Local Government Energy Audit:
Energy Audit Report

Ben Samuels Children's Center

80 Clove Road

Montclair, NJ 07043

Montclair State University

May 31, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Ben Samuels Children's Center.

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

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

1.1 Facility Summary

Ben Samuels Children's Center is a 23,081 square foot facility. The two-story building primarily includes day care rooms, offices, and mechanical spaces.

Lighting at Ben Samuels Children's Center consists primarily of a mixture of T8 fluorescent sources, which are inefficient as compared to currently available alternatives. Cooling and ventilation are provided by a nominal 78-ton scroll chiller serving three air handling units (AHUs). The chiller is 10 years old with remaining useful service life. Heating hot water (HHW) is provided to the AHUs, zone terminal units, and radiant heat floors by two 900 MBH condensing boilers. Domestic hot water (DHW) is produced through a 270- MBH natural gas water heater. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated three measures which together represent an opportunity for Ben Samuels Children's Center to reduce annual energy costs by $6,415 and annual greenhouse gas emissions by 39,849 lbs CO_2e. We estimate that if all high priority measures are implemented as recommended, the project will pay for itself in 4.6 years. TRC has defined high priority measures as the evaluated measures that have a simple payback less than the typical equipment life of the proposed equipment. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Ben Samuels Children's Center's annual energy use by 5%.

Figure 1 – Previous 12 Month Utility Costs

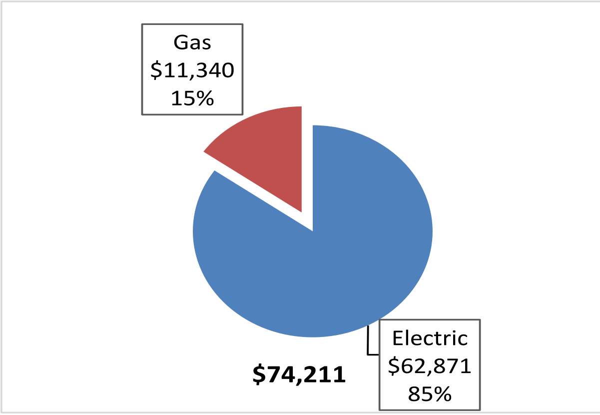
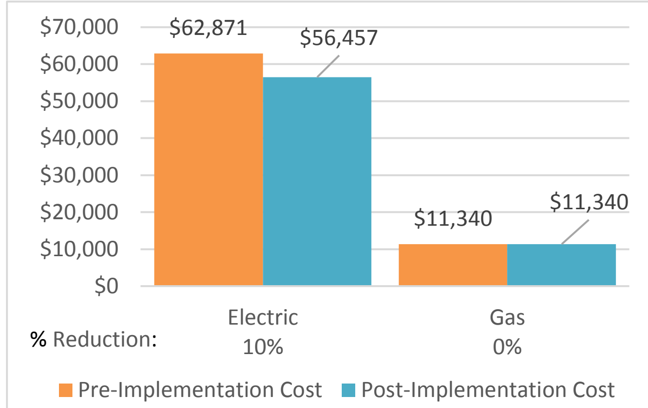


Figure 2 – Potential Post-Implementation Costs



A detailed description of Ben Samuels Children's Center's existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the evaluated 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		High Priority?	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			**29,620**	**10.2**	**0.0**	**$4,801.31**	**$27,859.61**	**$4,795.00**	**$23,064.61**	**4.8**	**29,827**
ECM 1	Install LED Fixtures	Yes	615	0.3	0.0	$99.67	$781.35	$200.00	$581.35	5.8	619
ECM 2	Retrofit Fixtures with LED Lamps	Yes	29,005	9.9	0.0	$4,701.63	$27,078.25	$4,595.00	$22,483.25	4.8	29,208
Variable Frequency Drive (VFD) Measures			**9,953**	**1.3**	**0.0**	**$1,613.34**	**$6,551.70**	**$0.00**	**$6,551.70**	**4.1**	**10,022**
ECM 3	Install VFDs on Hot Water Pumps	Yes	9,953	1.3	0.0	$1,613.34	$6,551.70	$0.00	$6,551.70	4.1	10,022
TOTALS FOR HIGH PRIORITY MEASURES			**39,573**	**11.5**	**0.0**	**$6,414.65**	**$34,411.31**	**$4,795.00**	**$29,616.31**	**4.6**	**39,849**
TOTALS FOR ALL EVALUATED MEASURES			**39,573**	**11.5**	**0.0**	**$6,414.65**	**$34,411.31**	**$4,795.00**	**$29,616.31**	**4.6**	**39,849**

* - 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.

