Local Government Energy Audit:
Energy Audit Report

Midstreams Elementary School

Brick Township Board of Education

500 Midstreams Road

Brick, NJ 08724

April 16, 2018

Final Report by:

TRC Energy Services

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Disclaimer

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

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

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

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

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

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

The goal of an LGEA report is to provide local governments with valuable information on their facilities' energy usage, to identify energy conservation measures (ECMs) and energy management options that may benefit their facilities, and to provide information on financial incentives from New Jersey's Clean Energy Programs (NJCEP) and other sources which may be available to assist with ECM implementation.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing energy usage statewide.

1.1 Facility Summary

Midstreams Elementary School is a 49,392 square foot public school in Brick Township, New Jersey. It is a fairly typical single-story elementary school comprised of classrooms, office spaces, storage areas, restrooms, a kitchen area, and a large multi-purpose room. The original building was constructed in 1959. Significant expansions were added in 1967, 1998, and 2002.

Interior lighting at Midstreams Elementary School consists mostly of 4-foot T8 linear fluorescent fixtures with one to four lamps each. There are also a few incandescent bulbs remaining, mostly in storage areas and restrooms. The lighting is controlled throughout by manual wall switches. Exterior lights in the main parking and playground areas have recently been retrofitted with high efficiency LED lights. The perimeter of the building and the front parking area are still lit with high intensity discharge (HID) fixtures.

The building has four gas-fired hot water boilers for heating (manufactured by HB Smith and Raypak), one for each building section. They were installed as each new building addition was added. Their input heating capacities and ages are: 3,588 MBh (58 yrs), 945 MBh (50 yrs), 333 MBh (18 yrs), and 400 MBh (15 yrs). There is also a York gas/electric rooftop unity (RTU) which supplies 180 MBh of heating (input) and 10 tons of cooling to the Library. The rest of the building is cooled by 21 Carrier and Friedrich window air conditioners, plus 3 Comfort Star ductless mini-split systems.

A detailed description of the facility, its systems, and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated seven potential energy conservation measures. Five ECMs are considered to be "high priority" measures, because we estimate that those measures would likely pay for themselves in energy savings alone over the lifetime of the equipment. The other two measures are lower priority, or optional, because their payback period is longer, compared to the rated useful lifetime of that equipment. The five "high priority" measures together represent an opportunity for Midstreams Elementary School to reduce its annual energy costs by $17,074 and its annual greenhouse gas emissions by 152,692 lbs CO_2e. We estimate that if all measures are implemented as described in this report, then the project would likely pay for itself in about 6.3 years. The breakdown of existing and potential utility costs and the expected utility savings following project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Midstreams Elementary School's annual energy use by about 23%.

Figure 1 – Previous 12 Month Utility Costs

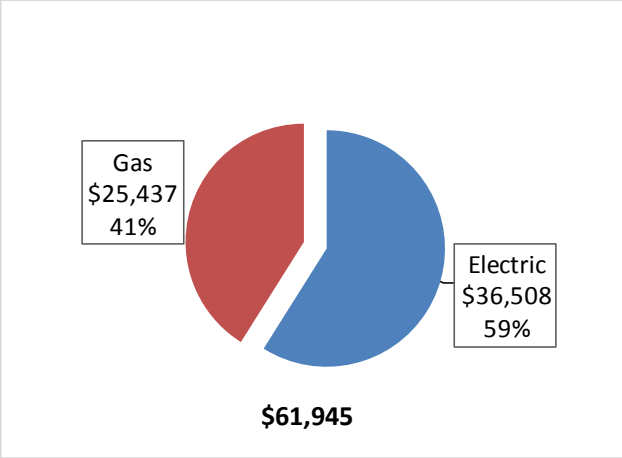
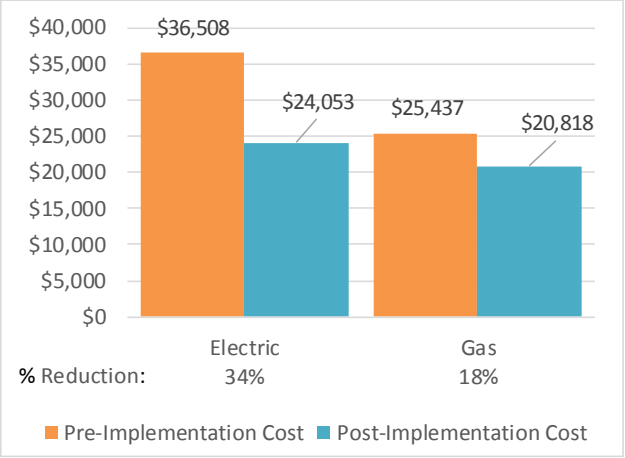


