



Local Government Energy Audit: Energy Audit Report



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Administration Building and Saybrook Annex

195 Virginia St and 171 Virginia St
Hillside, NJ 07205

Hillside Board of Education

September 25, 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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I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for the Administration Building and Saybrook Annex.

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

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

I.1 Facility Summary

The Administration Building and Saybrook Annex for the Hillside Public School District are located next to each other. The Administration Building and Saybrook Annex are sized 11,000 square feet and 12,000 square feet, respectively. The buildings are mainly comprised of offices and meeting rooms. There is a machine/wood/repair shop in the basement of the Administration Building.

Lighting at the Administration Building and Saybrook Annex consists primarily of T8 fluorescent, incandescent and CFL sources and which are inefficient as compared to currently available alternatives. Heating in the buildings is mainly provided by steam radiators supplied from gas-fired steam boilers in each building. Cooling is provided by window A/C units and one split system air-source heat pump unit (Saybrook Annex). A thorough description of the facility and our observations are located in Section 2

I.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated four measures which together represent an opportunity for the Administration Building and Saybrook Annex to reduce annual energy costs by \$8,384 and annual greenhouse gas emissions by 37,108 lbs CO₂e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 3.4 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce the Administration Building and Saybrook Annex's annual energy use by 8%.

Figure 1 – Previous 12 Month Utility Costs

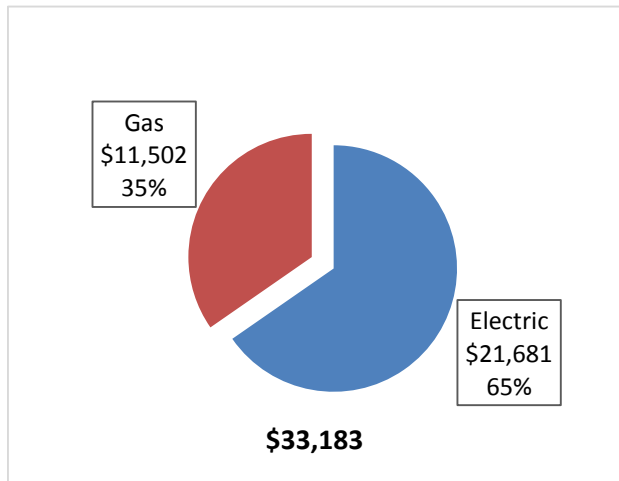
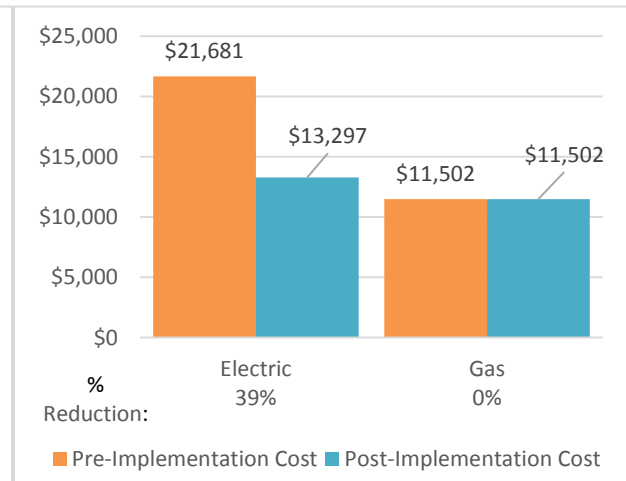


Figure 2 – Potential Post-Implementation Costs



A detailed description of the Administration Building and Saybrook Annex’s existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure	Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		30,962	9.1	0.0	\$7,044.19	\$23,634.07	\$3,850.00	\$19,784.07	2.8	31,179
ECM 1 Install LED Fixtures	Yes	994	0.2	0.0	\$226.17	\$1,368.52	\$180.00	\$1,188.52	5.3	1,001
ECM 2 Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	18	0.0	0.0	\$4.03	\$117.00	\$10.00	\$107.00	26.6	18
ECM 3 Retrofit Fixtures with LED Lamps	Yes	29,951	8.8	0.0	\$6,813.99	\$22,148.55	\$3,660.00	\$18,488.55	2.7	30,160
Lighting Control Measures		5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930
ECM 4 Install Occupancy Sensor Lighting Controls	Yes	5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930
TOTALS		36,851	10.8	0.0	\$8,383.84	\$33,894.07	\$5,180.00	\$28,714.07	3.4	37,108

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

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

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

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

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 the Administration Building and Saybrook Annex include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Ensure Lighting Controls Are Operating Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Repair/Replace Steam Traps
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for the Administration Building and Saybrook Annex. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- 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 than SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated DI contractor and, in most cases, they will perform the installation work.

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Darice Gonzalez	School Business Administrator/Bd Sec	dgonzalez@hillsidek12.org	908-352-7664 ext 6429
TRC Energy Services			
Alexander Klieverik	Auditor	AKlieverik@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On February 22, 2018, TRC performed an energy audit at the Administration Building and Saybrook Annex located in Hillside, New Jersey. TRC’s team met with David DeFluri, District Facility Manager to review the facility operations and help focus our investigation on specific energy-using systems.

The Administration Building and Saybrook Annex for the Hillside Public School District are located next to each other. The Administration Building and Saybrook Annex are sized 11,000 square feet and 12,000 square feet, respectively. The buildings are mainly comprised of offices and meeting rooms. There is a machine/wood/repair shop in the basement of the Administration Building.

Lighting at the Administration Building and Saybrook Annex consists primarily of T8 fluorescent, incandescent and CFL sources and which are inefficient as compared to currently available alternatives. Heating in the buildings is mainly provided by steam radiators supplied from gas-fired steam boilers in each building. Cooling is provided by window A/C units and one split system air-source heat pump unit (Saybrook Annex). A thorough description of the facility and our observations are located in Section 2.

