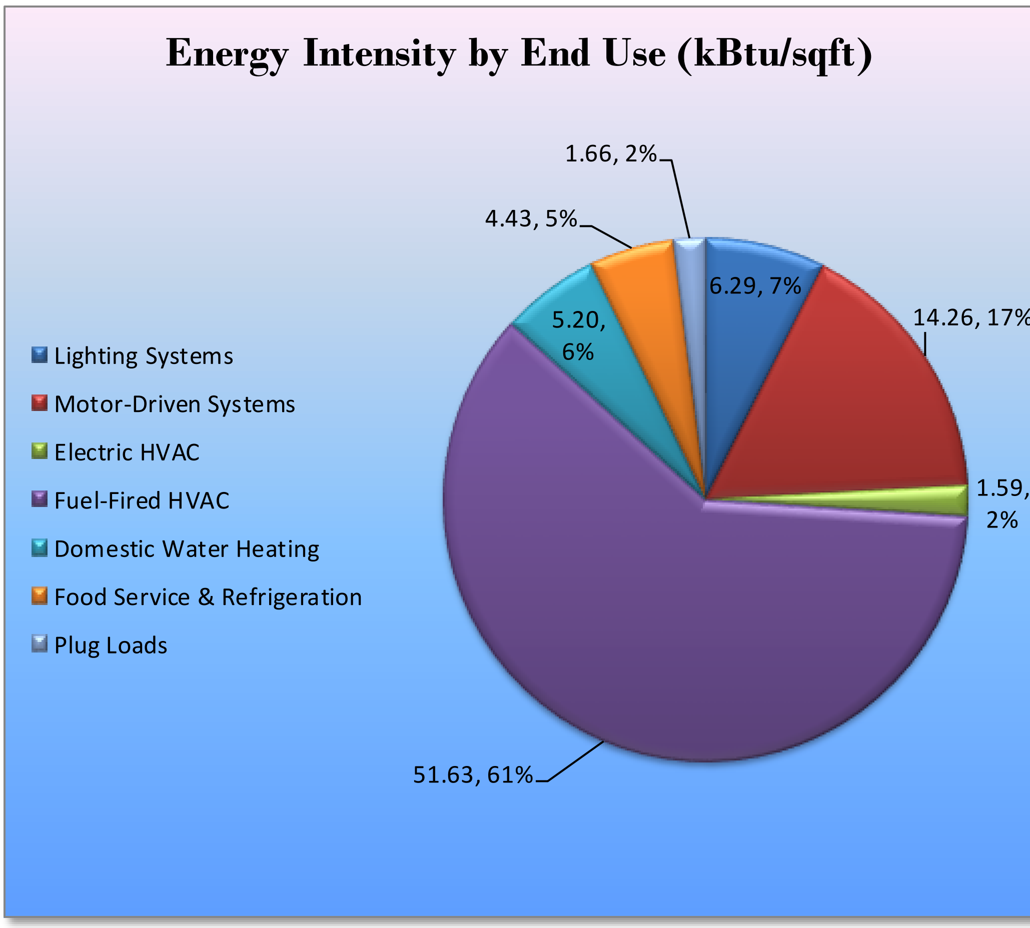
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 (% and kBtu/SF)



