



Local Government Energy Audit: Energy Audit Report



Copyright ©2017 TRC Energy Services. All rights reserved.

Reproduction or distribution of the whole, or any part of the contents of this document without written permission of TRC is prohibited. Neither TRC nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any data, information, method, product or process disclosed in this document, or represents that its use will not infringe upon any privately-owned rights, including but not limited to, patents, trademarks or copyrights.

Lanoka Harbor Elementary School

Lacey Township Board of Education
281 Manchester Avenue
Lanoka Harbor, NJ 08734

March 16, 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

1	Executive Summary.....	1
1.1	Facility Summary	1
1.2	Your Cost Reduction Opportunities.....	1
	Energy Conservation Measures.....	1
	Energy Efficient Practices	3
	On-Site Generation Measures.....	4
1.3	Implementation Planning.....	4
2	Facility Information and Existing Conditions	6
2.1	Project Contacts	6
2.2	General Site Information.....	6
2.3	Building Occupancy	6
2.4	Building Envelope	7
2.5	On-Site Generation.....	7
2.6	Energy-Using Systems	7
	Lighting System	7
	Hot Water Heating System.....	7
	Direct Expansion Air Conditioning System (DX)	8
	Domestic Hot Water Heating System.....	8
	Food Service	8
	Refrigeration	8
	Building Plug Load	8
2.7	Water-Using Systems	8
3	Site Energy Use and Costs.....	9
3.1	Total Cost of Energy	9
3.2	Electricity Usage	10
3.3	Natural Gas Usage	11
3.4	Benchmarking.....	12
3.5	Energy End-Use Breakdown	13
4	Energy Conservation Measures	14
4.1	Recommended ECMs	14
4.1.1	Lighting Upgrades.....	15
	ECM 1: Install LED Fixtures	15
	ECM 2: Retrofit Fixtures with LED Lamps	15
4.1.2	Lighting Control Measures	16
	ECM 3: Install Occupancy Sensor Lighting Controls	16
	ECM 4: Install High/Low Lighting Controls	17
4.1.3	Motor Upgrades	17
	ECM 5: Premium Efficiency Motors.....	17
4.1.4	Variable Frequency Drive Measures	19

ECM 6: Install VFDs on Hot Water Pumps.....	19
ECM 7: Install Boiler Draft Fan VFDs	19
4.1.5 Domestic Hot Water Heating System Upgrades	20
ECM 8: Install Low-Flow DHW Devices.....	20
4.1.6 Plug Load Equipment Control - Vending Machines.....	20
ECM 9: Vending Machine Control	20
4.2 ECMs Evaluated But Not Recommended	21
Install High Efficiency Hot Water Boilers.....	21
5 Energy Efficient Practices	23
Reduce Air Leakage	23
Close Doors and Windows	23
Use Window Treatments/Coverings	23
Perform Proper Lighting Maintenance.....	23
Develop a Lighting Maintenance Schedule	23
Ensure Lighting Controls Are Operating Properly	24
Perform Routine Motor Maintenance	24
Practice Proper Use of Thermostat Schedules and Temperature Resets	24
Clean Evaporator/Condenser Coils on AC Systems	24
Check for and Seal Duct Leakage	24
Perform Proper Boiler Maintenance	24
Perform Proper Water Heater Maintenance	25
Plug Load Controls.....	25
Water Conservation	25
6 On-Site Generation Measures	26
6.1 Photovoltaic.....	26
6.2 Combined Heat and Power	26
7 Demand Response	28
8 Project Funding / Incentives	29
8.1 SmartStart	30
8.2 Direct Install	31
8.3 Energy Savings Improvement Program	31
9 Energy Purchasing and Procurement Strategies	33
9.1 Retail Electric Supply Options.....	33
9.2 Retail Natural Gas Supply Options	33

Appendix A: Equipment Inventory & Recommendations

Appendix B: ENERGY STAR® Statement of Energy Performance

Table of Figures

Figure 1 –Previous 12 Month Utility Costs	2
Figure 2 –Potential Post-Implementation Costs	2
Figure 3 –Summary of Energy Reduction Opportunities	2
Figure 4–Project Contacts	6
Figure 5-Building Schedule.....	6
Figure 6-Utility Summary	9
Figure 7-Energy Cost Breakdown.....	9
Figure 8-Electric Usage & Demand	10
Figure 9-Electric Usage & Demand	10
Figure 10 Natural Gas Usage.....	11
Figure 11 Natural Gas Usage.....	11
Figure 12-Existing Conditions.....	12
Figure 13 Energy Use Intensity Comparison–Following Installation of Recommended Measures	12
Figure 14 -Energy Balance (kBtu/SF,%).....	13
Figure 15 – Summary of Recommended ECMs.....	14
Figure 16 – Summary of Lighting Upgrade ECMs.....	15
Figure 17 – Summary of Lighting Control ECMs	16
Figure 18 – Summary of Variable Frequency Drive ECMs	19
Figure 19 -Summary of Domestic Water Heating ECMs	20
Figure 20 – Summary of Measures Evaluated, But Not Recommended	21
Figure 21 -Combined Heat and Power Screening	27
Figure 22 -ECM Incentive Program Eligibility.....	29

I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPUB) has sponsored this Local Government Energy Audit (LGEA) Report for Lanoka Harbor 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, as part of a comprehensive effort to assist Lacey Township Board of Education in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

I.1 Facility Summary

Lanoka Harbor Elementary School is a 51,630 square foot facility comprised of a single story public school building that provides educational services at the elementary grade level (K-4).

Lighting at Lanoka Harbor Elementary School consists primarily of a mixture of T8 and T12 fluorescent sources, which are inefficient compared to currently available alternatives. Cooling and ventilation are provided by relatively efficient split system air conditioning units, although the older units are less efficient and close to retirement age at 18-20 years. Heating is provided by two large hot water boilers that are nearly 50 years old. Space heating for most zones is provided by unit ventilators. A measure to replace the boilers was evaluated but not recommended due to the long payback. HVAC systems are monitored and controlled through a building management system. A thorough description of the facility and our observations are located in Section 2.

I.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC Energy Services recommends nine (9) measures which together represent an opportunity for Lanoka Harbor Elementary School to reduce annual energy costs by \$7,391 and annual greenhouse gas emissions by 99,615 lbs CO₂e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 9.9 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 Lanoka Harbor Elementary School's annual energy use by 10%.