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.

Energy Efficient Practices

TRC also identified 11 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Ben Samuels Children's Center include:

- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Assess Chillers & Request Tune-Ups
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Ben Samuels Children's Center. Based on the configuration of the site and its loads there is a moderate potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	64	kW DC STC
Electric Generation	76,248	kWh/yr
Displaced Cost	$6,630	/yr
Installed Cost	$166,400	

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- Energy Savings Improvement Program (ESIP)

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

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

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

2 Facility Information and Existing Conditions

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Ana Pinto	Director of Energy Management	pintoa@mail.montclair.edu	973-655-3244
Kevin Johnson	Supervisor of Building Repairs	johnsonke@mail.montclair.edu	973-655-4505
TRC Energy Services			
Moussa Traore	Auditor	MTraore@trcsolutions.com	(732) 902-1797

2.2 General Site Information

On July 12, 2017, TRC performed an energy audit at Ben Samuels Children's Center located in Montclair, New Jersey. TRC's team met with Ana Pinto to review the facility operations and help focus our investigation on specific energy-using systems.

Ben Samuels Children's Center is a 23,081 square foot facility. The two-story building primarily includes day care rooms, offices, and mechanical spaces.

Lighting at Ben Samuels Children's Center consists primarily of a mixture of T8 fluorescent sources, which are inefficient as compared to currently available alternatives. Cooling and ventilation are provided by a 75-ton scroll chiller serving three air handling units (AHUs). The chiller is 10 years old with remaining useful service life. Heating hot water (HHW) is provided to the AHUs, zone terminal units, and radiant heat floors by two 900 MBH condensing boilers. Domestic hot water (DHW) is produced through a 270- MBH natural gas water heater.

2.3 Building Occupancy

The day care center is open Monday to Friday, 52 weeks a year. During a typical day, the facility is occupied by approximately 75 students and staff.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Ben Samuels Children's Center	Weekday	7:30 AM - 6:15 PM
Ben Samuels Children's Center	Weekend	closed

2.4 Building Envelope

The Ben Samuels Children's Center building is constructed of concrete block and structural steel with a concrete facade. The building has a pitched, tile-covered roof that is in good condition. The building has double pane windows which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of metal and are in good condition.

Building envelope measures generally consist of improving the following aspects of the walls, roofs, windows and in some cases floor or foundation:

- Increase resistance to heat transfer by improving the insulation quality.
- Reduce the loss of conditioned air or introduction of outside air by sealing the components of the envelope.
- Reduce heat gain be improving the reflectance of components of the envelope.

Quantifying the savings associated with implementing these changes is difficult primarily due to the transient nature of the energy use and because the savings do not occur at the envelope components but rather at the supporting heating, air conditioning and ventilation systems. In addition, most building envelope measures are expensive to implement and as a result have long paybacks.

Although this energy audit did not identify any envelope specific issues related to any of the Montclair University buildings the following should be included during the normal facility maintenance and planning.

A cost effective alternative to address some envelope issues is known as weatherization, which generally involves sealing cracks and gaps around windows, doors, and wall and roof penetrations. Weatherization measures are typically inexpensive, can be done by on-site staff, result in relatively low energy savings, and can improve occupant comfort by reducing drafts and hot/cold spots. Maintaining caulking and weather stripping are almost always cost effective and should be part of the on-going maintenance program.

Installing window film can be one of the relatively less expensive envelope measures. Window films can be successful when installed correctly and in the right application. Window film generally reduces solar heat gain by restricting the transmittance of specific parts of the solar spectrum. In some cases solar film can also increase the overall R-value of the window resulting in reduced heat loss. Some window films will also reduce the light transmittance which can cause the interior space to be darker. Two factors that make a good application for window film are cooling dominant buildings and buildings with clear, single pane windows. Buildings orientations that are significantly shaded are generally not a good application for window film. The installed cost for window film can range from $5 to $20 per square foot of window depending on the quality of the film, the size of the job, and arrangement of the windows.

Most other improvements to the building envelope only become cost effective when done in conjunction with other renovations. The most common example is increasing the insulation value of a roof or installing a "cool-roof" as part of an overall roof replacement project.

2.5 On-Site Generation

The campus has a central cogeneration plant. The cogeneration plant uses natural gas fired turbines to produce electricity. Waste heat from the turbines is used to produce steam. The steam is delivered to some of the buildings on campus and used to produce chilled water which is delivered to some of the buildings on campus. See the campus summary report for additional information regarding the campus cogeneration plant.