2.3 Building Occupancy

The buildings are open Monday through Friday from 6:00 AM through 5:00 PM throughout the year. The buildings are closed on the weekend.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Administration Building	Weekday	6:00 am -4:30pm
Administration Building	Weekend	Closed
Sandybrook Annex	Weekday	6:00 am -5:00pm
Sandybrook Annex	Weekend	Closed

2.4 Building Envelope

The Administration Building was constructed in 1910 and the Saybrook Annex was constructed in 1922. Both buildings are constructed of clay brick. The Administration Building has a pitched roof while the Saybrook Annex has a flat roof. The building has double paned windows which are in fair condition. The exterior doors are constructed of aluminum and tempered glass and are in good condition.



Image 1 – Administration Building



Image 2 – Saybrook Annex

2.5 On-Site Generation

The Administration Building and Saybrook Annex do not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting in both buildings is provided mostly by linear fluorescent T8 lamps with electronic ballasts. Additional lighting is provided by incandescent and 2-pin compact fluorescent (CFL) lamps. The linear fluorescent fixtures are located in all areas of the building. Exterior lighting is provided by LED wallpacks and is controlled by a schedule timer.

Lighting control in interior spaces is provided mainly by manual switches. There are occupancy sensor controls in only a few a rooms of the buildings. The Saybrook Annex has occupancy sensors in the Board Room and Rooms 7 and 8 (1st floor) while the Administration Building occupancy sensors in the copy/mail room and the 2nd floor restrooms. The LED exit signs operate 24 hours per day for security reasons.



***Image 3 – Admin. Bldg.
T8 Fluorescent Lighting***



***Image 4 – Saybrook Annex
T8 Fluorescent Lighting***

Steam Heating System

The steam heating system consists of one Cleaver Brooks gas-fired steam boiler in each building. Both boilers are forced draft and have a nominal combustion efficiency of about 80%. The steam boiler in the Administration Building has a rated output capacity of 1,674 kBtu/hr, while the Saybrook Annex boiler is rated at 2,511 kBtu/hr. Steam is distributed to radiators in the zones.



Image 5 – Admin. Bldg Steam Boiler



Image 6 – Saybrook Annex Steam Boiler

Direct Expansion Air Conditioning System (DX)

There are 19 window air conditioners (ACs) located throughout the building in the Administration Building and ten window ACs in the Saybrook Annex. The units serve the various offices and meeting rooms.

There are two split-system air-source heat pump (HP) system located in the Saybrook Annex. The units serve the Main Office.



*Image 7 – Admin. Bldg
Window AC*



*Image 8 – Saybrook Annex
Split HP Outdoor Coil Units*

Domestic Hot Water Heating System

In the Administration Building, there is one 30 gallon electric storage tank water heater (AO Smith) located in the boiler room. The Saybrook Annex has one 40 gallon natural gas-fired storage tank water (Rheem) with an input rating of 34 kbtu/hr and a nominal efficiency of about 80%. The water heaters serve the restrooms and kitchens in the buildings.

Building Plug Load

There are 34 computer work stations, 17 printers, five projectors and four smart-boards located throughout the buildings. There is work shop located in the basement of the Administration Building with various electric saws, drill presses, grinders, etc.

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

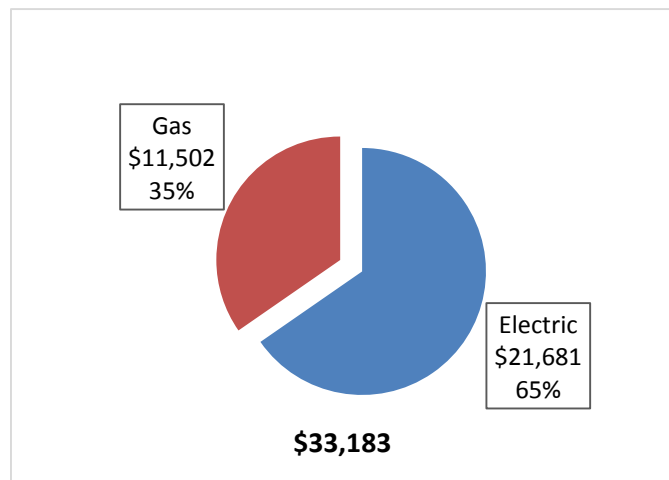
The following energy consumption and cost data was combined for the Administration Building and Saybrook Annex and is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed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

Figure 6 - Utility Summary

Utility Summary for Administration Building & Sandybrook Annex		
Fuel	Usage	Cost
Electricity	95,296 kWh	\$21,681
Natural Gas	12,518 Therms	\$11,502
Total		\$33,183

The combined current annual energy cost for the Administration Building and Saybrook Annex is \$33,183 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was \$0.228/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 usage profile for both buildings is similar, although the overall usage at the Administration Building is higher. Higher usage in the Administration Building, particularly in the summer, may be due to a higher cooling load as compared to the Annex. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Administration Building Electric Usage & Demand