Figure 1 –Previous 12 Month Utility Costs

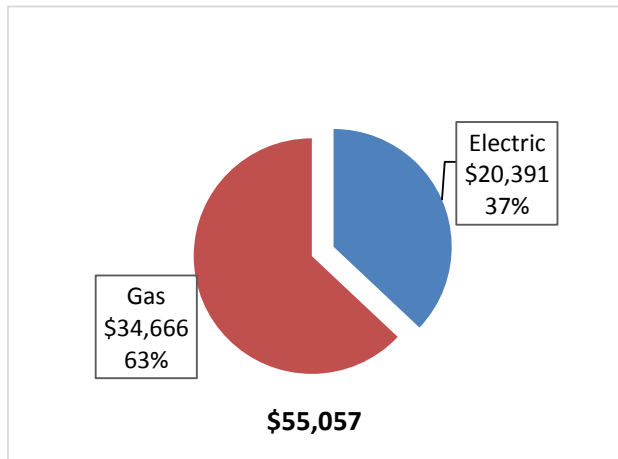
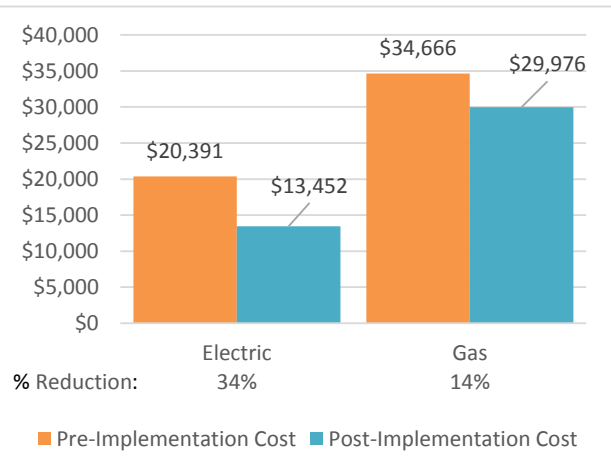


Figure 2 –Potential Post-Implementation Costs



A detailed description of Lanoka Harbor 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		58,702	19.9	0.0	\$4,296.65	\$35,265.97	\$2,310.00	\$32,955.97	7.7	59,112
ECM 1 Install LED Fixtures	Yes	2,767	0.4	0.0	\$202.55	\$2,998.80	\$20.00	\$2,978.80	14.7	2,787
ECM 2 Retrofit Fixtures with LED Lamps	Yes	55,934	19.5	0.0	\$4,094.10	\$32,267.17	\$2,290.00	\$29,977.17	7.3	56,325
Lighting Control Measures		9,436	3.3	0.0	\$690.68	\$14,476.00	\$1,580.00	\$12,896.00	18.7	9,502
ECM 3 Install Occupancy Sensor Lighting Controls	Yes	7,223	2.5	0.0	\$528.68	\$12,076.00	\$1,580.00	\$10,496.00	19.9	7,274
ECM 4 Install High/Low Lighting Controls	Yes	2,213	0.8	0.0	\$161.99	\$2,400.00	\$0.00	\$2,400.00	14.8	2,229
Motor Upgrades		1,334	0.4	0.0	\$97.68	\$6,040.65	\$0.00	\$6,040.65	61.8	1,344
ECM 5 Premium Efficiency Motors	Yes	1,334	0.4	0.0	\$97.68	\$6,040.65	\$0.00	\$6,040.65	61.8	1,344
Variable Frequency Drive (VFD) Measures		23,710	4.4	0.0	\$1,735.42	\$21,300.56	\$775.00	\$20,525.56	11.8	23,875
ECM 6 Install VFDs on Hot Water Pumps	Yes	17,058	2.2	0.0	\$1,248.55	\$15,017.06	\$0.00	\$15,017.06	12.0	17,177
ECM 7 Install Boiler Draft Fan VFDs	Yes	6,652	2.3	0.0	\$486.87	\$6,283.50	\$775.00	\$5,508.50	11.3	6,698
Gas Heating (HVAC/Process) Replacement		0	0.0	332.2	\$4,236.78	\$123,419.30	\$5,020.72	\$118,398.58	27.9	38,899
Install High Efficiency Hot Water Boilers	No	0	0.0	332.2	\$4,236.78	\$123,419.30	\$5,020.72	\$118,398.58	27.9	38,899
Domestic Water Heating Upgrade		0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159
ECM 8 Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159
Plug Load Equipment Control - Vending Machine		1,612	0.0	0.0	\$117.98	\$230.00	\$0.00	\$230.00	1.9	1,623
ECM 9 Vending Machine Control	Yes	1,612	0.0	0.0	\$117.98	\$230.00	\$0.00	\$230.00	1.9	1,623
TOTAL RECOMMENDED MEASURES		94,794	28.0	35.5	\$7,391.34	\$77,650.16	\$4,665.00	\$72,985.16	9.9	99,615
TOTAL FOR ALL MEASURES		94,794	28.0	367.7	\$11,628.12	\$201,069.46	\$9,685.72	\$191,383.74	16.5	138,514

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

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

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

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

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

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

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

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

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

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 Lanoka Harbor 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
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Check for and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Lanoka Harbor Elementary School. The site has a 50 kW photovoltaic (PV) array that supplies electricity to the school. Based on the configuration of the site and its loads there is a low potential for installing any combined heat and power self-generation measures.

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

I.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

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 than 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 8.3 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon

commercial facilities to reduce their electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4—Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Patrick S. DeGeorge	Business Administrator	pdegeorge@laceyschools.org	(609) 971-2000 x 1001
Designated Representative			
David Klink			
TRC Energy Services			
Smruti Srinivasan	Auditor	SSrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On April 6, 2017, TRC performed an energy audit at Lanoka Harbor Elementary School located in Lanoka Harbor, New Jersey. TRC’s team met with David Klink to review the facility operations and help focus our investigation on specific energy-using systems.

Lanoka Harbor Elementary School is a 51,630 square foot facility comprised of a single story public school building that provides educational services at the elementary grade level.

Lighting at Lanoka Harbor Elementary School consists primarily of a mixture of T8 and T12 fluorescent sources, which are inefficient compared to currently available alternatives. Cooling and ventilation are provided by relatively efficient split system air conditioning units, although the older units are less efficient and close to retirement age at 18-20 years. Heating is provided by two large hot water boilers that are nearly 50 years old. Space heating for most zones is provided by unit ventilators. HVAC systems are monitored and controlled through a building management system.