4 Energy Conservation Measures

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Holly Glen 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		**77,759**	**20.6**	**0.0**	**$11,087.40**	**$69,288.58**	**$12,290.00**	**$56,998.58**	**5.1**	**78,303**
ECM 1	Install LED Fixtures	12,702	1.7	0.0	$1,811.13	$7,813.54	$2,000.00	$5,813.54	3.2	12,791
ECM 2	Retrofit Fixtures with LED Lamps	65,057	18.9	0.0	$9,276.28	$61,475.04	$10,290.00	$51,185.04	5.5	65,512
Lighting Control Measures		**16,157**	**4.6**	**0.0**	**$2,303.75**	**$13,850.00**	**$1,845.00**	**$12,005.00**	**5.2**	**16,270**
ECM 3	Install Occupancy Sensor Lighting Controls	16,157	4.6	0.0	$2,303.75	$13,850.00	$1,845.00	$12,005.00	5.2	16,270
Motor Upgrades		**1,807**	**0.2**	**0.0**	**$257.72**	**$3,447.46**	**$0.00**	**$3,447.46**	**13.4**	**1,820**
ECM 4	Premium Efficiency Motors	1,807	0.2	0.0	$257.72	$3,447.46	$0.00	$3,447.46	13.4	1,820
Variable Frequency Drive (VFD) Measures		**54,259**	**4.6**	**0.0**	**$7,737.09**	**$16,772.95**	**$1,700.00**	**$15,072.95**	**1.9**	**54,645**
ECM 5	Install VFDs on Constant Volume (CV) HVAC	21,677	2.8	0.0	$3,090.80	$6,551.70	$800.00	$5,751.70	1.9	21,828
ECM 6	Install VFDs on Chilled Water Pumps	11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706
ECM 7	Install VFDs on Hot Water Pumps	11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706
ECM 8	Install VFDs on Single-Speed Kitchen Hoods	9,333	0.0	0.0	$1,331.16	$3,007.65	$900.00	$2,107.65	1.6	9,404
Domestic Water Heating Upgrade		**0**	**0.0**	**41.7**	**$375.86**	**$344.16**	**$0.00**	**$344.16**	**0.9**	**4,878**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	41.7	$375.86	$344.16	$0.00	$344.16	0.9	4,878
TOTALS		**149,983**	**30.1**	**41.7**	**$21,761.82**	**$103,703.15**	**$15,835.00**	**$87,868.15**	**4.0**	**155,916**

* - 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		77,759	20.6	0.0	$11,087.40	$69,288.58	$12,290.00	$56,998.58	5.1	78,303
ECM 1	Install LED Fixtures	12,702	1.7	0.0	$1,811.13	$7,813.54	$2,000.00	$5,813.54	3.2	12,791
ECM 2	Retrofit Fixtures with LED Lamps	65,057	18.9	0.0	$9,276.28	$61,475.04	$10,290.00	$51,185.04	5.5	65,512

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	12,702	1.7	0.0	$1,811.13	$7,813.54	$2,000.00	$5,813.54	3.2	12,791

Measure Description

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

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	65,057	18.9	0.0	$9,276.28	$61,475.04	$10,290.00	$51,185.04	5.5	65,512
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend retrofitting existing fluorescent fixtures 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. 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 fluorescent tubes.

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		**16,157**	**4.6**	**0.0**	**$2,303.75**	**$13,850.00**	**$1,845.00**	**$12,005.00**	**5.2**	**16,270**
ECM 3	Install Occupancy Sensor Lighting Controls	16,157	4.6	0.0	$2,303.75	$13,850.00	$1,845.00	$12,005.00	5.2	16,270

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
16,157	4.6	0.0	$2,303.75	$13,850.00	$1,845.00	$12,005.00	5.2	16,270

Measure Description

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

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

4.1.3 Motor Upgrades

ECM 4: Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,807	0.2	0.0	$257.72	$3,447.46	$0.00	$3,447.46	13.4	1,820

Measure Description

We recommend replacing standard efficiency motors with IHP 2014 efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

4.1.4 Variable Frequency Drive Measures

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

Figure 18 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**54,259**	**4.6**	**0.0**	**$7,737.09**	**$16,772.95**	**$1,700.00**	**$15,072.95**	**1.9**	**54,645**
ECM 5	Install VFDs on Constant Volume (CV) HVAC	21,677	2.8	0.0	$3,090.80	$6,551.70	$800.00	$5,751.70	1.9	21,828
ECM 6	Install VFDs on Chilled Water Pumps	11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706
ECM 7	Install VFDs on Hot Water Pumps	11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706
ECM 8	Install VFDs on Single-Speed Kitchen Hoods	9,333	0.0	0.0	$1,331.16	$3,007.65	$900.00	$2,107.65	1.6	9,404

ECM 5: Install VFDs on Constant Volume (CV) HVAC

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
21,677	2.8	0.0	$3,090.80	$6,551.70	$800.00	$5,751.70	1.9	21,828

Measure Description

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

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

ECM 6: Install VFDs on Chilled Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706

Measure Description

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

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

ECM 7: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
11,625	0.9	0.0	$1,657.57	$3,606.80	$0.00	$3,606.80	2.2	11,706

Measure Description

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

ECM 8: Install VFDs on Kitchen Hood Fan Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
9,333	0.0	0.0	$1,331.16	$3,007.65	$900.00	$2,107.65	1.6	9,404

Measure Description

We recommend installing variable frequency drives (VFDs) and sensors to control the kitchen hood fan motors. The air flow of the hood is varied based on two key inputs: temperature and smoke/cooking fumes. The VFD controls the amount of exhaust (and kitchen make-up air) based on temperature—the lower the temperature the lower the flow. If the optic sensor is triggered by smoke or cooking fumes, the speed of the fan ramps up to 100%. The magnitude of energy savings is based on the estimated amount of time that the system will operate at partial load.