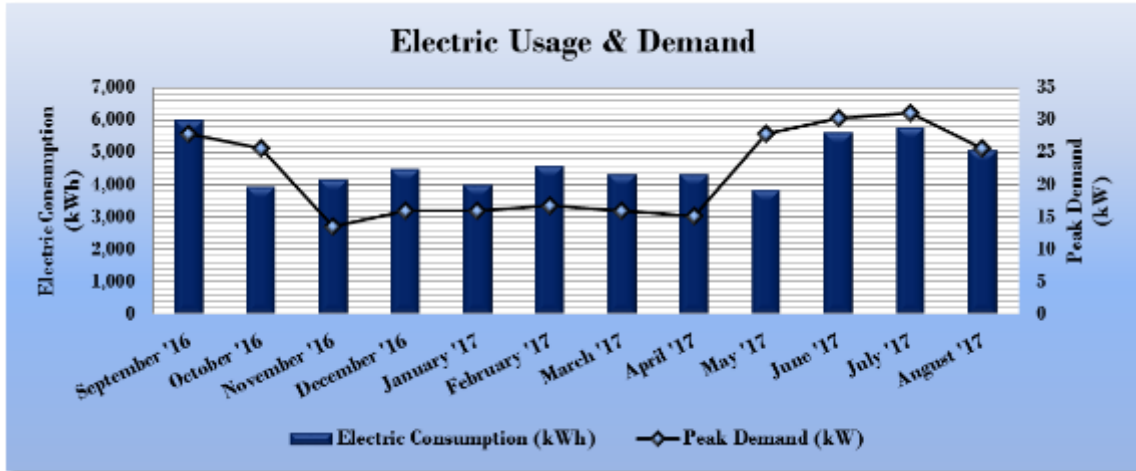


Figure 9 - Saybrook Annex Electric Usage & Demand

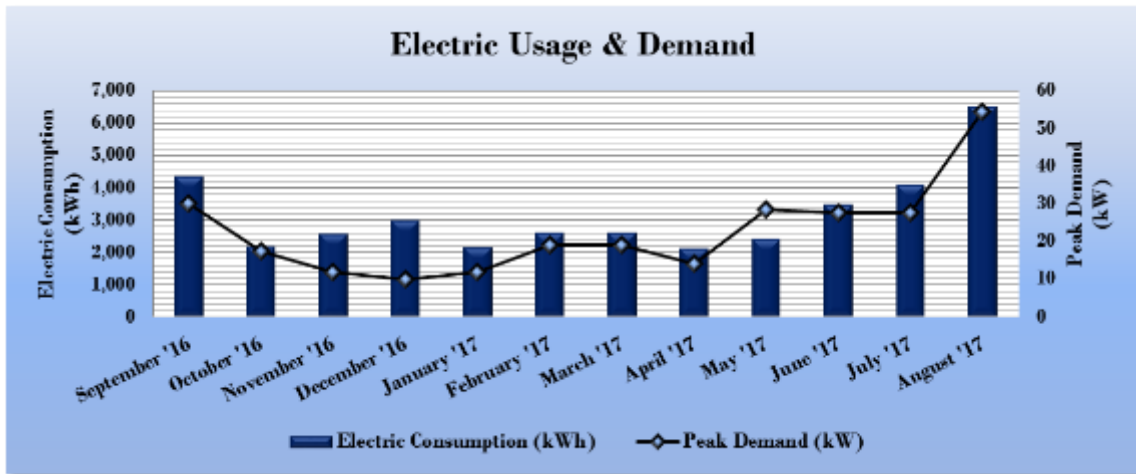


Figure 10 - Electric Usage & Demand

Electric Billing Data for Administration Building						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
9/28/16	30	6,000	28	\$125	\$1,250	No
10/27/16	29	3,920	26	\$114	\$790	No
11/29/16	33	4,160	14	\$61	\$752	No
12/29/16	30	4,480	16	\$71	\$793	No
1/30/17	32	4,000	16	\$71	\$766	No
3/1/17	30	4,560	17	\$75	\$824	No
3/30/17	29	4,320	16	\$72	\$818	No
5/1/17	32	4,320	15	\$69	\$822	No
5/25/17	24	3,840	28	\$101	\$759	No
6/26/17	32	5,600	30	\$137	\$1,243	No
7/26/17	30	5,760	31	\$141	\$1,251	No
8/24/17	29	5,040	26	\$112	\$1,066	No
Totals	360	56,000	31.2	\$1,149	\$11,134	0
Annual	365	56,778	31.2	\$1,165	\$11,288	

Electric Billing Data for Sandybrook Annex						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
9/28/16	30	4,338	30	\$135	\$1,109	No
10/27/16	29	2,184	18	\$78	\$599	No
11/29/16	33	2,556	12	\$54	\$600	No
12/29/16	30	2,976	10	\$45	\$626	No
1/30/17	32	2,142	12	\$54	\$593	No
3/1/17	30	2,604	19	\$85	\$679	No
3/30/17	29	2,600	19	\$86	\$689	No
5/1/17	32	2,111	14	\$64	\$632	No
5/25/17	24	2,421	28	\$103	\$632	No
6/26/17	32	3,468	28	\$125	\$1,038	No
7/26/17	30	4,080	28	\$125	\$1,080	No
8/24/17	59	6,511	54	\$241	\$1,974	No
Totals	390	37,991	54.4	\$1,194	\$10,250	0
Annual	365	35,556	54.4	\$1,118	\$9,593	

3.3 Natural Gas Usage

Natural gas is provided by Elizabethtown Gas. The average gas cost for the past 12 months is \$0.919/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the charts below. The gas use profile and overall gas usage for the two facilities are practically identical.