The building was constructed in 1969. The facility has replaced some of its existing T12 fluorescent fixtures with T8 fluorescent fixtures. The site installed photovoltaic panels as part of a district-wide effort.

2.3 Building Occupancy

The school building is open Monday through Friday from approximately 8:00 AM through 3:30 PM during the school year September through June. During a typical day, the facility is occupied by a total of approximately 600 staff and students. The typical schedule is presented in the table below.

Figure 5—Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Lanoka Harbor Elementary School	Weekday	8:00 AM - 3:30 PM
Lanoka Harbor Elementary School	Weekend	not occupied

2.4 Building Envelope

Lanoka Harbor Elementary School is a single story building. The construction is brick façade with double pane windows. The roof is flat, composition type with photovoltaic solar panels.



2.5 On-Site Generation

As part of a 2009 district-wide effort, Lanoka Harbor Elementary School installed a 50 kW solar energy project consisting of rooftop mounted photovoltaic panels. The building power requirements are relatively small and the facility does not have ability to utilize waste heat, therefore, distributed generation measures are not recommended for this site.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting is provided mostly by fixtures containing highly inefficient 34 Watt linear T12 fluorescent lamps and magnetic ballasts. A significant number of light fixtures contain somewhat more efficient linear 32 W fluorescent T8 lamps and electronic ballasts. Compact fluorescent lamps have been installed replacing incandescent lamps in storage spaces. Building exit signs use LED sources. Interior lighting control is provided by manually operated switches.

The building's exterior lighting is provided by a mix of fluorescent, metal halide, and LED fixtures controlled to operate only during non-daylight hours..

Hot Water Heating System

The heating hot water system consists of two (2) HB Smith Bryan forced draft boilers rated at 125 and 75 boiler hp. The boilers have a nominal combustion efficiency of 78%. The boilers provide hot water to the original wing and the additions via five (5) pumps. Heat is distributed to the classrooms and offices by distributed perimeter convection heaters.

The boilers are original equipment (1969) in operational condition. A project to replace the boilers as investigated but not recommended on the basis of energy savings alone.

Direct Expansion Air Conditioning System (DX)

Space cooling is limited to a portion of the building; cooling is generally limited to office areas, computer rooms, library, and the 1997 addition. Most cooled areas are served by split system air conditioning systems with capacities ranging between 1 and 3 tons, although several units also provide heating capacity when functioning in heat pump mode.

The HVAC systems are controlled by the building EMS which schedules and optimizes cooling systems based on control algorithms and control inputs including zone and outside air temperature sensor readings.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of an AO Smith gas fired 77 gallon water heater with an input rating of 199 kBtu/hr. A small circulating pump provides domestic hot water throughout the building.

Food Service

The school has an all-electric warming kitchen. Food warming equipment consists of a full sized convection oven and three insulated food holding cabinets. The kitchen also contains a Hobart dishwasher with electric booster heater.

Refrigeration

The facility has two (2) cold storage areas, a walk-in cooler box and a walk-in freezer. The facility also has a reach in milk cooler.

Building Plug Load

There are approximately 94 computer work stations throughout the facility, the majority with LCD monitors. Classroom areas are equipped with smart boards and projectors. The facility plug load includes several copiers, printers, and other office equipment. A small service kitchen includes a coffee machine, refrigerator, microwave, and toaster. The faculty room has a refrigerated beverage vending machine.

2.7 Water-Using Systems

There are several faculty and student restrooms. A sampling of restrooms found that all of the faucets are rated for 2.0 gallons per minute (gpm) or higher. Additionally, there are kitchen sink fixtures located in some classrooms and lounges. Replacement of sink aerators with low flow devices is recommended.

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

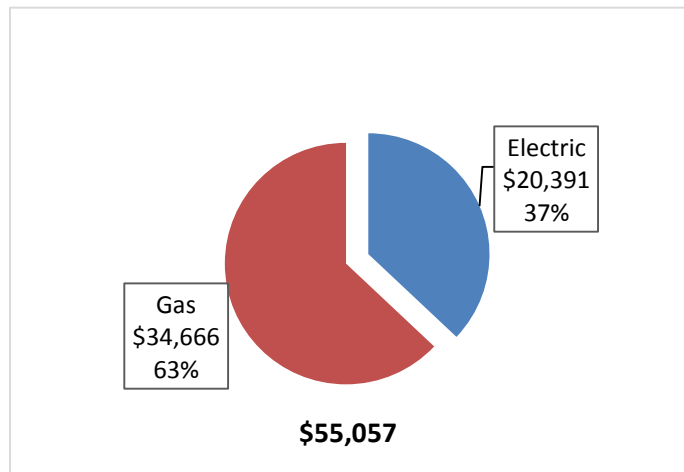
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6-Utility Summary

Utility Summary for Lanoka Harbor Elementary School		
Fuel	Usage	Cost
Electricity	278,584 kWh	\$20,391
Natural Gas	27,183 Therms	\$34,666
Total		\$55,057

The current annual energy cost for this facility is \$55,057 as shown in the chart below.

Figure 7-Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L and supplemented by on-site generation. The average electric cost over the past 12 months for purchased power was \$0.073/kWh, which is the blended rate that includes energy supply, distribution, and other charges. Solar production accounts for over 45% of the facility total electricity use. Costs are not tabulated for the energy produced by the solar panels, which, brings down the site's overall cost of electricity. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

The summer electricity use is unusually high for a site that does not have summer school. It is recommended that the facility adjust the control system programming to match occupancy schedules during periods of reduced occupancy.