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**88,163**	**20.2**	**0.0**	**$10,982.38**	**$48,982.40**	**$10,305.00**	**$38,677.40**	**3.5**	**88,780**
ECM 1	Install LED Fixtures	Yes	27,502	3.6	0.0	$3,425.88	$11,469.39	$3,100.00	$8,369.39	2.4	27,694
ECM 2	Retrofit Fixtures with LED Lamps	Yes	60,661	16.6	0.0	$7,556.49	$37,513.01	$7,205.00	$30,308.01	4.0	61,086
Lighting Control Measures			**11,826**	**3.3**	**0.0**	**$1,473.09**	**$13,582.00**	**$1,455.00**	**$12,127.00**	**8.2**	**11,908**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	11,826	3.3	0.0	$1,473.09	$13,582.00	$1,455.00	$12,127.00	8.2	11,908
Motor Upgrades			**519**	**0.1**	**0.0**	**$64.69**	**$1,064.34**	**$0.00**	**$1,064.34**	**16.5**	**523**
	Premium Efficiency Motors	No	519	0.1	0.0	$64.69	$1,064.34	$0.00	$1,064.34	16.5	523
Variable Frequency Drive (VFD) Measures			**4,119**	**0.5**	**0.0**	**$513.12**	**$5,457.71**	**$0.00**	**$5,457.71**	**10.6**	**4,148**
	Install VFDs on Hot Water Pumps	No	4,119	0.5	0.0	$513.12	$5,457.71	$0.00	$5,457.71	10.6	4,148
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**424.7**	**$4,416.97**	**$62,616.41**	**$6,478.50**	**$56,137.91**	**12.7**	**49,730**
ECM 4	Install High Efficiency Hot Water Boilers	Yes	0	0.0	424.7	$4,416.97	$62,616.41	$6,478.50	$56,137.91	12.7	49,730
Domestic Water Heating Upgrade			**0**	**0.0**	**19.4**	**$201.93**	**$124.35**	**$0.00**	**$124.35**	**0.6**	**2,274**
ECM 5	Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	19.4	$201.93	$124.35	$0.00	$124.35	0.6	2,274
TOTAL FOR PROPOSED MEASURES			**99,989**	**23.5**	**444.1**	**$17,074.37**	**$125,305.16**	**$18,238.50**	**$107,066.66**	**6.3**	**152,692**
TOTAL FOR ALL MEASURES			**104,628**	**24.1**	**444.1**	**$17,652.19**	**$131,827.20**	**$18,238.50**	**$113,588.70**	**6.4**	**157,363**

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

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

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

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

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

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient than using a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

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

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

Energy Efficient Best Practices

TRC also identified 11 low cost (or no cost) energy efficient best 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 best practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. It is our understanding Brick Township Board of Education is already implementing many of the best practices described in the audit reports, however they are listed for representative purposes only.

- Reduce Air Leakage
- Close Doors and Windows
- Ensure Lighting Controls Are Operating Properly
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

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

On-Site Generation Measures

On October 30, 2015, Brick Township Board of Education entered into a long-term solar power purchase agreement (PPA) with GeoPeak Energy, LLC. According to the terms of the PPA, GeoPeak will install rooftop solar arrays on seven Brick Township schools, including a 112-kW PV solar array at Midstreams Elementary School. Brick BOE has agreed to purchase the electric output of the solar arrays at a specified rate (as detailed in the PPA) over the next 20 years. Installation of the solar array at Midstreams Elementary School was on-going during TRC's inspection of the facility, though purchases of the array's electric output had not yet begun. Because an agreement for solar development of the site was already in place, no additional analysis was deemed to be necessary for on-site generation potential at the facility.

For further details the building's on-site generation potential, please see Section 6.

1.3 Implementation Planning

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

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

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

- SmartStart
- Energy Savings Improvement Program
- Demand Response Energy Aggregator

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some 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.

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 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Will Kolibas	Exec Director of Facilities	wkolibas@brickschools.org	(732) 785-3000
James W. Edwards	Business Administrator	jedwards@brickschools.org	(732) 785-3000
TRC Energy Services			
Tom Page	Auditor	tpage@TRCsolutions.com	(732) 855-0033

2.2 General Site Information

On February 23, 2017, TRC performed an inspection of Midstreams Elementary School located in Brick, New Jersey. TRC's team met with Will Kolibas to review the facility operations and help focus our investigation on specific energy-using systems.

Midstreams Elementary School is a 49,392 square foot public school in Brick Township, New Jersey. It is a fairly typical single-story elementary school comprised of classrooms, office spaces, storage areas, restrooms, a kitchen area, and a large Multi-Purpose Room.

The original section of the building was constructed in 1959. Significant expansions were added in 1967, 1998, and 2002. A solar PPA was signed in October 2015 to develop rooftop areas at the rear of the building for solar power generation. The array is expected to begin power generation sometime in 2017.

2.3 Building Occupancy

The school building is open for classes from Monday through Friday from 8:00 AM to 4:00 PM. Staff begin arriving as early as 6:00 AM and the building is occasionally occupied as late as 11:30 PM for after-hours events. The building is typically closed on weekends, although it is open some Saturdays (from 8:30 AM to 5:30 PM) during basketball season (from October through January). The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 70 staff and 523 students.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Midstreams Elementary School	Weekday	8am-4pm
Midstreams Elementary School	Weekend	Closed

2.4 Building Envelope

The school complex has undergone three major expansions since initial construction. However, all sections are simple one-story slab-on-grade constructions composed of concrete masonry block. The building's roof appears to be in good shape. The sections in the front of the building (near the main entrance) have a sloped rooftop, while the newer sections (in the back) have a flat rooftops. All appear to be covered with the same single-ply light-colored membrane. Window and door seals all appeared to be tight. Windows are all double-paned hopper-type with aluminum frames, which appear to be in good condition.

Image 1: Building Layout, Front Entrance, and Windows

2.5 On-Site Generation

Midstreams Elementary School is one of the schools included in a solar PPA that the Brick Township BOE signed with GeoPeak Energy, LLC in October 2015. According to the terms of the PPA, a 112-kW solar array is planned to be installed on the building's rooftop in 2017 (along with other Brick Township schools). At the time of our inspection, installation had not yet begun at the school.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting consists mostly of 4-foot T8 linear fluorescent fixtures with 1 to 4 tubes each. There are also a few incandescent bulbs in some areas, mostly in storage areas and restrooms. The lighting is controlled throughout by manual wall switches.

Exterior lights in the main parking and playground areas have recently been retrofitted with high efficiency LED lights. The perimeter of the building and the front parking area are lit with high intensity discharge (HID) fixtures. Exterior lighting is controlled by timers.