Ben Samuels Children's Center does not have any on-site electric generation capacity nor does it currently receive energy from the cogeneration plant.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting at the facility is provided mostly by linear fluorescent T8 lamps with electronic ballasts and compact fluorescent screw-in lamps. The linear fluorescent fixtures are located in all areas of the building. The site has upgraded some fixtures to more efficient LED technology including the building exit signs. The interior lighting controls use a combination of occupancy sensors and manually operated switches.

Chilled Water or Condenser Water System

The facility is served by its own chilled water plant. The chiller plant contains a nominal 75-ton air-cooled, scroll chiller (CH1). The chiller provides chilled water to the zones via two dedicated 10 hp primary pumps (CHWP) that operate in a lead/lag configuration. The pumps are piped in parallel and equipped with variable frequency drives (VFDs). The building's chiller plant supplies chilled water to AHUs 1, 2, and 3.

The chilled water (CHW) supply set point is 44°F with an outside temperature (OAT) chiller lockout of 55°F.

The chiller is 10 years old, in good condition, and well maintained.

Hot Water Heating System

The hot water heating system consists of two natural gas condensing boilers with capacities of 900 MBH each. Only one boiler operates at a time. The HHW system supplies the cabinet unit heaters with two 5 hp pumps piped in parallel. There is also a radiant floor heating system that uses the HHW. There is an OAT boiler lockout of 67°F.

The boilers are 10 years old, in good condition, and well maintained.

Chilled Water Air Conditioning System (CHW)

There are three air handling units (AHU1, 2, & 3) that serve the building. AHUs 1, 2 & 3 are single zone variable air volume (VAV) systems. Each AHU has a supply fan ranging from 10 to 15 hp and a return fans with 5 hp motors. Each AHU also has a heat recovery wheel. The AHU supply air temperatures (SAT) range from 52°F to 58°F.

The air is distributed via ducts to VAV terminal units in the zones with reheat coils. The zone temperature set points range from 66°F to 70°F.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists one PVI gas-fired 125 gallon storage tank water heater with an input capacity of 270 MBh, which performs at an efficiency of approximately 83%. The gas water heater serves the breakroom and restrooms.

Building Plug Load

The facility plug load includes computers, copiers, printers, other office equipment, and a washer and dryer. A breakroom includes a refrigerator, microwave, and a coffee maker. There is also a refrigerated vending machine on site.

2.7 Water-Using Systems

There are eight restrooms at this facility. A sampling of restrooms found that the fixtures meet current water-conservation guidelines for "low flow" devices. The faucets are all rated below 2.2 gallons per minute (gpm). The toilets are all rated at less than 2.5 gallons per flush (gpf) and the urinals are rated at less than 2 gpf.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

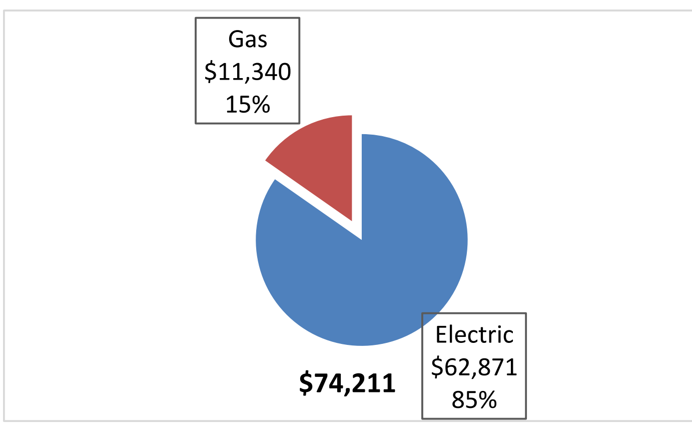
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Ben Samuels Children's Center		
Fuel	**Usage**	**Cost**
Electricity	387,859 kWh	$62,871
Natural Gas	14,026 Therms	$11,340
Total		**$74,211**

The current annual energy cost for this facility is $74,211 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was $0.162/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 electrical demand profile is indicative of a building with peak summer usage resulting from comfort cooling. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