Figure 8-Electric Usage & Demand

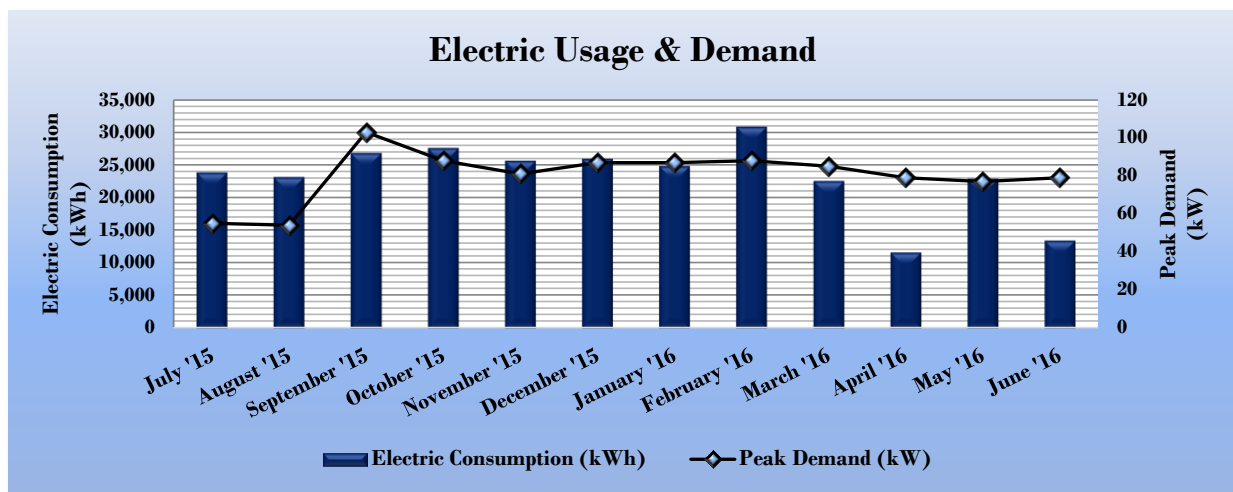


Figure 9-Electric Usage & Demand

Summary Electric Billing Data for Lanoka Harbor Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
7/23/15	30	23,734	55	\$268	\$739
8/24/15	32	23,039	54	\$263	\$601
9/23/15	30	26,688	103	\$556	\$1,768
10/23/15	30	27,461	88	\$438	\$807
11/23/15	31	25,511	81	\$397	\$2,159
12/23/15	30	25,817	87	\$432	\$2,430
1/22/16	30	24,740	87	\$430	\$3,478
2/23/16	32	30,723	88	\$435	\$2,692
3/23/16	29	22,435	85	\$419	\$1,923
4/21/16	29	11,536	79	\$384	\$1,025
5/20/16	29	22,761	77	\$374	\$1,700
6/21/16	32	13,376	79	\$414	\$1,013
Totals	364	277,821	103	\$4,810	\$20,335
Annual	365	278,584	103	\$4,823	\$20,391

3.3 Natural Gas Usage

Natural gas is provided by New Jersey Natural Gas. The average gas cost for the past 12 months is \$1.275/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

The gas use indicates seasonal variation due to winter heating. The low baseline gas use corresponds to domestic hot water heating, a year-round activity.

Figure 10 Natural Gas Usage

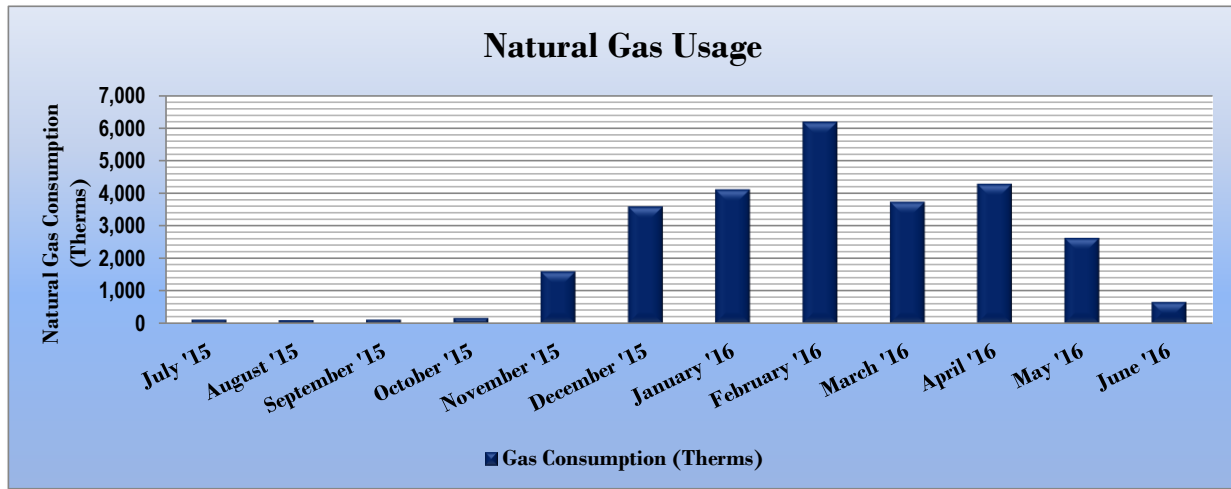


Figure 11 Natural Gas Usage

Gas Billing Data for Lanoka Harbor Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
7/20/15	31	116	466
8/17/15	28	98	452
9/15/15	29	114	465
10/15/15	30	164	502
11/13/15	29	1,591	1,628
12/16/15	33	3,579	4,858
1/16/16	31	4,096	6,874
2/19/16	34	6,170	8,943
3/16/16	26	3,722	3,345
4/19/16	34	4,268	3,781
5/18/16	29	2,613	2,459
6/18/16	31	652	893
Totals	365	27,183	\$34,666
Annual	365	27,183	\$34,666

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-Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Lanoka Harbor Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	113.1	141.4
Site Energy Use Intensity (kBtu/ft ²)	71.1	58.2

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

Figure 13 Energy Use Intensity Comparison—Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Lanoka Harbor Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	92.7	141.4
Site Energy Use Intensity (kBtu/ft ²)	64.1	58.2