Figure 11 - Administration Building Natural Gas Usage

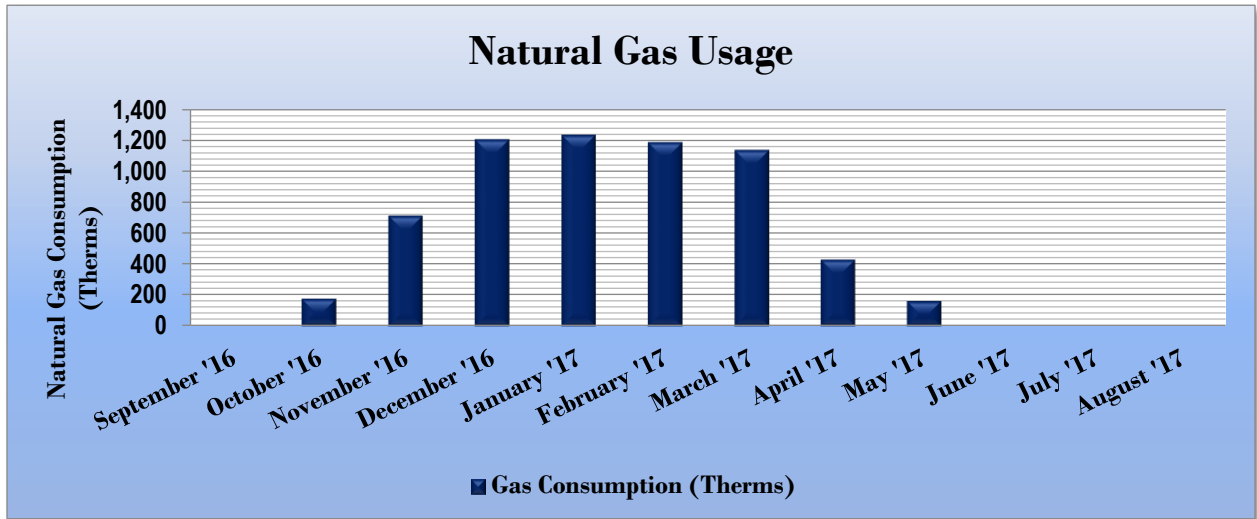


Figure 12 – Saybrook Annex Months Natural Gas Usage

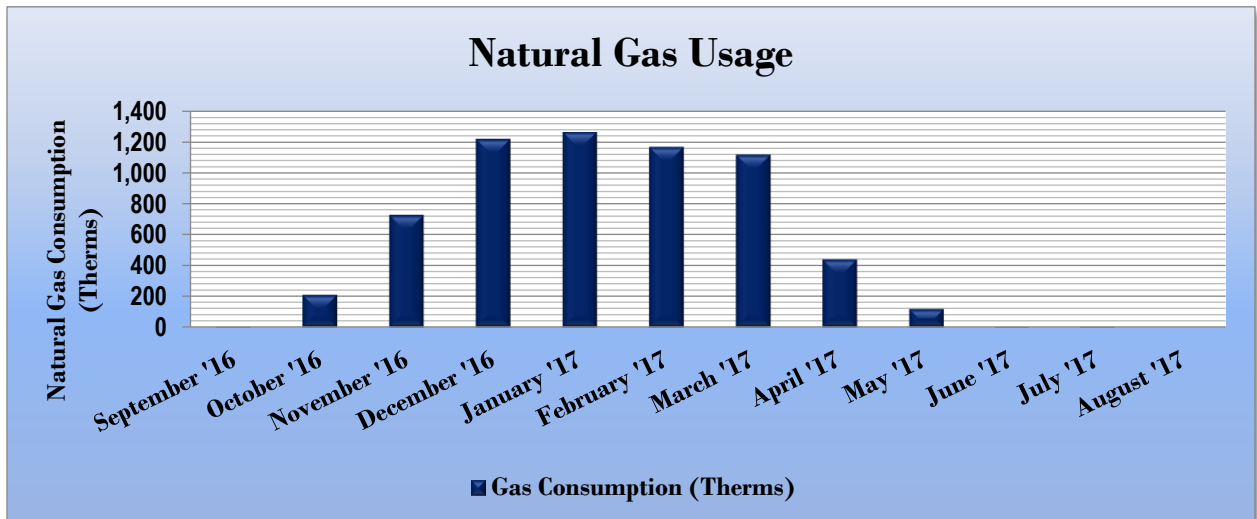


Figure 13 - Natural Gas Usage

Gas Billing Data for Administration Building				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
9/29/16	30	0	\$70	No
10/28/16	29	178	\$202	No
11/30/16	33	711	\$584	No
12/29/16	29	1,202	\$996	No
1/27/17	29	1,231	\$1,102	No
2/27/17	31	1,184	\$1,014	No
3/28/17	29	1,133	\$874	No
4/27/17	30	429	\$408	No
5/30/17	33	163	\$194	No
6/28/17	29	0	\$70	No
7/28/17	30	0	\$78	No
8/29/17	32	0	\$79	No
Totals	364	6,232	\$5,674	0
Annual	365	6,249	\$5,689	

Gas Billing Data for Sandybrook Annex				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
9/29/16	30	2	\$81	No
10/28/16	29	209	\$234	No
11/30/16	33	726	\$603	No
12/29/16	29	1,216	\$1,015	No
1/27/17	29	1,261	\$1,136	No
2/27/17	31	1,165	\$1,008	No
3/28/17	29	1,113	\$869	No
4/27/17	30	438	\$424	No
5/30/17	33	119	\$169	No
6/28/17	29	2	\$81	No
7/28/17	30	2	\$89	No
8/29/17	32	0	\$88	No
Totals	364	6,252	\$5,797	0
Annual	365	6,269	\$5,813	

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 14 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Administration Building & Sandybrook Annex	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	101.5	141.4
Site Energy Use Intensity (kBtu/ft ²)	68.6	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 15 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Administration Building & Sandybrook Annex	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)	63.1	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. The Administration Building has a current score of 75 and the Saybrook Annex has a current score of 79.