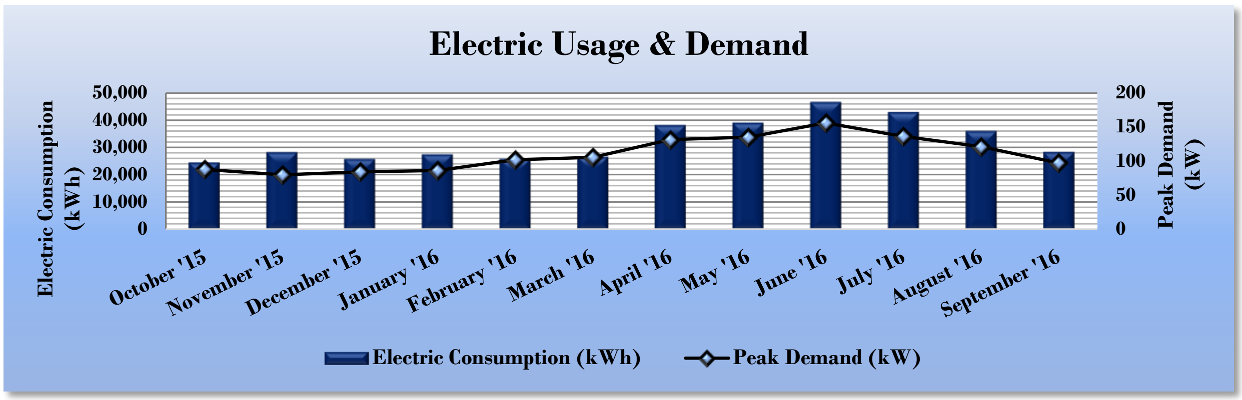


Figure 10 - Electric Usage & Demand

Electric Billing Data for Ben Samuels Children's Center					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
11/1/15	31	24,486	88	$3,771	No
12/1/15	30	28,262	80	$4,069	No
1/1/16	31	25,810	84	$4,019	No
2/1/16	31	27,456	86	$4,161	No
3/1/16	29	25,785	102	$4,199	No
4/1/16	31	26,513	105	$4,240	No
5/1/16	30	38,128	132	$6,626	No
6/1/16	31	38,954	135	$7,144	No
7/1/16	30	46,523	156	$8,001	No
8/1/16	31	42,813	136	$7,274	No
9/1/16	31	35,904	121	$5,171	No
10/1/16	30	28,288	97	$4,369	No
Totals	**366**	**388,922**	**156.1**	**$63,043**	0
Annual	**365**	**387,859**	**156.1**	**$62,871**	

3.3 Natural Gas Usage

Natural Gas is provided by PSE&G. The average gas cost for the past 12 months is $0.808/therm, which is the blended rate used throughout the analyses in this report. The gas usage profile is indicative of a building subject to a winter heating load with a limited amount of year round domestic hot water use. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

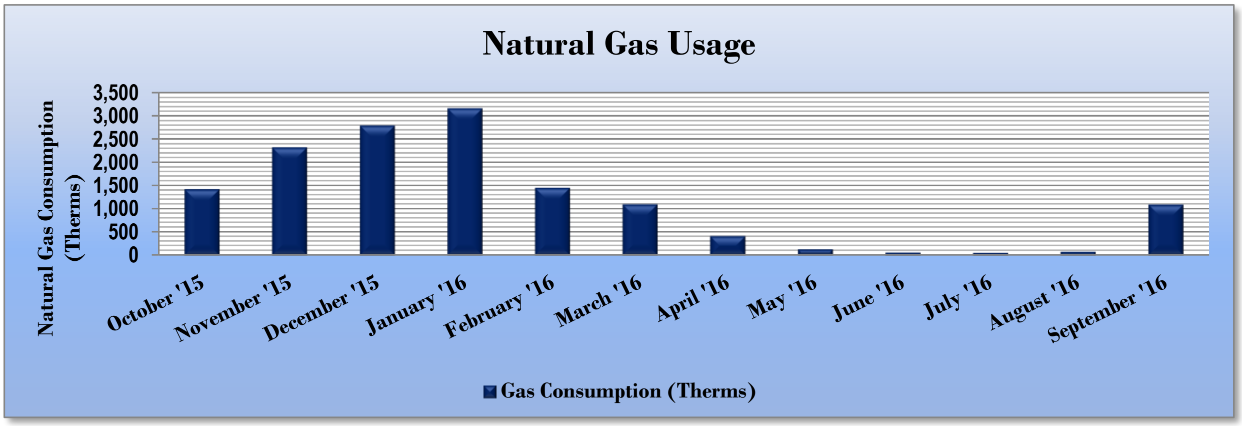


Figure 12 - Natural Gas Usage

Gas Billing Data for Ben Samuels Children's Center				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
11/1/15	31	1,422	$1,310	No
12/1/15	30	2,324	$1,903	No
1/1/16	31	2,792	$2,160	No
2/1/16	31	3,167	$2,302	No
3/1/16	29	1,453	$815	No
4/1/16	31	1,095	$661	No
5/1/16	30	411	$318	No
6/1/16	31	127	$175	No
7/1/16	30	57	$142	No
8/1/16	31	51	$137	No
9/1/16	31	75	$153	No
10/1/16	30	1,090	$1,292	No
Totals	**366**	**14,065**	**$11,371**	0
Annual	**365**	**14,026**	**$11,340**	