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

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

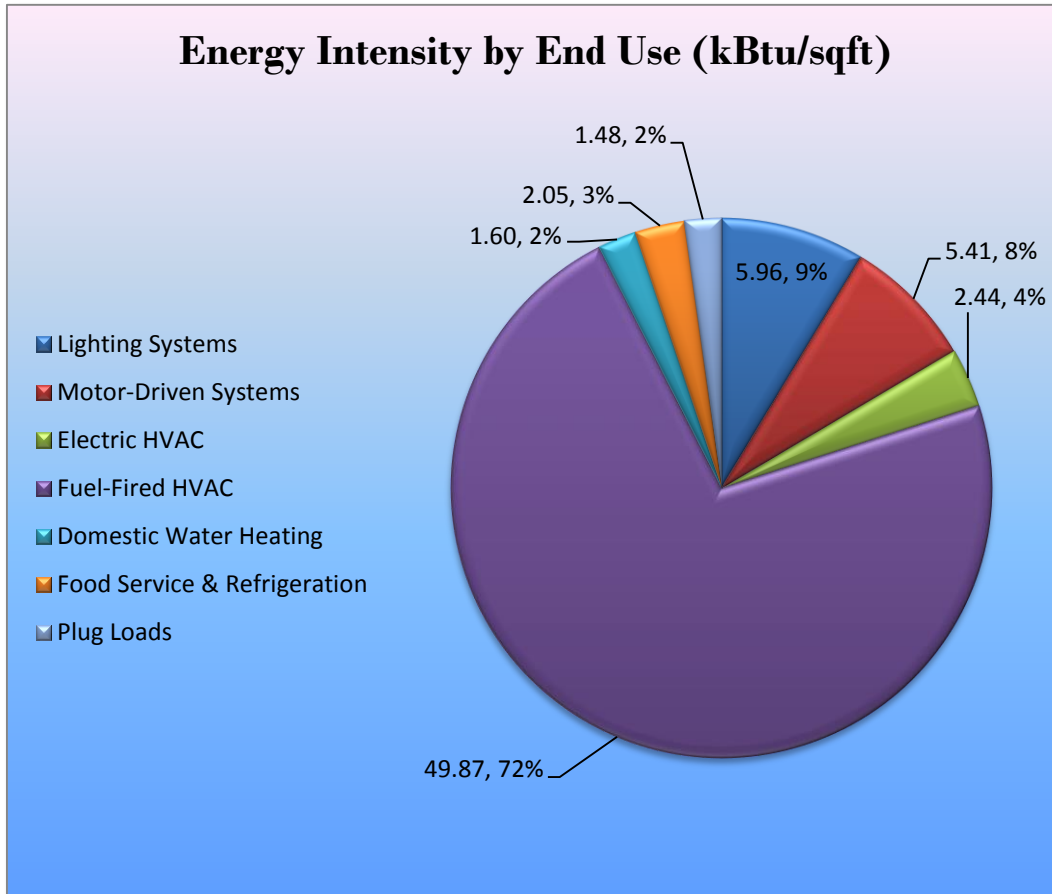
For more information on Energy Star certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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 (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 Lanoka Harbor 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		58,702	19.9	0.0	\$4,296.65	\$35,265.97	\$2,310.00	\$32,955.97	7.7	59,112
ECM 1	Install LED Fixtures	2,767	0.4	0.0	\$202.55	\$2,998.80	\$20.00	\$2,978.80	14.7	2,787
ECM 2	Retrofit Fixtures with LED Lamps	55,934	19.5	0.0	\$4,094.10	\$32,267.17	\$2,290.00	\$29,977.17	7.3	56,325
Lighting Control Measures		9,436	3.3	0.0	\$690.68	\$14,476.00	\$1,580.00	\$12,896.00	18.7	9,502
ECM 3	Install Occupancy Sensor Lighting Controls	7,223	2.5	0.0	\$528.68	\$12,076.00	\$1,580.00	\$10,496.00	19.9	7,274
ECM 4	Install High/Low Lighting Controls	2,213	0.8	0.0	\$161.99	\$2,400.00	\$0.00	\$2,400.00	14.8	2,229
Motor Upgrades		1,334	0.4	0.0	\$97.68	\$6,040.65	\$0.00	\$6,040.65	61.8	1,344
ECM 5	Premium Efficiency Motors	1,334	0.4	0.0	\$97.68	\$6,040.65	\$0.00	\$6,040.65	61.8	1,344
Variable Frequency Drive (VFD) Measures		23,710	4.4	0.0	\$1,735.42	\$21,300.56	\$775.00	\$20,525.56	11.8	23,875
ECM 6	Install VFDs on Hot Water Pumps	17,058	2.2	0.0	\$1,248.55	\$15,017.06	\$0.00	\$15,017.06	12.0	17,177
ECM 7	Install Boiler Draft Fan VFDs	6,652	2.3	0.0	\$486.87	\$6,283.50	\$775.00	\$5,508.50	11.3	6,698
Domestic Water Heating Upgrade		0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159
ECM 8	Install Low-Flow Domestic Hot Water Devices	0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159
Plug Load Equipment Control - Vending Machine		1,612	0.0	0.0	\$117.98	\$230.00	\$0.00	\$230.00	1.9	1,623
ECM 9	Vending Machine Control	1,612	0.0	0.0	\$117.98	\$230.00	\$0.00	\$230.00	1.9	1,623
TOTALS		94,794	28.0	35.5	\$7,391.34	\$77,650.16	\$4,665.00	\$72,985.16	9.9	99,615

* - 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 ₂ e Emissions Reduction (lbs)
Lighting Upgrades		58,702	19.9	0.0	\$4,296.65	\$35,265.97	\$2,310.00	\$32,955.97	7.7	59,112
ECM 1	Install LED Fixtures	2,767	0.4	0.0	\$202.55	\$2,998.80	\$20.00	\$2,978.80	14.7	2,787
ECM 2	Retrofit Fixtures with LED Lamps	55,934	19.5	0.0	\$4,094.10	\$32,267.17	\$2,290.00	\$29,977.17	7.3	56,325

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 ₂ e Emissions Reduction (lbs)
Interior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0
Exterior	2,767	0.4	0.0	\$202.55	\$2,998.80	\$20.00	\$2,978.80	14.7	2,787

Measure Description

We recommend replacing existing fixtures containing the exterior 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.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of HID sources, such as the existing metal halide fixtures.

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 ₂ e Emissions Reduction (lbs)
Interior	55,934	19.5	0.0	\$4,094.10	\$32,267.17	\$2,290.00	\$29,977.17	7.3	56,325
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 a fluorescent tube.

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 ₂ e Emissions Reduction (lbs)
Lighting Control Measures		9,436	3.3	0.0	\$690.68	\$14,476.00	\$1,580.00	\$12,896.00	18.7	9,502
ECM 3	Install Occupancy Sensor Lighting Controls	7,223	2.5	0.0	\$528.68	\$12,076.00	\$1,580.00	\$10,496.00	19.9	7,274
ECM 4	Install High/Low Lighting Controls	2,213	0.8	0.0	\$161.99	\$2,400.00	\$0.00	\$2,400.00	14.8	2,229

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 ₂ e Emissions Reduction (lbs)
7,223	2.5	0.0	\$528.68	\$12,076.00	\$1,580.00	\$10,496.00	19.9	7,274

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in classrooms, offices areas, and similar spaces. 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.

ECM 4: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
2,213	0.8	0.0	\$161.99	\$2,400.00	\$0.00	\$2,400.00	14.8	2,229

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are stairwells, interior corridors, parking lots, and parking garages.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Motor Upgrades

ECM 5: Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
1,334	0.4	0.0	\$97.68	\$6,040.65	\$0.00	\$6,040.65	61.8	1,344

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.