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

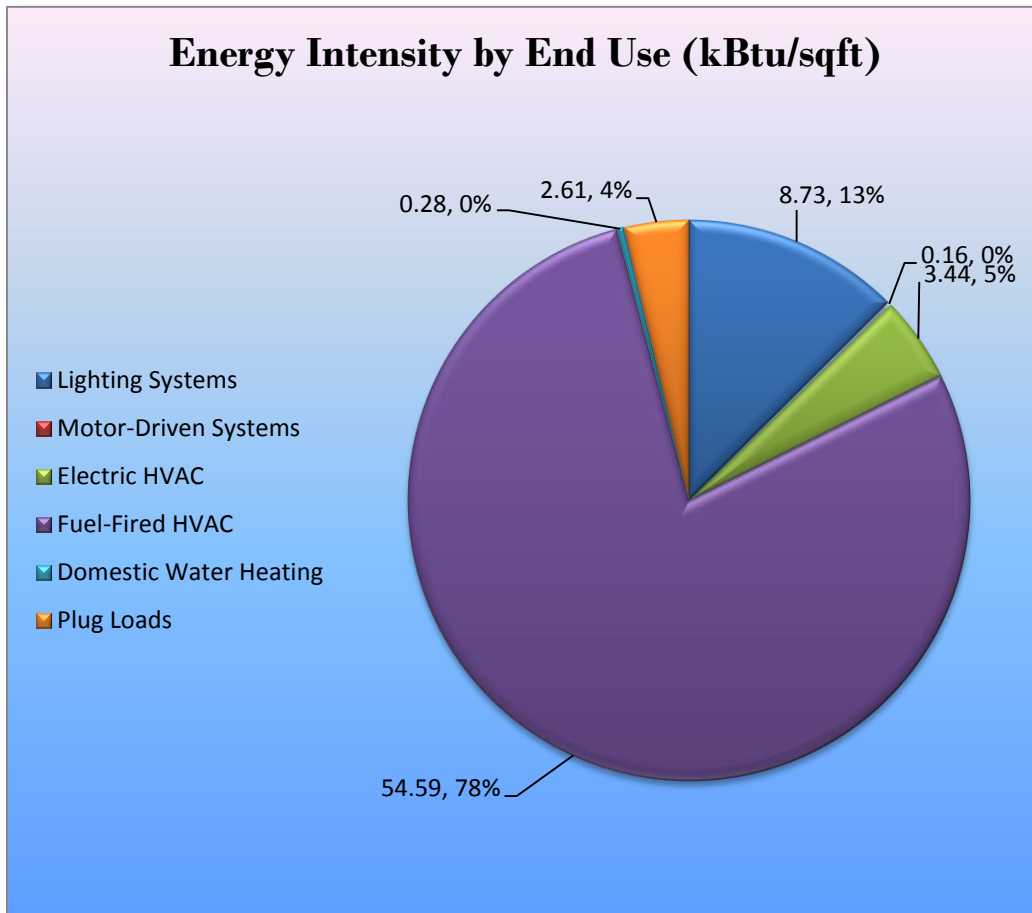
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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 16 - 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 Administration Building and Saybrook Annex 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 17 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		30,962	9.1	0.0	\$7,044.19	\$23,634.07	\$3,850.00	\$19,784.07	2.8	31,179
ECM 1	Install LED Fixtures	994	0.2	0.0	\$226.17	\$1,368.52	\$180.00	\$1,188.52	5.3	1,001
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	18	0.0	0.0	\$4.03	\$117.00	\$10.00	\$107.00	26.6	18
ECM 3	Retrofit Fixtures with LED Lamps	29,951	8.8	0.0	\$6,813.99	\$22,148.55	\$3,660.00	\$18,488.55	2.7	30,160
Lighting Control Measures		5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930
ECM 4	Install Occupancy Sensor Lighting Controls	5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930
TOTALS		36,851	10.8	0.0	\$8,383.84	\$33,894.07	\$5,180.00	\$28,714.07	3.4	37,108

* - 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 recommendations for upgrades to existing lighting fixtures are summarized in Figure 18 below.

Figure 18 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		30,962	9.1	0.0	\$7,044.19	\$23,634.07	\$3,850.00	\$19,784.07	2.8	31,179
ECM 1	Install LED Fixtures	994	0.2	0.0	\$226.17	\$1,368.52	\$180.00	\$1,188.52	5.3	1,001
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	18	0.0	0.0	\$4.03	\$117.00	\$10.00	\$107.00	26.6	18
ECM 3	Retrofit Fixtures with LED Lamps	29,951	8.8	0.0	\$6,813.99	\$22,148.55	\$3,660.00	\$18,488.55	2.7	30,160

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	96	0.0	0.0	\$21.89	\$977.84	\$80.00	\$897.84	41.0	97
Exterior	898	0.1	0.0	\$204.28	\$390.68	\$100.00	\$290.68	1.4	904

Measure Description

We recommend replacing existing fixtures containing T8 Circline Bulb (interior) and Halogen Quartz (exterior) with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	18	0.0	0.0	\$4.03	\$117.00	\$10.00	\$107.00	26.6	18
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

We recommend retrofitting the existing T12 fluorescent fixture (in the Administration Building 2nd Floor storage room) by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	28,334	8.6	0.0	\$6,446.29	\$21,987.29	\$3,655.00	\$18,332.29	2.8	28,533
Exterior	1,616	0.3	0.0	\$367.70	\$161.26	\$5.00	\$156.26	0.4	1,628

Measure Description

We recommend retrofitting existing incandescent, T8 fluorescent, and CFL (pin based) fixtures with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

Our recommendations for upgrades to existing lighting controls are summarized in Figure 189 below.

Figure 19 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Lighting Control Measures		5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930
ECM 4	Install Occupancy Sensor Lighting Controls	5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930

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 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
5,888	1.7	0.0	\$1,339.65	\$10,260.00	\$1,330.00	\$8,930.00	6.7	5,930

Measure Description

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

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

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.

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.

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.

Repair/Replace Steam Traps

Properly functioning steam traps ensure that all latent heat in the steam is delivered to the end use by preventing pressurized steam from leaking. Steam traps should be inspected as part of the regular steam system maintenance. Traps that are blocked, venting, or allowing steam to leak through should be repaired or replaced. Repairing or replacing existing steam traps will reduce steam losses.

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Water Conservation

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

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

6 ON-SITE GENERATION MEASURES

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

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

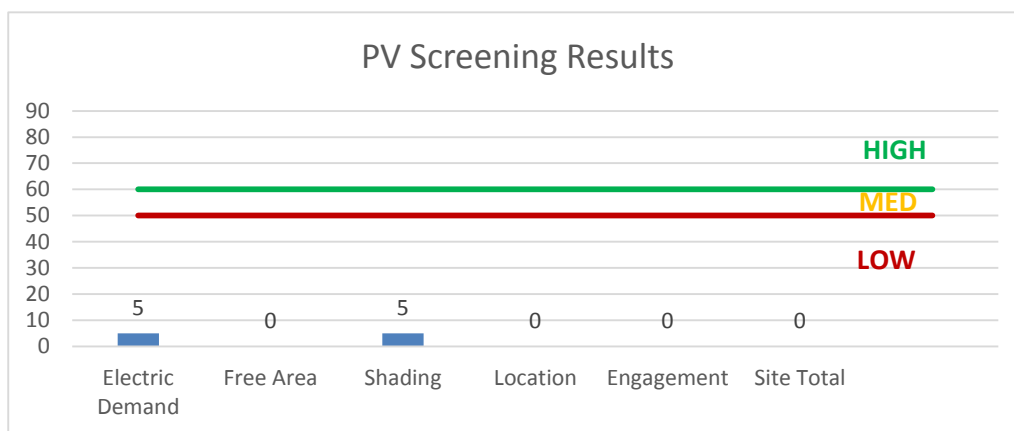
Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection,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