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 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Ben Samuels Children's Center	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	243.8	262.6
Site Energy Use Intensity (kBtu/ft^2)	118.1	130.7

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

Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Ben Samuels Children's Center	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	225.5	262.6
Site Energy Use Intensity (kBtu/ft^2)	112.3	130.7

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

Your building is not one of the building categories that are eligible to receive a score. The Portfolio Manager Statement of Energy Performance (SEP) was generated and is included in this report as Appendix B.

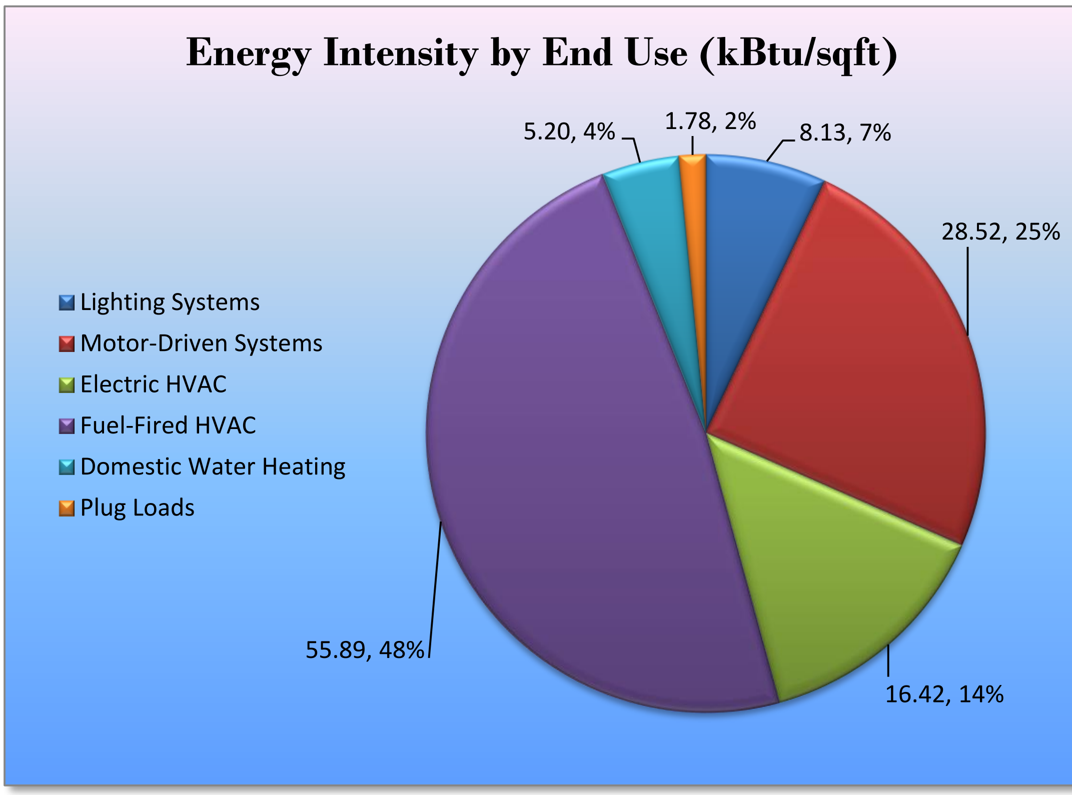
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 15 - 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 Ben Samuels Children's Center 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 High Priority ECMs

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

Figure 16 – Summary of High Priority 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		**29,620**	**10.2**	**0.0**	**$4,801.31**	**$27,859.61**	**$4,795.00**	**$23,064.61**	**4.8**	**29,827**
ECM 1	Install LED Fixtures	615	0.3	0.0	$99.67	$781.35	$200.00	$581.35	5.8	619
ECM 2	Retrofit Fixtures with LED Lamps	29,005	9.9	0.0	$4,701.63	$27,078.25	$4,595.00	$22,483.25	4.8	29,208
Variable Frequency Drive (VFD) Measures		**9,953**	**1.3**	**0.0**	**$1,613.34**	**$6,551.70**	**$0.00**	**$6,551.70**	**4.1**	**10,022**
ECM 3	Install VFDs on Hot Water Pumps	9,953	1.3	0.0	$1,613.34	$6,551.70	$0.00	$6,551.70	4.1	10,022
TOTALS		**39,573**	**11.5**	**0.0**	**$6,414.65**	**$34,411.31**	**$4,795.00**	**$29,616.31**	**4.6**	**39,849**

* - 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

Our recommended upgrades to existing lighting fixtures are summarized in Figure 17 below.