4.1.5 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 19 below.

Figure 19 - 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**	**41.7**	**$375.86**	**$344.16**	**$0.00**	**$344.16**	**0.9**	**4,878**
ECM 9	Install Low-Flow Domestic Hot Water Devices	0	0.0	41.7	$375.86	$344.16	$0.00	$344.16	0.9	4,878

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	41.7	$375.86	$344.16	$0.00	$344.16	0.9	4,878

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy.

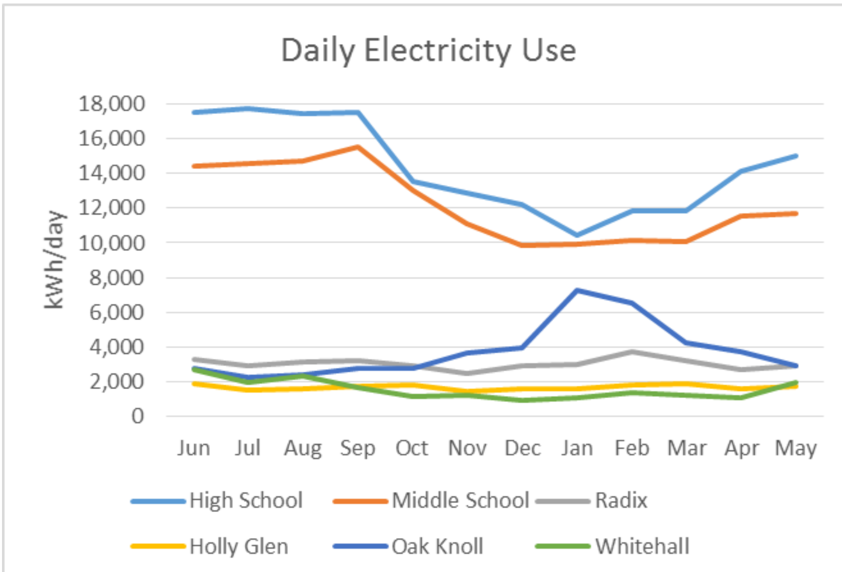
Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

4.2 ECMs for Further Evaluation

Summer electricity use is higher than expected for all of the Monroe Township schools included in the LGEA Program. School is not in session July through August, however, the daily electricity use during those months ranges from 84% to 101% of the daily use in June and September. These use patterns are shown in the graph below. Even accounting for summer maintenance and community activities at the schools the electricity use should decrease when school is not in session.

The indication is that equipment, and in particular HVAC equipment, are operating longer than necessary. It is recommended that a retro-commissioning study be conducted district wide with particular focus on the building management system. Several of the schools use night setback controls for the HVAC. It is also recommended that a control strategy be implemented that turns off the HVAC fans and package units when the buildings are not occupied and then uses a high/low temperature limit to turn the equipment back on if the interior temperature exceeds the limits. This will reduce HVAC equipment operations while still maintaining freeze protection control.

Figure 20 – Daily Electricity Use



5 Energy Efficient Practices

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

Reduce Air Leakage

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

Close Doors and Windows

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

Use Window Treatments/Coverings

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

Ensure Economizers are Functioning Properly

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

Reset Heating and Chilled Water Temperature

The heating and cooling water temperature supplied by the hybrid chiller are maintained at constant setpoints of 40°F for cooling and 160°F for heating. Setting these temperatures back when the campus is not occupied will reduce heat gain/loss throughout the distribution system and reduce the runtime of the hybrid chiller. Consider using setpoints of 50°F and 140°F respectively for periods that the campus is unoccupied. Some experimentation will be required to find the optimum setback temperature and period that allows the system to recover to the occupied operating temperatures. Additional fine tuning of the setback temperature will be required if the distribution system is converted to variable flow.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper 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.

Replace Computer Monitors

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

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 gallons per flush (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.

The district staff informed the TRC auditor that the district is committed to the installation of PV for on-site generation.

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

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

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

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.