6.1 Photovoltaic

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

A preliminary screening based on the facility’s electric demand, size and location of free area, and shading elements shows that the facility has a Low potential for installing a PV array. If the Administration Building and Saybrook Annex is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 20 - Photovoltaic Screening



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

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

6.2 Combined Heat and Power

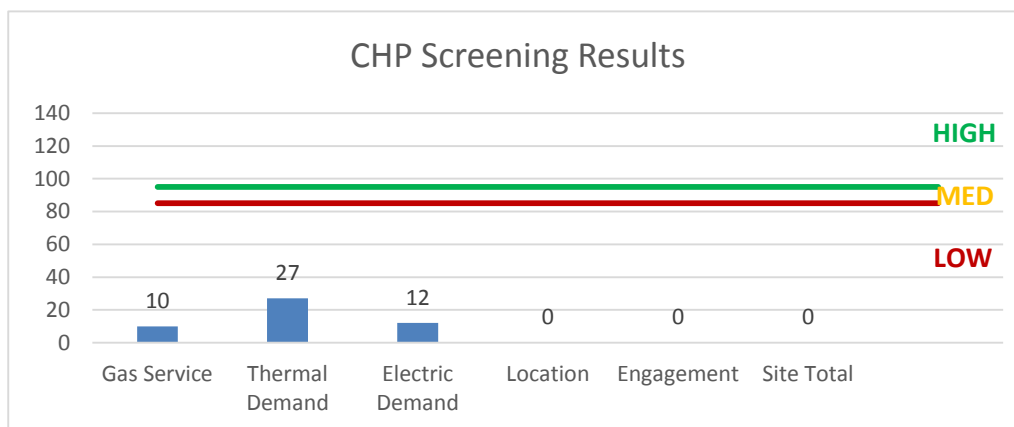
Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric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

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

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has a Low potential for installing a cost-effective CHP system. Low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

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

Figure 21 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

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

Figure 22 - 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 Fluorescent Fixtures with LED Lamps and Drivers	x		x			
ECM 3	Retrofit Fixtures with LED Lamps	x		x			
ECM 4	Install Occupancy Sensor Lighting Controls	x		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 an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You 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. Each entity is limited to incentives up to \$250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to 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.

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 description and application can be found at: www.njcleanenergy.com/ESIP.

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

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Adm_Bsmnt_Boiler Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Adm_Bsmnt_Boiler Rm	4	Compact Fluorescent: pin based	Wall Switch	23	2,573	Relamp	No	4	LED Screw-In Lamps: CFL Pin-Based Replacement	Wall Switch	12	2,573	0.04	132	0.0	\$30.13	\$215.01	\$0.00	7.14
Adm_Bsmnt_Storage 1	2	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	2	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.08	34	0.0	\$7.83	\$107.51	\$10.00	12.46
Adm_Bsmnt_Storage 2	2	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	2	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.08	34	0.0	\$7.83	\$107.51	\$10.00	12.46
Adm_Bsmnt_Storage 3	5	Compact Fluorescent: pin based	Wall Switch	23	300	Relamp	No	5	LED Screw-In Lamps: CFL Pin-Based Replacement	Wall Switch	12	300	0.04	19	0.0	\$4.39	\$268.77	\$0.00	61.19
Adm_Bsmnt_Storage 3	3	Compact Fluorescent: pin based	Wall Switch	23	300	Relamp	No	3	LED Screw-In Lamps: CFL Pin-Based Replacement	Wall Switch	12	300	0.03	12	0.0	\$2.64	\$161.26	\$0.00	61.19
Adm_Bsmnt_Corridor	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,573	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,573	0.01	48	0.0	\$10.96	\$48.20	\$10.00	3.49
Adm_Bsmnt_Corridor	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
Adm_Bsmnt_Corridor	1	Compact Fluorescent: pin based	Wall Switch	23	2,573	Relamp	No	1	LED Screw-In Lamps: CFL Pin-Based Replacement	Wall Switch	12	2,573	0.01	33	0.0	\$7.53	\$53.75	\$0.00	7.14
Adm_Bsmnt_Storage	1	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
Adm_Bsmnt_Storage	1	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
Adm_Bsmnt_Shop Area	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.29	1,093	0.0	\$248.57	\$643.50	\$110.00	2.15
Adm_Bsmnt_Shop Area	2	Compact Fluorescent: pin based	Wall Switch	23	2,573	Relamp	No	2	LED Screw-In Lamps: CFL Pin-Based Replacement	Wall Switch	12	2,573	0.02	66	0.0	\$15.06	\$107.51	\$0.00	7.14
Adm_Bsmnt_Shop Area	1	Incandescent A Lamp (60 W)	Wall Switch	60	2,573	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	2,573	0.04	147	0.0	\$33.55	\$53.75	\$5.00	1.45
Adm_1stFir_Storage Rm 1	1	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
Adm_1stFir_Storage Rm 2	1	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
Adm_1stFir_SuperintOffice ConfRm	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,573	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,801	0.45	1,694	0.0	\$385.48	\$1,216.80	\$205.00	2.62
Adm_1stFir_Office-RR	1	Compact Fluorescent: Circline Bulb (32W)	Wall Switch	32	2,573	Fixture Replacement	No	1	LED - Fixtures: Ambient - 2' - Indirect/Direct Fixture	Wall Switch	20	2,573	0.01	36	0.0	\$8.22	\$244.46	\$20.00	27.32
Adm_1stFir_Office-RR	1	Incandescent A Lamp (60 W)	Wall Switch	60	2,573	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	2,573	0.04	147	0.0	\$33.55	\$53.75	\$5.00	1.45
Adm_1stFir_Offices	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,573	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,801	0.45	1,694	0.0	\$385.48	\$1,216.80	\$205.00	2.62
Adm_1stFir_Womens RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
Adm_1stFir_Copy-Mail	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,801	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,261	0.10	264	0.0	\$59.96	\$445.50	\$65.00	6.35
Adm_1stFir_Mens RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
Adm_1stFir_LargeConfRm	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,573	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,801	0.45	1,694	0.0	\$385.48	\$1,216.80	\$205.00	2.62
Adm_1stFir_CurriculumOffice1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.20	753	0.0	\$171.33	\$891.00	\$130.00	4.44