Figure 17 – 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		29,620	10.2	0.0	$4,801.31	$27,859.61	$4,795.00	$23,064.61	4.8	29,827
ECM 1	Install LED Fixtures	615	0.3	0.0	$99.67	$781.35	$200.00	$581.35	5.8	619
ECM 2	Retrofit Fixtures with LED Lamps	29,005	9.9	0.0	$4,701.63	$27,078.25	$4,595.00	$22,483.25	4.8	29,208

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	615	0.3	0.0	$99.67	$781.35	$200.00	$581.35	5.8	619

Measure Description

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

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

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	25,394	8.3	0.0	$4,116.28	$25,559.66	$4,435.00	$21,124.66	5.1	25,571
Exterior	3,611	1.7	0.0	$585.36	$1,518.59	$160.00	$1,358.59	2.3	3,636

Measure Description

We recommend retrofitting existing incandescent, halogen, or 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 Variable Frequency Drive Measures

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

Figure 18 – Summary of Variable Frequency Drive (VFD) ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**9,953**	**1.3**	**0.0**	**$1,613.34**	**$6,551.70**	**$0.00**	**$6,551.70**	**4.1**	**10,022**
ECM 3	Install VFDs on Hot Water Pumps	9,953	1.3	0.0	$1,613.34	$6,551.70	$0.00	$6,551.70	4.1	10,022

ECM 3: 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)
9,953	1.3	0.0	$1,613.34	$6,551.70	$0.00	$6,551.70	4.1	10,022

Measure Description

We recommend installing a variable frequency drives (VFD) to control the 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.

5 Energy Efficient Practices

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

Close Doors and Windows

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

Assess Chillers & Request Tune-Ups

Chillers are responsible for a substantial portion of a commercial building's overall energy usage. When components of a chiller are not optimized, this can quickly result in a noticeable increase in energy bills. Chiller diagnostics can produce a 5% to 10% cost avoidance potential from discovery and implementation of low/no cost optimization strategies.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper 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.

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).

6 On-Site Generation Measures

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

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

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

6.1 Photovoltaic

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

A preliminary screening based on the campus' electric demand and the size and location of free areas on campus was performed and is addressed in the campus level summary report.

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

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

6.2 Combined Heat and Power

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

The campus has a CHP plant that uses natural gas fired turbines to generate electricity. Waste heat from the turbines is used to produce steam which is either delivered to buildings on campus or used to produce chilled water which is delivered to buildings on campus. Since the campus has a CHP that serves a significant portion of the campus further evaluation of individual building CHP applications were not done.

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 building is not a good candidate for DR.

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

Figure 19 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	X		X			
ECM 2	Retrofit Fixtures with LED Lamps	X		X			
ECM 3	Install VFDs on Hot Water Pumps			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. This facility does not meet all of the criteria for participating in the P4P program based on the measures identified in this study. However, since additional measures may be identified during the P4P evaluation and the facility is close to meeting the P4P program criteria it is worth considering the P4P program for this site. 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.](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 any recent 12-month period. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