While the recommended motor replacements have a relatively long payback, motor replacement may be necessary for compatibility with ECM 4.1.4, “Variable Frequency Drives”. Many of the 2, 3, and 5 horsepower motors recommended for replacement are original equipment and are at or near the extent of their useful life.

.

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 ₂ e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		23,710	4.4	0.0	\$1,735.42	\$21,300.56	\$775.00	\$20,525.56	11.8	23,875
ECM 6	Install VFDs on Hot Water Pumps	17,058	2.2	0.0	\$1,248.55	\$15,017.06	\$0.00	\$15,017.06	12.0	17,177
ECM 7	Install Boiler Draft Fan VFDs	6,652	2.3	0.0	\$486.87	\$6,283.50	\$775.00	\$5,508.50	11.3	6,698

ECM 6: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
17,058	2.2	0.0	\$1,248.55	\$15,017.06	\$0.00	\$15,017.06	12.0	17,177

Measure Description

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

ECM 7: Install Boiler Draft Fan VFDs

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 ₂ e Emissions Reduction (lbs)
6,652	2.3	0.0	\$486.87	\$6,283.50	\$775.00	\$5,508.50	11.3	6,698

Measure Description

We recommend replacing existing volume control devices on boiler draft fans, such as inlet vanes or dampers, with VFDs. Inlet vanes or dampers are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device would be removed, or permanently disabled, and the control signal would be redirected to the VFD to determine proper fan motor speed. Energy savings results from more efficient control of motor energy usage when fan motors are operated at partial load. The magnitude of energy savings is based on the estimated amount of time that fan motors would be operated at partial load.

Additional maintenance savings may result from this measure as well, since VFDs are solid state electronic device, which generally requires less maintenance than mechanical air volume control devices.

Replacement and control of the boiler draft fan motors should not be pursued if the district plans to replace the boiler system during the next decade.

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 ₂ e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159
ECM 8	Install Low-Flow Domestic Hot Water Devices	0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159

ECM 8: 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 ₂ e Emissions Reduction (lbs)
0	0.0	35.5	\$452.94	\$336.99	\$0.00	\$336.99	0.7	4,159

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.

4.1.6 Plug Load Equipment Control - Vending Machines

ECM 9: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
1,612	0.0	0.0	\$117.98	\$230.00	\$0.00	\$230.00	1.9	1,623

Measure Description

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

4.2 ECMs Evaluated But Not Recommended

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

Figure 20 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement	0	0.0	332.2	\$4,236.78	\$123,419.30	\$5,020.72	\$118,398.58	27.9	38,899
Install High Efficiency Hot Water Boilers	0	0.0	332.2	\$4,236.78	\$123,419.30	\$5,020.72	\$118,398.58	27.9	38,899
TOTALS	0	0.0	332.2	\$4,236.78	\$123,419.30	\$5,020.72	\$118,398.58	27.9	38,899

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

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

Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
0	0.0	332.2	\$4,236.78	\$123,419.30	\$5,020.72	\$118,398.58	27.9	38,899

Measure Description

We evaluated replacing older inefficient hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

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

Reasons for not Recommending

Boiler replacement is a capital measure requiring design not only of the boiler system, but potentially the hot water distribution loop as well. Measure economics is difficult to estimate without further study.

It is recommended the district pursue a study to replace the two (2) 48 year-old boilers. A system of modular boilers and controls configured in accordance with the hot water piping loops may result in greater savings at a reduced cost as compared to the estimate provided.

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.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

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.

Check for and Seal Duct Leakage

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 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 installed a photovoltaic array at this site in 2009, using much of the available roof area for this self-generation measure. The existing PV array currently produces over 45% of the total electricity used at the site. In our opinion, the facility does not appear to meet the criteria for additional cost-effective PV installation.

6.2 Combined Heat and Power

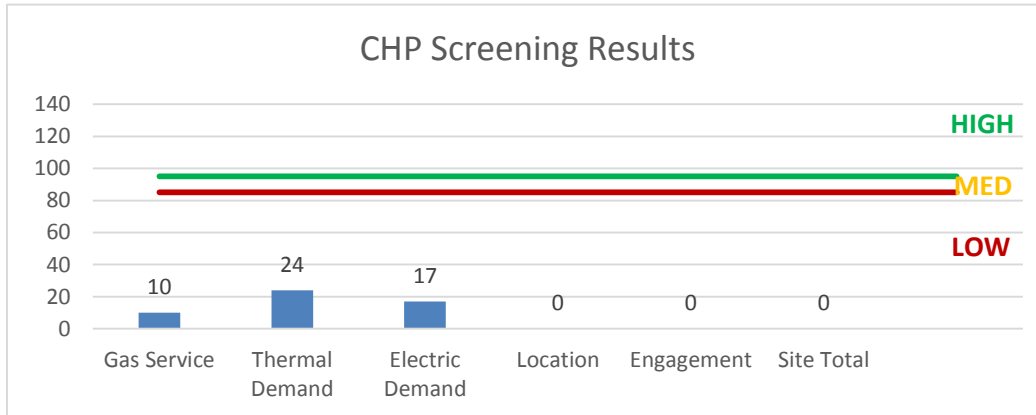
Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric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

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

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

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

Figure 21 -Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

Lanoka Harbor Elementary School has a low electrical load. In our opinion, the facility does not appear to meet the minimum requirements for participation in a DR program.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 22 for a list of the eligible programs identified for each recommended ECM.

Figure 22 -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	Install High/Low Lightng Controls	x	x
ECM 5	Premium Efficiency Motors		x
ECM 6	Install VFDs on Hot Water Pumps		x
ECM 7	Install Boiler Draft Fan VFDs	x	x
ECM 8	Install Low-Flow Domestic Hot Water Devices		x
ECM 9	Vending Machine Control		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.