The campus has a moderate thermal load, however, installing a CHP system to replace the hybrid chiller/heater is unlikely to be cost effective. This combined with the district's intent to install PV are the most significant factors contributing to the low 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 backup generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

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

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

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

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

In our opinion Holly Glen is not a good candidate for DR due to the limited loads that could be shed or the automated control capability to easily shed load.

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 an 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 21 for a list of the eligible programs identified for each recommended ECM.

Figure 21 – ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	Direct Install
ECM 1	Install LED Fixtures	x	x
ECM 2	Retrofit Fixtures with LED Lamps	x	x
ECM 3	Install Occupancy Sensor Lighting Controls	x	x
ECM 4	Premium Efficiency Motors		x
ECM 5	Install VFDs on Constant Volume (CV) HVAC	x	x
ECM 6	Install VFDs on Chilled Water Pumps		x
ECM 7	Install VFDs on Hot Water Pumps		x
ECM 8	Install VFDs on Single-Speed Kitchen Hoods	x	x
ECM 9	Install Low-Flow Domestic Hot Water Devices		x

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with a peak electric demand that does not exceed 200 kW for a recent 12-month period. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

To participate in the Direct Install program you will need to contact the participating contractor who the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

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

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

8.3 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter into 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
Boiler Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,235	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,235	0.17	367	0.0	$52.30	$526.50	$90.00	8.35
Custodian Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,235	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	865	0.11	237	0.0	$33.78	$350.00	$60.00	8.59
Entrance	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.09	304	0.0	$43.29	$234.00	$40.00	4.48
Main Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.22	767	0.0	$109.40	$738.00	$115.00	5.69
Tech Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	190	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	190	0.02	7	0.0	$1.03	$58.50	$10.00	47.17
A102 G office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.16	575	0.0	$82.05	$416.80	$80.00	4.10
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,000	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,000	0.04	152	0.0	$21.64	$117.00	$20.00	4.48
A102 E office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.08	288	0.0	$41.03	$266.40	$50.00	5.27
A102 D office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.16	575	0.0	$82.05	$416.80	$80.00	4.10
Lavatory	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	865	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	865	0.04	66	0.0	$9.36	$117.00	$20.00	10.37
Conference Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.19	675	0.0	$96.29	$496.53	$100.00	4.12
Hallway	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.28	987	0.0	$140.69	$760.50	$130.00	4.48
Hallway	22	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,000	Relamp	No	22	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,000	0.23	810	0.0	$115.44	$1,060.40	$220.00	7.28
Hallway	10	Compact Fluorescent: one lamp	Wall Switch	23	2,000	None	No	10	Compact Fluorescent: one lamp	Wall Switch	23	2,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Gym	40	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	40	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	1.92	6,753	0.0	$962.86	$4,345.33	$870.00	3.61
Supply Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.04	152	0.0	$21.64	$117.00	$20.00	4.48
A101B Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$27.35	$233.00	$40.00	7.06
Lavatory	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	865	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	865	0.02	33	0.0	$4.68	$58.50	$10.00	10.37
Kitchen	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.52	1,822	0.0	$259.83	$1,381.50	$225.00	4.45