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Adm_1stFlr_CurriculumOffice2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.13	502	0.0	\$114.22	\$504.00	\$75.00	3.76
Adm_1stFlr_CurriculumOffice3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_1stFlr_CurriculumOfficeRR	1	Compact Fluorescent: Circline Bulb (32W)	Wall Switch	32	2,573	Fixture Replacement	No	1	LED - Fixtures: Ambient - 2' - Indirect/Direct Fixture	Wall Switch	20	2,573	0.01	36	0.0	\$8.22	\$244.46	\$20.00	27.32
Adm_1stFlr_MainCenterArea	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.13	502	0.0	\$114.22	\$504.00	\$75.00	3.76
Adm_1stFlr_EntryStair	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,573	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,573	0.03	96	0.0	\$21.91	\$96.40	\$20.00	3.49
Adm_2ndFlr_Stairs	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_Main	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
Adm_2ndFlr_Area	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_Kitchen	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_M/W RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,801	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.03	70	0.0	\$15.82	\$58.50	\$10.00	3.07
Adm_2ndFlr_PayrollOffice	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,573	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,801	0.35	1,318	0.0	\$299.82	\$1,066.40	\$175.00	2.97
Adm_2ndFlr_Storage1	1	Compact Fluorescent: Circline Bulb (32W)	Wall Switch	32	300	Fixture Replacement	No	1	LED - Fixtures: Ambient - 2' - Indirect/Direct Fixture	Wall Switch	20	300	0.01	4	0.0	\$0.96	\$244.46	\$20.00	234.24
Adm_2ndFlr_Storage2(server rm)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	300	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	300	0.03	12	0.0	\$2.64	\$58.50	\$10.00	18.40
Adm_2ndFlr_Asst Adm Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.10	377	0.0	\$85.66	\$445.50	\$65.00	4.44
Adm_2ndFlr_Offices	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_Offices	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.10	377	0.0	\$85.66	\$445.50	\$65.00	4.44
Adm_2ndFlr_Storage	1	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
Adm_2ndFlr_Empty Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_Storage	1	Incandescent A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
Adm_2ndFlr_Office Back	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_Office Corridor	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_BusinessAdmnOffice	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
Adm_2ndFlr_BusinessAdmnOffice	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.13	502	0.0	\$114.22	\$504.00	\$75.00	3.76
Adm_2ndFlr_BusinessAdmnOffice	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,573	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,801	0.10	377	0.0	\$85.66	\$690.40	\$100.00	6.89
Adm_2ndFlr_BusinessAdmnOff RR	1	Compact Fluorescent: Circline Bulb (32W)	Wall Switch	32	2,573	Fixture Replacement	No	1	LED - Fixtures: Ambient - 2' - Indirect/Direct Fixture	Wall Switch	20	2,573	0.01	36	0.0	\$8.22	\$244.46	\$20.00	27.32

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Adm_2ndFlr_Storage	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	300	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	300	0.05	21	0.0	\$4.71	\$117.00	\$10.00	22.71
Adm_2ndFlr_Book-keeping Office	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,573	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,801	0.45	1,694	0.0	\$385.48	\$1,216.80	\$205.00	2.62
Adm_Exterior_Sides of Building	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	4,380	None	No	3	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Adm_Exterior_Sides of Building	8	Compact Fluorescent: pin based	Daylight Dimming	45	4,380	Relamp	No	2	LED Screw-In Lamps: CFL Pin-Based Replacement	Daylight Dimming	20	4,380	0.25	1,640	0.0	\$373.08	\$107.51	\$0.00	0.29
Adm_Exterior_Sides of Building	1	Halogen Incandescent: Quartz - 300W	Daylight Dimming	300	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	95	4,380	0.16	1,051	0.0	\$239.01	\$390.68	\$100.00	1.22
Adm_Exterior_Sides of Building	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	4,380	None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Adm_Exterior_Entry	1	Incandescent: A Lamp (60 W)	Daylight Dimming	60	4,380	Relamp	No	1	LED Screw-In Lamps: A type lamp	Daylight Dimming	11	4,380	0.04	251	0.0	\$57.13	\$53.75	\$5.00	0.85
SB-Anx_Bsmnt_Boiler Rm	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
SB-Anx_Bsmnt_Boiler Rm	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	500	0.16	116	0.0	\$26.35	\$351.00	\$60.00	11.04
SB-Anx_Bsmnt_Storage	1	Incandescent: A Lamp (60 W)	Wall Switch	60	300	Relamp	No	1	LED Screw-In Lamps: A type lamp	Wall Switch	11	300	0.04	17	0.0	\$3.91	\$53.75	\$5.00	12.46
SB-Anx_Bsmnt_Multi-purpose Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
SB-Anx_Bsmnt_Mens RR	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
SB-Anx_Bsmnt_Corridor RR	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,573	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,573	0.03	105	0.0	\$23.97	\$71.80	\$10.00	2.58
SB-Anx_Bsmnt_CenterArea1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
SB-Anx_Bsmnt_CenterArea1	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
SB-Anx_Bsmnt_CenterArea2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
SB-Anx_Bsmnt_CenterArea2	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
SB-Anx_Bsmnt_Faculty RR	2	Incandescent: A Lamp (60 W)	Wall Switch	60	2,573	Relamp	No	2	LED Screw-In Lamps: A type lamp	Wall Switch	11	2,573	0.08	295	0.0	\$67.11	\$107.51	\$10.00	1.45
SB-Anx_Bsmnt_Faculty RR	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
SB-Anx_Bsmnt_Meeting Rm	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.70	2,636	0.0	\$599.64	\$1,768.50	\$280.00	2.48
SB-Anx_FamilyConn_Office1	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,573	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,573	0.01	53	0.0	\$11.98	\$35.90	\$5.00	2.58
SB-Anx_FamilyConn_Office Main	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
SB-Anx_FamilyConn_Office Main	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,573	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,573	0.01	53	0.0	\$11.98	\$35.90	\$5.00	2.58
SB-Anx_FamilyConn_Women's RR	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.10	377	0.0	\$85.66	\$445.50	\$65.00	4.44
SB-Anx_FamilyConn_Corridor RR	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,573	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,573	0.03	105	0.0	\$23.97	\$71.80	\$10.00	2.58