Image 2: Building Interior & Exterior Lighting

Hot Water Heating System

The building has four gas-fired hot water boilers for heating, one for each building section. They were installed as each new building addition was added. Boiler manufacturers, input heating capacities, and ages are as follows:

- Boiler 1: HB Smith, 3,588 MBH, 58 yrs;
- Boiler 2: HB Smith, 945 MBH, 50 yrs;
- Boiler 3: Raypak, 333 MBH, 18 yrs;
- Boiler 4: Raypak, 400 MBH, 15 yrs.

Image 3: Boilers 1 & 2

Boilers 1 and 2 are both over 50 years old, which is significantly beyond their rated useful lifetime.

Four hot water pumps distribute heating hot water to unit ventilators in classrooms and offices throughout the building. The pumps are old and in fair condition.

The Multi-Purpose Room is supplied with heating and ventilation by two ceiling-mounted air handling units (AHUs).

Image 4: Heating Hot Water Pumps, Classroom Unit Ventilators, AHUs in Multi-Purpose Room

There is also a York gas/electric packaged rooftop unity (RTU) above the library. It has an input heating capacity of 180 MBH and a cooling capacity of 10 tons – see image in air conditioning section below.

Direct Expansion Air Conditioning System (DX)

On the roof above the library (which is the newest section of the building), there is a York gas/electric packaged rooftop unity (RTU). It has a cooling capacity of 10 tons and an input heating capacity of 180 MBH.

Image 5: York RTU on roof above the Library

Image 6: A mix of old window AC units & some newer, high efficiency ductless mini-split AC units supply building cooling

Domestic Hot Water Heating System

The kitchen area receives domestic hot water from one 50 gallon Rheem gas-fired water heater. Restrooms in the older sections of the building are provided with hot water by one 50 gallon Rheem electric water heater, located in the main boiler room. The newer sections (at the back of the building) are supplied by smaller 19 gallon A.O. Smith electric water heaters. All domestic water heaters are in good condition.

Image 7: Domestic Hot Water Heaters

Refrigeration

A small kitchen area is used for preparing school lunches. It contains several large refrigerators, freezers, and milk coolers. There are also two standard refrigerators and four mini-refrigerators located throughout the building used by faculty and staff. All were in good condition.

Image 8: Building Refrigeration Equipment

Building Plug Load

There are approximately 53 desktop computers with LCD monitors in the building. We also observed one large server rack, seven printers, four copy machines, and other standard office and classroom equipment. All classrooms use smart board projectors.

Image 9: Building Plug Load Equipment

2.7 Water-Using Systems

We counted 10 restrooms at this facility. We checked a representative sample of fixtures. The restroom fixtures were found to meet current federal guidelines for water conserving low-flow devices (i.e. restroom faucets were found to be 2.2 gallon per minute (gpm) or less, toilets were found to be 2.5 gallons per flush (gpf) or less, and urinals were found to be 2.0 gpf or less).

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

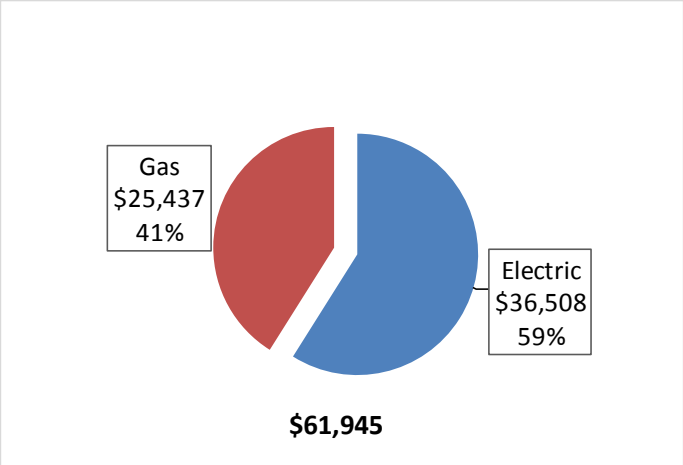
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Midstreams Elementary School		
Fuel	**Usage**	**Cost**
Electricity	293,079 kWh	$36,508
Natural Gas	24,459 Therms	$25,437
Total		**$61,945**

The current annual energy cost for this facility is $61,945 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric rate over a recent 12-month period was found to be $0.125/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