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

How to Participate

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

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

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

9 Energy Purchasing and Procurement Strategies

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	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
24	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.32	968	0.0	$156.99	$877.50	$150.00	4.63
24	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
24	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.14	432	0.0	$70.03	$578.40	$120.00	6.55
18	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.36	1,114	0.0	$180.53	$877.50	$150.00	4.03
18	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
18	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.14	432	0.0	$70.03	$578.40	$120.00	6.55
20	9	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.11	324	0.0	$52.52	$433.80	$90.00	6.55
21	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.44	1,336	0.0	$216.64	$1,053.00	$180.00	4.03
21	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.26	780	0.0	$126.37	$526.40	$105.00	3.33
22	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.44	1,336	0.0	$216.64	$1,053.00	$180.00	4.03
22	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.26	780	0.0	$126.37	$526.40	$105.00	3.33
19	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,957	0.09	261	0.0	$42.31	$252.80	$0.00	5.98
Gym2	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
17	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.15	445	0.0	$72.21	$300.80	$60.00	3.33
25	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.05	144	0.0	$23.34	$192.80	$40.00	6.55
2	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.05	144	0.0	$23.34	$192.80	$40.00	6.55
3	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.14	432	0.0	$70.03	$578.40	$120.00	6.55
3	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
3	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.36	1,114	0.0	$180.53	$877.50	$150.00	4.03
9	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.14	432	0.0	$70.03	$578.40	$120.00	6.55
9	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
9	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.36	1,114	0.0	$180.53	$877.50	$150.00	4.03
Gym2	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
8	12	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.14	432	0.0	$70.03	$578.40	$120.00	6.55
8	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
8	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.36	1,114	0.0	$180.53	$877.50	$150.00	4.03
7	9	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.11	324	0.0	$52.52	$433.80	$90.00	6.55
15	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.44	1,336	0.0	$216.64	$1,053.00	$180.00	4.03
15	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
15	1	Compact Fluorescent: Screw-in (23W) - 1L	Occupancy Sensor	23	1,957	Relamp	No	1	LED Screw-In Lamps: LED screw-in (23W) - 1L	Occupancy Sensor	16	1,957	0.01	16	0.0	$2.52	$43.95	$0.00	17.47
6	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.39	1,188	0.0	$192.57	$936.00	$160.00	4.03
6	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.22	668	0.0	$108.32	$451.20	$90.00	3.33
6	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,957	0.02	65	0.0	$10.58	$63.20	$0.00	5.98
10	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.36	1,114	0.0	$180.53	$752.00	$150.00	3.33
11	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
12	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
13	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
14	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
15	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	None	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
15	7	Compact Fluorescent: Screw-in (13W) - 1L	Occupancy Sensor	13	1,957	Relamp	No	7	LED Screw-In Lamps: LED screw-in (13W) - 1L	Occupancy Sensor	9	1,957	0.02	61	0.0	$9.96	$307.67	$0.00	30.90
16	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.18	557	0.0	$90.27	$376.00	$75.00	3.33
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.07	223	0.0	$36.11	$150.40	$30.00	3.33
Data closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.07	223	0.0	$36.11	$150.40	$30.00	3.33
1	8	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.09	288	0.0	$46.68	$385.60	$80.00	6.55
26	8	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	8	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.09	288	0.0	$46.68	$385.60	$80.00	6.55
26	2	Compact Fluorescent: Screw-in (13W) - 1L	Occupancy Sensor	13	1,957	Relamp	No	2	LED Screw-In Lamps: LED screw-in (13W) - 1L	Occupancy Sensor	9	1,957	0.01	18	0.0	$2.84	$87.91	$0.00	30.90
Closet	2	Compact Fluorescent: Screw-in (13W) - 1L	Occupancy Sensor	13	1,957	Relamp	No	2	LED Screw-In Lamps: LED screw-in (13W) - 1L	Occupancy Sensor	9	1,957	0.01	18	0.0	$2.84	$87.91	$0.00	30.90
Janitorial	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
Electrical closet	1	Compact Fluorescent: Screw-in (13W) - 1L	Occupancy Sensor	13	1,957	Relamp	No	1	LED Screw-In Lamps: LED screw-in (13W) - 1L	Occupancy Sensor	9	1,957	0.00	9	0.0	$1.42	$43.95	$0.00	30.90