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 Direct Install 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 Energy Savings Improvement Program

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

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

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

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by

the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

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

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	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
Receiving	9	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,950	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.42	1,211	0.0	\$88.67	\$526.50	\$0.00	5.94
Receiving	1	Exit Signs: LED - 2 W Lamp	None	42	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	42	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm	8	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	None	No	8	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
APR	24	U-Bend Fluorescent - T8: U T8 (32W) - 3L	Wall Switch	92	1,950	Relamp	Yes	24	LED - Linear Tubes: (3) U-Lamp	Occupancy Sensor	50	1,365	1.10	3,140	0.0	\$229.85	\$2,457.60	\$70.00	10.39
APR	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Stage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,950	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,950	0.06	160	0.0	\$11.69	\$143.60	\$20.00	10.57
Stage	7	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	None	No	7	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Stage	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,950	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,950	0.53	1,533	0.0	\$112.22	\$1,141.60	\$240.00	8.03
Hallway	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,365	0.65	1,855	0.0	\$135.79	\$1,377.60	\$195.00	8.71
B RR	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.08	226	0.0	\$16.53	\$175.50	\$30.00	8.80
G RR	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.05	151	0.0	\$11.02	\$117.00	\$20.00	8.80
G RR	1	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	None	No	1	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
G RR	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,950	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,950	0.01	37	0.0	\$2.67	\$48.20	\$10.00	14.30
Hallway	23	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	23	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,365	0.76	2,188	0.0	\$160.16	\$1,745.50	\$230.00	9.46
Hallway	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Fac RR (2)	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,365	0.06	178	0.0	\$12.99	\$358.40	\$0.00	27.59
Storage	3	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	None	No	3	Compact Fluorescent: Ceiling mount	Wall Switch	42	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CR 7, 6	18	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.51	1,472	0.0	\$107.76	\$1,186.20	\$70.00	10.36
Lav (2)	2	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,950	0.05	144	0.0	\$10.52	\$71.80	\$0.00	6.82
Store Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,950	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,365	0.18	502	0.0	\$36.77	\$401.40	\$80.00	8.74
Hallway	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,365	0.15	428	0.0	\$31.34	\$425.60	\$45.00	12.15
Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CR 8/9/10	36	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	1.03	2,945	0.0	\$215.52	\$2,102.40	\$105.00	9.27

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
CR 2/3/4/5	40	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	40	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	1.14	3,272	0.0	\$239.47	\$2,516.00	\$140.00	9.92
Hallway	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,365	0.15	428	0.0	\$31.34	\$425.60	\$45.00	12.15
Hallway	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,365	0.23	666	0.0	\$48.75	\$609.50	\$70.00	11.07
Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Fac Lounge	10	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.29	818	0.0	\$59.87	\$629.00	\$35.00	9.92
Man Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,950	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,365	0.18	502	0.0	\$36.77	\$401.40	\$80.00	8.74
Man Office	12	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.34	982	0.0	\$71.84	\$700.80	\$35.00	9.27
CR 1	10	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	10	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.29	818	0.0	\$59.87	\$629.00	\$35.00	9.92
Nurses Ofc	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,365	0.25	714	0.0	\$52.23	\$492.00	\$95.00	7.60
Library	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,365	0.03	95	0.0	\$6.96	\$58.50	\$10.00	6.96
Library	36	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	1.03	2,945	0.0	\$215.52	\$2,102.40	\$105.00	9.27
Conf	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,950	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,365	0.29	837	0.0	\$61.29	\$591.67	\$120.00	7.70
C3	5	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.14	409	0.0	\$29.93	\$295.50	\$20.00	9.20
C3	1	Compact Fluorescent Ceiling mount	Wall Switch	18	1,950	None	No	1	Compact Fluorescent Ceiling mount	Wall Switch	18	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,365	0.15	428	0.0	\$31.34	\$425.60	\$45.00	12.15
Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CR 11/12/29/30	60	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	60	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	1.71	4,908	0.0	\$359.20	\$3,234.00	\$140.00	8.61
C4	6	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.17	491	0.0	\$35.92	\$331.40	\$20.00	8.67
BRR	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,950	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.14	404	0.0	\$29.56	\$175.50	\$0.00	5.94
Hallway	29	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	29	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,365	1.44	4,139	0.0	\$302.92	\$2,780.80	\$435.00	7.74
Hallway	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C7	8	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.23	654	0.0	\$47.89	\$403.20	\$20.00	8.00
CR 15	21	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.60	1,718	0.0	\$125.72	\$1,023.90	\$35.00	7.87
CR 14/16	36	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	1.03	2,945	0.0	\$215.52	\$1,832.40	\$70.00	8.18
CR 14/16	2	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	1,950	Relamp	Yes	2	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	1,365	0.06	179	0.0	\$13.09	\$153.07	\$40.00	8.64