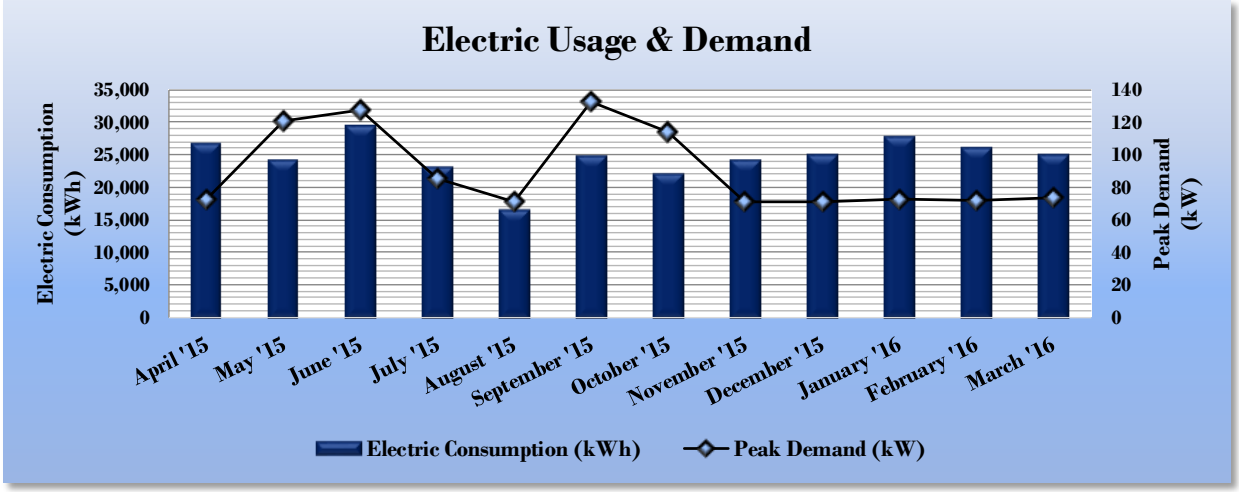


Figure 9 - Electric Usage & Demand

Electric Billing Data for Midstreams Elementary School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
4/16/15	33	26,790	73	$3,209	No
5/14/15	29	24,351	121	$3,215	No
6/15/15	32	29,577	127	$3,864	No
7/16/15	31	23,164	85	$3,059	Yes
8/14/15	29	16,713	71	$2,267	No
9/16/15	33	24,928	133	$3,246	No
10/15/15	29	22,290	114	$2,830	No
11/16/15	30	24,220	71	$2,926	No
12/14/15	30	25,199	71	$3,013	No
1/18/16	35	27,846	73	$3,148	No
2/16/16	29	26,134	72	$3,116	No
3/16/16	29	25,079	74	$3,015	No
Totals	**369**	**296,291**	**133**	**$36,909**	
Annual	**365**	**293,079**	**133**	**$36,508**	

3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas rate over a recent 12-month period was found to be $1.040/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

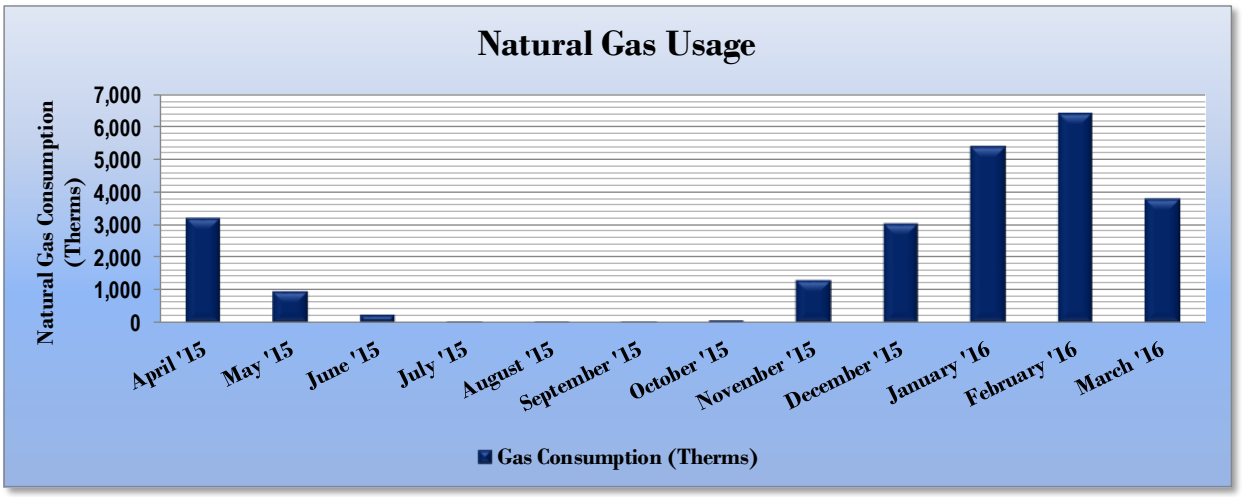


Figure 11 - Natural Gas Usage

Gas Billing Data for Midstreams Elementary School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/17/15	28	3,219	$3,158
5/18/15	31	972	$1,299
6/18/15	31	246	$693
7/20/15	32	45	$530
8/15/15	26	11	$404
9/17/15	33	22	$511
10/16/15	29	80	$557
11/16/15	31	1,323	$1,539
12/17/15	31	3,046	$2,926
1/19/16	33	5,401	$4,806
2/17/16	29	6,436	$5,633
3/21/16	33	3,792	$3,522
Totals	**367**	**24,594**	**$25,576**
Annual	**365**	**24,459**	**$25,437**

3.4 Benchmarking

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

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

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Midstreams Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	115.6	141.4
Site Energy Use Intensity (kBtu/ft^2)	69.8	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		
	Midstreams Elementary School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	84.4	141.4
Site Energy Use Intensity (kBtu/ft^2)	53.9	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is one of the building categories that are eligible to receive a score. The school has a current score of 47, which makes it slightly less efficient than the average elementary school of similar age and size.