	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
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.04	111	0.0	$18.05	$75.20	$15.00	3.33
Corridor	8	Compact Fluorescent: Screw-in (34W) - 1L	Occupancy Sensor	34	1,957	Relamp	No	8	LED Screw-In Lamps: LED screw-in (34W) - 1L	Occupancy Sensor	24	1,957	0.06	184	0.0	$29.76	$351.62	$0.00	11.81
Corridor	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,957	Relamp	No	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,957	0.12	354	0.0	$57.44	$323.10	$45.00	4.84
Corridor	11	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,957	Relamp	No	11	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,957	0.14	433	0.0	$70.21	$394.90	$55.00	4.84
South vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,957	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,957	0.03	79	0.0	$12.77	$71.80	$10.00	4.84
Corridor	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,957	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,957	0.07	223	0.0	$36.11	$150.40	$30.00	3.33
Corridor	26	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Occupancy Sensor	33	1,957	Relamp	No	26	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,957	0.31	936	0.0	$151.72	$1,253.20	$260.00	6.55
Corridor	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
North vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,957	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,957	0.03	79	0.0	$12.77	$71.80	$10.00	4.84
Main lobby	10	Compact Fluorescent: Screw-in (34W) - 1L	Occupancy Sensor	34	1,957	Relamp	No	10	LED Screw-In Lamps: LED screw-in (34W) - 1L	Occupancy Sensor	24	1,957	0.08	229	0.0	$37.20	$439.53	$0.00	11.81
Main lobby	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,957	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,957	0.05	148	0.0	$24.07	$117.00	$20.00	4.03
Main lobby	4	Compact Fluorescent: Screw-in (54W) - 1L	Wall Switch	54	2,795	Relamp	No	4	LED Screw-In Lamps: LED screw-in (54W) - 1L	Wall Switch	38	2,795	0.05	208	0.0	$33.76	$175.81	$0.00	5.21
Mechanical room	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,957	Relamp	No	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,957	0.12	354	0.0	$57.44	$323.10	$45.00	4.84
Attic	2	Compact Fluorescent: Screw-in (13W) - 1L	Occupancy Sensor	13	1,957	Relamp	No	2	LED Screw-In Lamps: LED screw-in (13W) - 1L	Occupancy Sensor	9	1,957	0.01	18	0.0	$2.84	$87.91	$0.00	30.90
Attic	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	1,957	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,957	0.05	157	0.0	$25.53	$143.60	$20.00	4.84
Front entrance	8	Halogen Incandescent: Screw-in (90W) - 1L	Daylight Dimming	90	1,398	Relamp	No	8	LED Screw-In Lamps: LED screw-in (13W) - 1L	Daylight Dimming	13	1,398	0.45	990	0.0	$160.48	$351.62	$40.00	1.94
Perimieter	22	Halogen Incandescent: Screw-in (90W) - 1L	Daylight Dimming	90	1,398	Relamp	No	22	LED Screw-In Lamps: LED screw-in (13W) - 1L	Daylight Dimming	13	1,398	1.25	2,722	0.0	$441.31	$966.97	$110.00	1.94
Perimieter	2	Halogen Incandescent: 2-pin (150W) - 1L	Daylight Dimming	150	1,398	Relamp	No	2	LED - Fixtures: Downlight Recessed	Daylight Dimming	13	1,398	0.20	440	0.0	$71.38	$200.00	$10.00	2.66
Perimieter	2	Metal Halide: (1) 250W Lamp	Daylight Dimming	295	1,398	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	1,398	0.32	707	0.0	$114.63	$781.35	$200.00	5.07

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical room	Chiller	2	Chilled Water Pump	10.0	91.7%	Yes	3,391	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical room	Boiler	2	Heating Hot Water Pump	5.0	89.5%	No	2,745	No	89.5%	Yes	2	1.26	9,953	0.0	$1,613.34	$6,551.70	$0.00	4.06
Attic	AHU-1	1	Supply Fan	15.0	91.0%	Yes	3,391	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-1	1	Return Fan	5.0	87.5%	Yes	3,391	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-2	1	Supply Fan	15.0	91.0%	Yes	3,391	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-2	1	Return Fan	5.0	87.5%	Yes	3,391	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Exhaust	10	Exhaust Fan	0.5	82.5%	Yes	2,745	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-3	1	Return Fan	5.0	87.5%	Yes	2,745	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-3	1	Supply Fan	10.0	89.5%	Yes	3,391	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-3	1	Return Fan	5.0	87.5%	Yes	3,391	No	87.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric Chiller Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical room	Space cooling	1	Air-Cooled Scroll Chiller	78.00	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
Mechnical room	Space heating	1	Condensing Hot Water Boiler	900.00	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
Mechanical room	Children's Center	1	Storage Tank Water Heater (> 50 Gal)	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?
Children's Center	1	Washing machine	900.0	Yes
Children's Center	1	Refrigerator	600.0	Yes
Children's Center	5	Microwave	1,000.0	Yes
Children's Center	12	Computer	110.0	Yes
Children's Center	7	Printer	460.0	Yes
Children's Center	2	Copy machine	1,400.0	Yes
Children's Center	4	Coffee maker	900.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Break room	1	Refrigerated	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Ben Samuels Children's Center

Primary Property Type: Pre-school/Daycare
Gross Floor Area (ft²): 23,081
Built: 2005

For Year Ending: October 31, 2016
Date Generated: September 26, 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
Ben Samuels Children's Center 80 Clove Road Little Falls, New Jersey 07424	Montclair Statet University 1 Normal Avenue Montclair, NJ 07043 973-655-3244	Ana Pinto 1 Normal Avenue Montclair, NJ 07043 973-655-3244 pintoa@montclair.edu

Property ID: 6023563

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
118.4 kBtu/ft²

Source EUI
244.4 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	1,326,303 (48%)	
Natural Gas (kBtu)	1,406,314 (52%)	

National Median Comparison

National Median Site EUI (kBtu/ft²)	70.6
National Median Source EUI (kBtu/ft²)	145.7
% Diff from National Median Source EUI	68%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	222

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)