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
CR 17	21	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.60	1,718	0.0	\$125.72	\$1,023.90	\$35.00	7.87
CR 17	1	Linear Fluorescent - T8: 2' T8 (17W) - 4L	Wall Switch	63	1,950	Relamp	Yes	1	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	1,365	0.03	89	0.0	\$6.55	\$76.53	\$20.00	8.64
CR 15	15	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.43	1,227	0.0	\$89.80	\$808.50	\$35.00	8.61
S6	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CR 18/19	15	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	15	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.43	1,227	0.0	\$89.80	\$1,078.50	\$70.00	11.23
C6	4	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.11	327	0.0	\$23.95	\$259.60	\$20.00	10.01
C6	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,365	0.03	89	0.0	\$6.50	\$63.20	\$0.00	9.73
Fac RR (2)	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,950	0.05	132	0.0	\$9.69	\$126.40	\$0.00	13.05
G RR	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,950	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.14	404	0.0	\$29.56	\$175.50	\$0.00	5.94
Storage	2	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	0.06	164	0.0	\$11.97	\$187.80	\$20.00	14.01
Storage	3	Compact Fluorescent: Ceiling mount	Wall Switch	18	1,950	None	No	3	Compact Fluorescent Ceiling mount	Wall Switch	18	1,950	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CR 20-28 (8)	120	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,950	Relamp	Yes	120	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,365	3.42	9,815	0.0	\$718.41	\$6,468.00	\$280.00	8.61
Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,365	0.17	476	0.0	\$34.82	\$492.50	\$50.00	12.71
CR 31, 32	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,950	Relamp	Yes	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,365	1.19	3,425	0.0	\$250.69	\$2,344.80	\$430.00	7.64
C8, C9	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,950	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,365	0.40	1,142	0.0	\$83.56	\$1,242.00	\$190.00	12.59
Entrance	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,950	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,950	0.03	80	0.0	\$5.84	\$71.80	\$10.00	10.57
Entrance	4	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,950	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,950	0.19	538	0.0	\$39.41	\$234.00	\$0.00	5.94
Entrance	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Exterior	6	Compact Fluorescent: Wall mount	Daylight Dimming	42	4,380	None	No	6	Compact Fluorescent: Wall mount	Daylight Dimming	42	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Exterior	4	Metal Halide: (1) 175W Lamp	Daylight Dimming	215	4,380	Fixture Replacement	No	4	LED - Fixtures: Outdoor Porch Wall Mount	Daylight Dimming	80	4,380	0.43	2,767	0.0	\$202.55	\$2,998.80	\$20.00	14.71
Exterior	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	104	4,380	None	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	104	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	Boiler 1	1	Other	5.0	85.5%	No	2,745	Yes	88.5%	Yes	1	1.49	4,396	0.0	\$321.73	\$4,129.86	\$775.00	10.43
Boiler Rm	Boiler 2	1	Other	3.0	85.5%	No	2,745	Yes	86.5%	Yes	1	0.88	2,586	0.0	\$189.30	\$3,758.85	\$0.00	19.86
Boiler Rm	Older Wing	2	Heating Hot Water Pump	5.0	87.5%	No	2,745	Yes	89.5%	Yes	2	1.35	10,306	0.0	\$754.33	\$8,393.82	\$0.00	11.13
Boiler Rm	1st Grade Hall	1	Heating Hot Water Pump	3.0	89.5%	No	2,745	Yes	89.5%	Yes	1	0.38	2,986	0.0	\$218.55	\$3,812.49	\$0.00	17.44
Boiler Rm	New wing	2	Heating Hot Water Pump	2.0	78.5%	No	2,745	Yes	86.5%	Yes	2	0.70	4,771	0.0	\$349.18	\$7,246.19	\$0.00	20.75
Boiler Rm	DHW	1	Water Supply Pump	0.3	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Various	Heat for Rooms	28	Supply Fan	0.3	74.0%	No	2,745	No	74.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Restrooms	11	Exhaust Fan	0.3	87.5%	No	2,745	No	87.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Rms, 6, 7	2	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Rm 3	1	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Fac Dining and Main Office	2	Supply Fan	0.2	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Principal Ofc	1	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Nurse	1	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Supervisor Ofc	1	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C4, C5, C6, S5 - Guidance	1	Supply Fan	0.3	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C8	1	Supply Fan	0.2	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C9	1	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Comp Rm	1	Supply Fan	0.5	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Library	2	Supply Fan	0.2	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Server Rm	1	Supply Fan	0.1	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	C12	1	Supply Fan	0.2	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	31	1	Supply Fan	0.5	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	32	1	Supply Fan	0.5	70.0%	No	2,745	No	70.0%	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	Rms, 6, 7	2	Split-System AC	3.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Rm 3	1	Split-System Air-Source HP	3.00	3.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Fac Dining and Main Office	2	Split-System AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Principal Ofc	1	Split-System AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Nurse	1	Split-System AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Supervisor Ofc	1	Split-System AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C4, C5, C6, S5 - Guidance	1	Packaged Air-Source HP	3.00	3.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C8	1	Split-System AC	1.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C9	1	Split-System AC	1.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Comp Rm	1	Split-System AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Library	2	Split-System AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Server Rm	1	Split-System AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	C12	1	Split-System AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	31	1	Through-The-Wall AC	5.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	32	1	Through-The-Wall AC	4.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions							Energy Impact & Financial Analysis						
		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 Rm 1	School	1	Non-Condensing Hot Water Boiler	4,183.93	Yes	1	Condensing Hot Water Boiler	4,183.93	93.00%	Ec	0.00	0	207.6	\$2,647.99	\$76,704.23	\$0.00	28.97
Boiler Rm 1	School	1	Non-Condensing Hot Water Boiler	2,510.36	Yes	1	Condensing Hot Water Boiler	2,510.36	93.00%	Ec	0.00	0	124.6	\$1,588.79	\$46,715.07	\$5,020.72	26.24

DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
		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 Rm	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

Location	Recommendation Inputs				Energy Impact & Financial Analysis							
	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	
Various	10	Faucet Aerator (Lavatory)	2.00	1.00	0.00	0	9.4	\$119.51	\$71.70	\$0.00	0.60	
Various	14	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	19.7	\$250.97	\$100.38	\$0.00	0.40	
Various	23	Faucet Aerator (Kitchen)	2.50	2.20	0.00	0	6.5	\$82.46	\$164.91	\$0.00	2.00	

Reach-In Cooler/Freezer Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions					Energy Impact & Financial Analysis						
	Cooler/Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Energy Efficient Doors?	Install Door Heater Control?	Install Aluminum Night Covers?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Milk Cooler	1	Cooler (35F to 55F)	No	No	No	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Walk-In Cooler/Freezer Inventory & Recommendations

Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis							
Location	Cooler/Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Cooler (35F to 55F)	No	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Cooking Equipment Inventory & Recommendations

Existing Conditions				Proposed Conditions	Energy Impact & Financial Analysis							
Location	Quantity	Equipment Type	High Efficiency Equipment?	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 Convection Oven (Full Size)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00	
Kitchen	3	Insulated Food Holding Cabinet (Full Size)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00	

Dishwasher Inventory & Recommendations

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


Plug Load Inventory

Existing Conditions				
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Various	94	Computer	75.0	
Various	10	Printer/Copier S	20.0	
Various	6	Printer/Copier M	300.0	
Various	2	Printer/Copier L	515.0	
Various	1	Paper shredder	360.0	
Various	37	Projector	200.0	
Various	5	Microwave	1,000.0	
Various	2	Refrigerator M	50.0	
Various	1	Refrigerator L	600.0	
Various	3	Coffee Machine	400.0	
Various	3	Toaster Oven	1,200.0	
Various	36	Smart Board	7.0	

Vending Machine Inventory & Recommendations

Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Rm	1	Refrigerated	Yes	0.00	1,612	0.0	\$117.98	\$230.00	\$0.00	1.95

Appendix B: ENERGY STAR® Statement of Energy Performance



LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

68

ENERGY STAR®
Score¹

Lanoka Harbor Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 52,000
Built: 1969

For Year Ending: May 31, 2016
Date Generated: May 25, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Lanoka Harbor Elementary School 281 Manchester Avenue Lanoka Harbor, New Jersey 08734	_____ () - _____	_____ () - _____

Property ID: 2388311

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison	
71.3 kBtu/ft ²	Natural Gas (kBtu) 2,726,948 (74%)	National Median Site EUI (kBtu/ft ²)	84.9
	Electric - Solar (kBtu) 283,380 (8%)	National Median Source EUI (kBtu/ft ²)	127.6
	Electric - Grid (kBtu) 696,461 (19%)	% Diff from National Median Source EUI	-16%
Source EUI	Annual Emissions		
107.2 kBtu/ft ²	Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	238	

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)