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

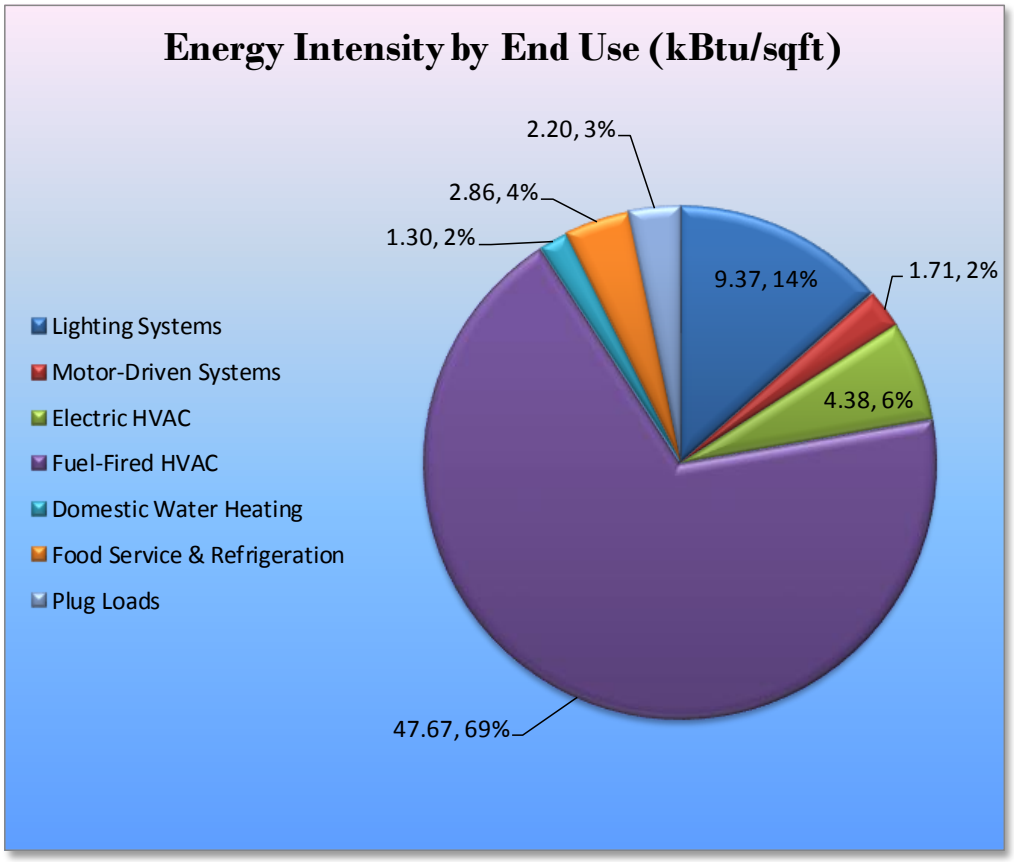
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.5 Energy End-Use Breakdown

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

Figure 14 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**88,163**	**20.2**	**0.0**	**$10,982.38**	**$48,982.40**	**$10,305.00**	**$38,677.40**	**3.5**	**88,780**
ECM 1	Install LED Fixtures	27,502	3.6	0.0	$3,425.88	$11,469.39	$3,100.00	$8,369.39	2.4	27,694
ECM 2	Retrofit Fixtures with LED Lamps	60,661	16.6	0.0	$7,556.49	$37,513.01	$7,205.00	$30,308.01	4.0	61,086
Lighting Control Measures		**11,826**	**3.3**	**0.0**	**$1,473.09**	**$13,582.00**	**$1,455.00**	**$12,127.00**	**8.2**	**11,908**
ECM 3	Install Occupancy Sensor Lighting Controls	11,826	3.3	0.0	$1,473.09	$13,582.00	$1,455.00	$12,127.00	8.2	11,908
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**424.7**	**$4,416.97**	**$62,616.41**	**$6,478.50**	**$56,137.91**	**12.7**	**49,730**
ECM 4	Install High Efficiency Hot Water Boilers	0	0.0	424.7	$4,416.97	$62,616.41	$6,478.50	$56,137.91	12.7	49,730
Domestic Water Heating Upgrade		**0**	**0.0**	**19.4**	**$201.93**	**$124.35**	**$0.00**	**$124.35**	**0.6**	**2,274**
ECM 5	Install Low-Flow Domestic Hot Water Devices	0	0.0	19.4	$201.93	$124.35	$0.00	$124.35	0.6	2,274
TOTALS		**99,989**	**23.5**	**444.1**	**$17,074.37**	**$125,305.16**	**$18,238.50**	**$107,066.66**	**6.3**	**152,692**

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

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

4.1.1 Lighting Upgrades

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

Figure 16 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**88,163**	**20.2**	**0.0**	**$10,982.38**	**$48,982.40**	**$10,305.00**	**$38,677.40**	**3.5**	**88,780**
ECM 1	Install LED Fixtures	27,502	3.6	0.0	$3,425.88	$11,469.39	$3,100.00	$8,369.39	2.4	27,694
ECM 2	Retrofit Fixtures with LED Lamps	60,661	16.6	0.0	$7,556.49	$37,513.01	$7,205.00	$30,308.01	4.0	61,086

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	27,502	3.6	0.0	$3,425.88	$11,469.39	$3,100.00	$8,369.39	2.4	27,694

Measure Description

We recommend replacing existing exterior fixtures that containing HID lamps with new high performance LED light fixtures. Some exterior areas (e.g. side parking lot and playground) have HID fixtures that have already been retrofitted with LED lamps. There are additional opportunities for cost-effective LED replacements around the perimeter of the school and in the front parking area. The school may choose to retrofit existing fixtures with LED lamps, or install new LED fixtures.

This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	58,606	16.3	0.0	$7,300.49	$37,389.01	$7,165.00	$30,224.01	4.1	59,016
Exterior	2,055	0.3	0.0	$256.00	$124.00	$40.00	$84.00	0.3	2,069

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Figure 17 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**11,826**	**3.3**	**0.0**	**$1,473.09**	**$13,582.00**	**$1,455.00**	**$12,127.00**	**8.2**	**11,908**
ECM 3	Install Occupancy Sensor Lighting Controls	11,826	3.3	0.0	$1,473.09	$13,582.00	$1,455.00	$12,127.00	8.2	11,908

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

ECM 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
11,826	3.3	0.0	$1,473.09	$13,582.00	$1,455.00	$12,127.00	8.2	11,908

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, classrooms, and offices areas.

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

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

4.1.3 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 18 below.