Kitchen	22	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	22	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	1.06	3,714	0.0	$529.57	$2,092.93	$440.00	3.12
Kitchen	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	32	1,400	0.08	273	0.0	$38.96	$510.00	$0.00	13.09
Kitchen	6	Compact Fluorescent: one lamp	Wall Switch	42	2,000	None	No	6	Compact Fluorescent: one lamp	Wall Switch	42	2,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Cafeteria	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	1.15	4,052	0.0	$577.71	$2,823.20	$550.00	3.93
Backstage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,235	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,235	0.13	281	0.0	$40.10	$351.00	$60.00	7.26
Backstage	1	Compact Fluorescent: one lamp	Wall Switch	42	1,235	None	No	1	Compact Fluorescent: one lamp	Wall Switch	42	1,235	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Backstage	2	Incandescent: one lamp	Wall Switch	60	1,235	Relamp	No	2	LED Screw-In Lamps: Incandescent: one lamp	Wall Switch	7	1,235	0.07	151	0.0	$21.47	$107.51	$10.00	4.54
Nurse	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.14	480	0.0	$68.38	$562.50	$85.00	6.98
Nurse	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.29	1,007	0.0	$143.59	$526.40	$105.00	2.93
Lavatory	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	865	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	865	0.03	49	0.0	$7.02	$75.20	$15.00	8.58
B103	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.41	1,439	0.0	$205.13	$1,022.00	$185.00	4.08
B103	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	32	1,400	0.03	91	0.0	$12.99	$170.00	$0.00	13.09
B103	2	Compact Fluorescent: one lamp	Wall Switch	23	2,000	None	Yes	2	Compact Fluorescent: one lamp	Occupancy Sensor	23	1,400	0.01	32	0.0	$4.53	$0.00	$0.00	0.00
Lavatory	1	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Occupancy Sensor	63	865	Relamp	No	1	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	865	0.02	29	0.0	$4.11	$76.53	$20.00	13.75
Stock Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	190	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	190	0.02	7	0.0	$1.03	$58.50	$10.00	47.17
Room 1 & Room 2	60	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	60	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	1.64	5,755	0.0	$820.53	$4,050.00	$670.00	4.12
Rooms 3, 4, 7, 9 & 27	85	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	85	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	2.32	8,152	0.0	$1,162.41	$6,322.50	$1,025.00	4.56
Rooms 5, 6, 8, 11, 17-26, 34-38	342	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	342	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	9.35	32,801	0.0	$4,677.00	$25,137.00	$4,085.00	4.50
Rooms 17 & 18	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.03	101	0.0	$14.33	$611.80	$80.00	37.11
Rooms 12-16, 28, 30-33	150	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	150	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	4.10	14,387	0.0	$2,051.31	$11,475.00	$1,850.00	4.69
Reading Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.14	480	0.0	$68.38	$408.50	$70.00	4.95
Faculty Rest Rooms	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.03	101	0.0	$14.33	$303.80	$50.00	17.71
Electrical Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	240	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	240	0.04	18	0.0	$2.60	$117.00	$20.00	37.35
Student Rest Rooms	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	865	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	865	0.02	35	0.0	$4.96	$71.80	$10.00	12.46
Student Rest Rooms	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	865	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	865	0.13	197	0.0	$28.07	$351.00	$60.00	10.37
Student Rest Rooms	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	62	865	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	32	865	0.04	60	0.0	$8.51	$340.00	$0.00	39.97
Student Rest Rooms	4	Compact Fluorescent: one lamp	Occupancy Sensor	42	865	None	No	4	Compact Fluorescent: one lamp	Occupancy Sensor	42	865	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 21	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.57	2,014	0.0	$287.18	$1,498.50	$245.00	4.36
Faculty Rest Room	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,400	0.01	49	0.0	$6.92	$164.20	$30.00	19.39
TV Studio	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.13	455	0.0	$64.93	$351.00	$60.00	4.48
Hallways	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.22	759	0.0	$108.22	$585.00	$100.00	4.48