Figure 18 - Summary of Gas-Fired Heating Replacement ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**424.7**	**$4,416.97**	**$62,616.41**	**$6,478.50**	**$56,137.91**	**12.7**	**49,730**
ECM 4	Install High Efficiency Hot Water Boilers	0	0.0	424.7	$4,416.97	$62,616.41	$6,478.50	$56,137.91	12.7	49,730

ECM 4: Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	424.7	$4,416.97	$62,616.41	$6,478.50	$56,137.91	12.7	49,730

Measure Description

We recommend replacing older inefficient hot water boilers with high efficiency hot water boilers. Boilers 1 and 2 are both more than 50 years old. They are clearly past their rated useful lifetime and should be replaced.

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 were only evaluated when the return water temperature is less

than 130°F during most of the operating hours. As a result, condensing hydronic boilers are recommended for this site.

We have estimated the costs and savings for this measure based on in-kind replacement. However, additional savings is often possible by installing multiple staged hydronic boilers rather than a single large boiler. Care should be taken to size new boilers appropriately, as operational conditions may have changed since the original boilers were installed.

4.1.4 Domestic Hot Water Heating System Upgrades

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

Figure 19 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**19.4**	**$201.93**	**$124.35**	**$0.00**	**$124.35**	**0.6**	**2,274**
ECM 5	Install Low-Flow Domestic Hot Water Devices	0	0.0	19.4	$201.93	$124.35	$0.00	$124.35	0.6	2,274

ECM 5: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	19.4	$201.93	$124.35	$0.00	$124.35	0.6	2,274

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.

Pre-rinse spray valves (PRSVs)—often used in commercial and institutional kitchens—are designed to remove food waste from dishes prior to dishwashing. Replacing standard pre-rinse spray valves with low flow PRSVs will reduce hot water usage and save energy. These devices are easily installed and will help cut hot water in the kitchen area used for dish washing.

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

4.2 ECMs 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_2e Emissions Reduction (lbs)
Motor Upgrades	**519**	**0.1**	**0.0**	**$64.69**	**$1,064.34**	**$0.00**	**$1,064.34**	**16.5**	**523**
Premium Efficiency Motors	519	0.1	0.0	$64.69	$1,064.34	$0.00	$1,064.34	16.5	523
Variable Frequency Drive (VFD) Measures	**4,119**	**0.5**	**0.0**	**$513.12**	**$5,457.71**	**$0.00**	**$5,457.71**	**10.6**	**4,148**
Install VFDs on Hot Water Pumps	4,119	0.5	0.0	$513.12	$5,457.71	$0.00	$5,457.71	10.6	4,148
TOTALS	**4,639**	**0.7**	**0.0**	**$577.82**	**$6,522.05**	**$0.00**	**$6,522.05**	**11.3**	**4,671**

* - 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).

Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
519	0.1	0.0	$64.69	$1,064.34	$0.00	$1,064.34	16.5	523

Measure Description

We evaluated the replacement of standard efficiency motors, for four heating hot water pumps, with IHP 2014 high efficiency motors. These motors are old, though still functioning. We evaluated options for adding VFD controls on these motors, as well. See below.

Our evaluation assumed that existing motors would 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.

Reasons for not Recommending

This measure was considered a lower priority because its estimated payback period was longer than the typical motor's rated useful lifetime of 15 years. However, we usually recommend replacing older motors when new VFD control measures are added. If the customer chooses to go ahead with the VFD measure below, then we recommend including motor replacement with a high efficiency new model as well.

Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
4,119	0.5	0.0	$513.12	$5,457.71	$0.00	$5,457.71	10.6	4,148

Measure Description

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

Reasons for not Recommending

This measure was determined to be a lower priority measure, because its estimated payback period was greater than 10 years.

However, the measure would provide some additional savings. The customer may choose to upgrade the hot water pumps and add VFD controls to the pumps as part of the overall boiler replacement that is recommended in this report. It is an optional upgrade that may provide some additional energy savings. Though the simple payback period may be longer than others, as a stand-alone measure, the customer may choose to do the pump motor upgrades and control measures sooner rather than later, simply because it may be easier to upgrade the pumps at the same time that the boiler upgrade work is done.

5 ENERGY EFFICIENT BEST 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. The recommendations below are for informational purposes only and do not reflect actual efforts actively being performed by Brick Township Board of Education.

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.

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.

Use Fans to Reduce Cooling Load

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

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.

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.

Replace Computer Monitors

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

Water Conservation

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

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 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 4.1.4 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.

On October 30, 2015, Brick Township Board of Education entered into a long-term solar power purchase agreement (PPA) with GeoPeak Energy, LLC. According to the terms of the PPA, GeoPeak will install rooftop solar arrays on seven Brick Township schools, including a 112-kW PV solar array at Midstreams Elementary School. Brick BOE has agreed to purchase the electric output of the solar arrays at a specified rate (as detailed in the PPA) over the next 20 years.

Installation of the solar array at Midstreams Elementary School was on-going during TRC's inspection of the facility, though purchases of the array's electric output had not yet begun.

Image 10: School's rooftop before and after solar PV installation

The first image above shows an aerial view of the school (from Google Maps) prior to installation of the solar array. The second image (from the PPA with GeoPeak, LLC) shows the proposed layout of the installed solar array. The image shows that all of virtually every square foot of available unshaded flat roof space has been developed for solar electric degeneration. The rear sections of the building all have flat rooftops. The rooftop areas near the front of the building were not developed for solar electric generation, most likely because those sections have sloped rooftops, which do not face the south. Development of additional solar electric generation capacity might be possible in those areas in the future, mounting PV panels there would likely be more challenging, which would mean a higher cost per unit in those areas.

Because there is an agreement for solar development of the building's rooftop is already in place and development already underway, no additional analysis was deemed to be necessary for on-site generation potential at the facility.

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

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

7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion this school building does not have a sufficiently high electric demand to make it a good candidate for a Demand Response 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 21 for a list of the eligible programs identified for each recommended ECM.

Figure 21 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
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 Efficiency Hot Water Boilers	X		X	
ECM 5	Install Low-Flow Domestic Hot Water Devices			X	

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

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

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

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.

8.4 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (DR) program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (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 program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.11	304	0.0	$37.82	$292.50	$50.00	6.41
Boiler Rm	1	Incandescent: 60W Bulb	Wall Switch	60	1,600	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	1,600	0.03	94	0.0	$11.69	$15.50	$5.00	0.90
Boiler Rm	2	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,600	None	No	2	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,600	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mech Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.08	144	0.0	$17.92	$266.40	$50.00	12.08
Rm 22	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Rm 21	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Rm 20	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Rm 19	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Rm 18	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Rm 17	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Mid Hall	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,520	0.22	1,336	0.0	$166.40	$585.00	$100.00	2.91
Mid Hall	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
Office Rm 16	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.14	506	0.0	$63.09	$401.40	$80.00	5.09
Rm 23	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Kitchen Hall	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,520	0.13	802	0.0	$99.84	$351.00	$60.00	2.91
Kitchen Hall	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,520	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,520	0.03	213	0.0	$26.47	$107.70	$15.00	3.50
Rm 25	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	$252.36	$1,411.60	$275.00	4.50
Kitchen	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.13	455	0.0	$56.73	$351.00	$60.00	5.13
Kitchen	2	Incandescent: 60W Bulb	Wall Switch	60	2,000	Relamp	No	2	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,000	0.07	235	0.0	$29.22	$31.00	$10.00	0.72
Kitchen Storage	1	Compact Fluorescent: 13W CFL Bulbs	Wall Switch	13	2,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,000	0.00	9	0.0	$1.15	$15.50	$0.00	13.52
OT Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$233.00	$40.00	8.08
Kitchen Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.03	96	0.0	$11.95	$174.50	$10.00	13.77
Rm A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$233.00	$40.00	8.08
Rm 34	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	No	12	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,000	0.39	1,366	0.0	$170.19	$902.40	$180.00	4.24
Rm 34	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.03	101	0.0	$12.52	$187.80	$10.00	14.20

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 34	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
Rm 35	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Rm 36	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Pod Hall to Westwing	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,520	0.15	935	0.0	$116.48	$409.50	$70.00	2.91
Pod Hall to Westwing	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,520	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,520	0.10	601	0.0	$74.88	$225.60	$45.00	2.41
Pod Hall to Westwing	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
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Westwing Hall	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	No	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,520	0.30	1,870	0.0	$232.96	$819.00	$140.00	2.91
Westwing Hall	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
Rm 37	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Rm 38	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Rm 39	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Rm 40	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Rm 42	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.49	1,726	0.0	$215.05	$1,172.40	$215.00	4.45
Library	26	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	26	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	1.07	3,740	0.0	$465.95	$2,495.20	$460.00	4.37
Library	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Front Hallway	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,520	0.43	2,672	0.0	$332.81	$1,170.00	$200.00	2.91
Front Hallway	6	Incandescent: 60W Bulb	Wall Switch	60	3,520	Relamp	No	6	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	3,520	0.20	1,239	0.0	$154.30	$93.00	$30.00	0.41
Front Hallway	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rm 2	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.87	3,039	0.0	$378.53	$1,982.40	$395.00	4.19
Rm 2 closet	1	Incandescent: 60W Bulb	Wall Switch	60	600	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	600	0.03	35	0.0	$4.38	$15.50	$5.00	2.40
Rm 3	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 4	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,000	0.02	81	0.0	$10.03	$71.80	$10.00	6.16
Rm 5	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 6	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 7	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.38	1,351	0.0	$168.24	$877.07	$180.00	4.14
Rm 8	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 9	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 10	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 11	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 12	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 13	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Rm 14	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.20	704	0.0	$87.64	$772.60	$105.00	7.62
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Multi-Purpose Rm	6	Linear Fluorescent - T5: 4' T5 (28W) - 6L	Wall Switch	180	2,800	Relamp	Yes	6	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	1,960	0.47	2,301	0.0	$286.63	$1,075.34	$215.00	3.00
Multi-Purpose Rm	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
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Faculty Rm	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	$112.68	$916.20	$125.00	7.02
Faculty Restroom 1	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.03	91	0.0	$11.37	$174.50	$30.00	12.70
Faculty Restroom 2	1	Incandescent: 60W Bulb	Wall Switch	60	2,000	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Occupancy Sensor	9	1,400	0.04	124	0.0	$15.39	$131.50	$25.00	6.92
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$387.00	$20.00	15.36
Rm 2 Restroom 1	1	Incandescent: 60W Bulb	Wall Switch	60	1,000	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Occupancy Sensor	9	700	0.04	62	0.0	$7.69	$131.50	$25.00	13.84
Rm 2 Restroom 2	1	Incandescent: 60W Bulb	Wall Switch	60	1,000	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Occupancy Sensor	9	700	0.04	62	0.0	$7.69	$131.50	$25.00	13.84
Office Rm 29	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	$23.89	$233.00	$40.00	8.08