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Hallways	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,000	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,000	0.13	442	0.0	$62.97	$578.40	$120.00	7.28
Hallways	17	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	17	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	32	2,000	0.33	1,173	0.0	$167.25	$2,890.00	$0.00	17.28
Hallways	5	Compact Fluorescent: one lamp	Wall Switch	23	2,000	None	No	5	Compact Fluorescent: one lamp	Wall Switch	23	2,000	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exit Signs	24	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	24	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	8	Compact Fluorescent: recessed	None	42	4,380	None	No	8	Compact Fluorescent: recessed	None	42	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	9	LED Screw-In Lamps: wall pack	None	30	4,380	None	No	9	LED Screw-In Lamps: wall pack	None	30	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	2	Compact Fluorescent: wall pack	None	26	4,380	None	No	2	Compact Fluorescent: wall pack	None	26	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	2	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	20	4,380	0.15	1,189	0.0	$169.50	$781.35	$200.00	3.43
Exterior	18	High-Pressure Sodium: (1) 150W Lamp	None	188	4,380	Fixture Replacement	No	18	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	40	4,380	1.75	13,419	0.0	$1,913.30	$7,032.19	$1,800.00	2.73

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
Rooms 17-22	Kindergarden class room Uvs	6	Supply Fan	0.3	67.0%	No	7,300	No	67.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gym - RTU1A	1	Supply Fan	5.0	86.5%	Yes	7,300	No	86.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Kitchen - RTU2	1	Supply Fan	2.0	85.5%	Yes	7,300	No	85.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ceiling	Administiation office fan coils	6	Supply Fan	0.1	60.0%	No	7,300	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
various	Halls and vestibule unit heaters	7	Supply Fan	0.1	60.0%	No	4,380	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gym - EF	1	Exhaust Fan	0.8	81.0%	Yes	7,300	No	81.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen Hood	1	Kitchen Hood Exhaust Fan	3.0	89.5%	No	7,300	No	89.5%	Yes	1	0.00	9,333	0.0	$1,331.16	$3,007.65	$900.00	1.58
Cafeteria	Cafeteria AHU2	2	Supply Fan	5.0	87.5%	No	7,300	Yes	89.5%	Yes	2	2.90	22,615	0.0	$3,224.65	$8,152.44	$800.00	2.28
Offices	Offices AHU1	2	Supply Fan	0.8	80.0%	No	7,300	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classroom UV	5	Supply Fan	0.2	60.0%	No	7,300	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classroom UV	34	Supply Fan	0.3	70.0%	No	7,300	No	70.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classroom EF	1	Exhaust Fan	5.5	75.0%	No	7,300	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Campus	1	Chilled Water Pump	7.5	91.7%	No	4,380	No	91.7%	Yes	1	0.92	11,625	0.0	$1,657.57	$3,606.80	$0.00	2.18
Boiler Room	Campus	1	Heating Hot Water Pump	7.5	91.7%	No	4,380	No	91.7%	Yes	1	0.92	11,625	0.0	$1,657.57	$3,606.80	$0.00	2.18
Boiler Room	Campus	1	Condenser Water Pump	15.0	91.0%	No	4,380	Yes	93.0%	No		0.15	869	0.0	$123.86	$1,846.72	$0.00	14.91
Roof	Campus	1	Cooling Tower Fan	15.0	91.0%	Yes	2,190	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Campus	1	Other	2.0	84.0%	No	1,320	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Gym - RTU1A	1	Packaged AC	18.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Kitchen - RTU2	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library Office	Library Office	1	Window AC	0.67		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Teacher Planning	Teacher Planning	1	Window AC	1.25		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 1	Room 1	1	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 2	Room 2	1	Window AC	1.25		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations (first row is the furnace portion of the absorption chiller and second row is the cooling portion)

		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	Campus	1	Furnace	2,857.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	Campus	1	Furnace	1,980.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Gym - RTU1A	1	Furnace	250.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

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

Low-Flow Device Recommendations

	Recommendation 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
Offices	4	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	1.1	$9.64	$28.68	$0.00	2.98
Classes	9	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	12.0	$108.42	$64.53	$0.00	0.60
Classes	12	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	3.2	$28.91	$86.04	$0.00	2.98
Offices	1	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	1.3	$12.05	$7.17	$0.00	0.60
Kitchen	5	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	1.3	$12.05	$35.85	$0.00	2.98
Kitchen	2	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	2.7	$24.09	$14.34	$0.00	0.60
Restrooms	15	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	20.0	$180.70	$107.55	$0.00	0.60

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	3	Stand-Up Freezer, Solid Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Refrigerator, Glass Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	2	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Ice Making Head (<450 lbs/day), Batch	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

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

Dishwasher Inventory & Recommendations

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

Plug Load Inventory

Location	Existing Conditions: Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
General	53	Computer	270.0	No
General	15	Laptop	75.0	Yes
General	4	Printer, small	400.0	Yes
General	9	Printer, medium	600.0	Yes
General	3	Printer, large	800.0	Yes
General	35	Projector	50.0	Yes
General	11	Microwave	1,500.0	Yes
General	4	Refrigerator, small	126.0	Yes
General	5	Refrigerator, medium	226.0	Yes
General	2	Refrigerator, large	572.0	Yes
General	2	Coffee Machine	900.0	No
General	1	Toaster Oven	1,500.0	No
General	1	Clothes washer	1,200.0	No
General	1	Clothes dryer	5,000.0	No
General	40	TV, LCD 42 inch	200.0	Yes
General	1	Hot/Cold Water	600.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

68

ENERGY STAR® Score[1]

Holly Glen Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 79,055
Built: 1967

For Year Ending: April 30, 2016
Date Generated: May 05, 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
Holly Glen Elementary School
900 Main Street
Williamstown, New Jersey 08094

Property ID: 5016227

Property Owner
____
,
(____)____-______

Primary Contact
____ ________
,
(____)____-______
____

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
89.6 kBtu/ft²

Source EUI
150.2 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	4,954,393 (70%)
Electric - Grid (kBtu)	2,125,896 (30%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	106.4
National Median Source EUI (kBtu/ft²)	178.5
% Diff from National Median Source EUI	-16%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	507

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)