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Men's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,464	0.05	338	0.0	$42.05	$387.00	$20.00	8.73
Women's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,520	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,464	0.05	338	0.0	$42.05	$387.00	$20.00	8.73
Art Rm 28	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.41	1,439	0.0	$179.21	$1,022.00	$185.00	4.67
Stage	50	Incandescent: 60W Bulb	Wall Switch	60	1,000	Relamp	No	50	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	1,000	1.67	2,933	0.0	$365.30	$775.00	$250.00	1.44
Stage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,600	0.17	486	0.0	$60.51	$468.00	$80.00	6.41
Stage	2	Halogen Incandescent: 75W Spotlights	Wall Switch	75	1,600	Relamp	No	2	LED Screw-In Lamps: 12W LED Spotlight Bulbs	Wall Switch	12	1,600	0.08	232	0.0	$28.88	$46.00	$10.00	1.25
Outer Boiler Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.02	76	0.0	$9.45	$58.50	$10.00	5.13
Main Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.16	575	0.0	$71.68	$570.80	$95.00	6.64
CS Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.08	288	0.0	$35.84	$266.40	$50.00	6.04
Principal's Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.08	288	0.0	$35.84	$266.40	$50.00	6.04
Principal's Office Restroom	1	Incandescent: 60W Bulb	Wall Switch	60	2,000	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Occupancy Sensor	9	1,400	0.04	124	0.0	$15.39	$131.50	$25.00	6.92
Nurse's Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.08	288	0.0	$35.84	$266.40	$50.00	6.04
Nurse's Office Restroom	1	Incandescent: 60W Bulb	Wall Switch	60	2,000	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Occupancy Sensor	9	1,400	0.04	124	0.0	$15.39	$131.50	$25.00	6.92
Front Foyer	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,520	None	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,520	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Front Entranceway	5	Incandescent: 60W Bulb	Wall Switch	60	4,380	Relamp	No	5	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	4,380	0.17	1,284	0.0	$160.00	$77.50	$25.00	0.33
Exterior Perimeter	26	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	26	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	2.56	19,644	0.0	$2,447.06	$8,678.54	$2,600.00	2.48
Exterior Perimeter	3	Incandescent: 60W Bulb	Wall Switch	60	4,380	Relamp	No	3	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	4,380	0.10	771	0.0	$96.00	$46.50	$15.00	0.33
Playground	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Wall Switch	86	4,380	None	No	4	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	Wall Switch	86	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Side Parking Area	12	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	86	4,380	None	No	12	LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	86	4,380	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Front Parking Area	5	Metal Halide: (1) 400W Lamp	Wall Switch	458	4,380	Fixture Replacement	No	5	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	146	4,380	1.02	7,858	0.0	$978.82	$2,790.85	$500.00	2.34

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	Boiler 1	2	Heating Hot Water Pump	2.0	80.0%	No	2,745	Yes	86.5%	Yes	2	0.66	4,639	0.0	$577.82	$6,522.05	$0.00	11.29
Boiler Rm	Boiler 2	2	Heating Hot Water Pump	1.3	80.0%	No	2,745	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Multi-Purpose Rm	2	Exhaust Fan	0.8	82.0%	No	2,745	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	West Wing	1	Exhaust Fan	0.8	82.0%	No	2,000	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Restrooms	Restrooms	11	Exhaust Fan	0.3	80.0%	No	400	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	Kitchen Hood	1	Kitchen Hood Exhaust Fan	1.0	80.0%	No	500	No	80.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ceiling	Multipurpose Rm	2	Ventilation Fan	2.0	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop	Library	1	Packaged AC	10.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Rm	Boiler Rm	1	Window AC	1.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Classrooms	Classrooms	19	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rm 4	Rm 4	1	Window AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rm 2, 18, 25	Rm 2, 18, 25	3	Ductless Mini-Split AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Library	1	Furnace	145.80	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Rm	Perimeter Heating	1	Non-Condensing Hot Water Boiler	2,511.60	Yes	1	Condensing Hot Water Boiler	2,511.60	93.00%	Ec	0.00	0	354.9	$3,691.24	$46,738.14	$5,023.20	11.30
Boiler Rm	Perimeter Heating (1967 Addition)	1	Non-Condensing Hot Water Boiler	661.50	Yes	1	Condensing Hot Water Boiler	661.50	91.00%	Et	0.00	0	69.8	$725.73	$15,878.26	$1,455.30	19.87
Boiler Rm	Perimeter Heating (1999 Addition)	1	Non-Condensing Hot Water Boiler	266.40	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Perimeter Heating (2002 Addition)	1	Non-Condensing Hot Water Boiler	327.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen Storage Area	Kitchen	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
West Wing Restrooms	West Wing	2	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Rm	Restrooms	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

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Pre-Rinse Spray Valve	3.00	1.15	0.00	0	19.4	$201.93	$124.35	$0.00	0.62

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Freezer Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Refrigerator Chest	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Break Rms	2	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Offices	4	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

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

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Midstreams Elem Sch	53	Desktop Computers + Monitors	148.0	Yes
Midstreams Elem Sch	7	Printers	13.0	Yes
Midstreams Elem Sch	4	Copy Machines	494.0	Yes
Midstreams Elem Sch	7	Microwaves	900.0	No
Midstreams Elem Sch	1	Server	650.0	No
Midstreams Elem Sch	15	CRT TVs	150.0	No
Midstreams Elem Sch	42	Smart Boards	316.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

47

ENERGY STAR® Score[1]

Midstreams Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 49,392
Built: 1959

For Year Ending: February 29, 2016
Date Generated: August 30, 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
Midstreams Elementary School 500 Midstreams Road Brick, New Jersey 08724	Brick Township Board of Education 101 Hendrickson Avenue Brick, NJ 08724 (732) 785-3000	James Edwards 101 Hendrickson Avenue Brick, NJ 08724 (732) 785-3000 jedwards@brickschools.org

Property ID: 6011356

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
74 kBtu/ft²

Source EUI
120 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	998,154 (27%)
Natural Gas (kBtu)	2,658,003 (73%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	72.2
National Median Source EUI (kBtu/ft²)	117
% Diff from National Median Source EUI	3%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	252

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)