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
SB-Anx_FamilyConn_Stairwe II B	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
SB-Anx_FamilyConn_Stairwe II B	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.11	397	0.0	\$90.39	\$234.00	\$40.00	2.15
SB-Anx_1stFlr_CenterArea	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
SB-Anx_1stFlr_CenterArea	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
SB-Anx_BoardRm	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,801	Relamp	Yes	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,261	1.39	3,690	0.0	\$839.50	\$3,267.00	\$525.00	3.27
SB-Anx_1stFlr_BoardRm RR	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,573	0.01	56	0.0	\$12.67	\$75.20	\$15.00	4.75
SB-Anx_1stFlr_Room3	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.73	2,761	0.0	\$628.20	\$1,827.00	\$290.00	2.45
SB-Anx_1stFlr_Room4	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.70	2,636	0.0	\$599.64	\$1,768.50	\$280.00	2.48
SB-Anx_1stFlr_Room8	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,801	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,261	0.73	1,933	0.0	\$439.74	\$1,827.00	\$290.00	3.50
SB-Anx_1stFlr_Room7	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,801	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,261	0.70	1,845	0.0	\$419.75	\$1,768.50	\$280.00	3.55
SB-Anx_1stFlr_Room6	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.70	2,636	0.0	\$599.64	\$1,768.50	\$280.00	2.48
SB-Anx_2ndFlr_CenterArea	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
SB-Anx_2ndFlr_CenterArea	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.03	99	0.0	\$22.60	\$58.50	\$10.00	2.15
SB-Anx_2ndFlr_MainOffice	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,801	0.73	2,761	0.0	\$628.20	\$1,827.00	\$290.00	2.45
SB-Anx_2ndFlr_Stairwell B Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
SB-Anx_2ndFlr_Stairwell A Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.05	199	0.0	\$45.19	\$117.00	\$20.00	2.15
SB-Anx_2ndFlr_Stairwell A	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,573	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,573	0.11	397	0.0	\$90.39	\$234.00	\$40.00	2.15
SB-Anx_2ndFlr_Stairwell A	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
SB-Anx_Exterior_SideOIBldg	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	4,380	None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	75	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Admin_Boiler Room	Boiler	1	Boiler Feed Water Pump	0.3	80.0%	No	1,050	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Admin_Boiler Room	Boiler	1	Combustion Air Fan	0.5	80.0%	No	1,050	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sandybrooks_Boiler Room	Boiler	1	Boiler Feed Water Pump	0.3	80.0%	No	1,050	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sandybrooks_Boiler Room	Boiler	1	Combustion Air Fan	0.5	80.0%	No	1,050	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis							
		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
AdmBldg_Windows	Offices	19	Window AC	0.90		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
SandybrookBldg_Windows	Offices	10	Window AC	0.90		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
SandybrookBldg	Offices	2	Split-System Air-Source HP	0.75	6.60	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis							
		System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years		
Admin_Boiler Room	Admin Bldg	1	Induced Draft Steam Boiler	1,339.20	No								0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Sandybrooks_Boiler Room	Bldg	1	Induced Draft Steam Boiler	2,008.80	No								0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00


DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
		System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Sandybrook_Boiler Rm	Bldg	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
AdminBldg_Boiler Rm	Bldg	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?
AdminBldg+Sandy brooks Annex	5	Projector	300.0	
AdminBldg+Sandy brooks Annex	4	Smartboard	200.0	
AdminBldg+Sandy brooks Annex	8	Photocopier	500.0	
AdminBldg+Sandy brooks Annex	5	minifridge	200.0	
AdminBldg+Sandy brooks Annex	7	microwave	1,000.0	
AdminBldg+Sandy brooks Annex	34	desktop PC	300.0	
AdminBldg+Sandy brooks Annex	17	desktop printer	50.0	
AdminBldg+Sandy brooks Annex	1	Tube TV	400.0	
AdminBldg+Sandy brooks Annex	1	Refridgerator	500.0	
AdminBldg+Sandy brooks Annex	3	Shredder	100.0	
AdminBldg+Sandy brooks Annex	7	Small LED TV (<32")	250.0	
AdminBldg+Sandy brooks Annex	3	Coffemaker	1,000.0	
AdminBldg Basement Shop	1	Lump Sum Shop Equipment	8,000.0	

Appendix B: ENERGY STAR® Statement of Energy Performance



ENERGY STAR® Statement of Energy Performance

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**ENERGY STAR®
Score¹**

Administration Building

Primary Property Type: Office
Gross Floor Area (ft²): 11,000
Built: 1910

For Year Ending: July 31, 2017
Date Generated: April 02, 2018

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
Administration Building
195 Virginia Street
Hillside, New Jersey 07205

Property Owner
Hillside Board of Education
195 Virginia Street
Hillside, NJ 07205
908-352-7664

Primary Contact
Darice Gonzalez
195 Virginia Street
Hillside, NJ 07205
908-352-7664 ext 6429
dgonzalez@hillsidek12.org

Property ID: 6280755

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison	
74.7 kBtu/ft ²	Natural Gas (kBtu) 623,160 (76%)	National Median Site EUI (kBtu/ft ²)	102.2
	Electric - Grid (kBtu) 198,800 (24%)	National Median Source EUI (kBtu/ft ²)	159
		% Diff from National Median Source EUI	-27%
Source EUI	Annual Emissions		
116.2 kBtu/ft ²	Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)		55

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)



ENERGY STAR[®] Statement of Energy Performance

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ENERGY STAR[®]
Score¹

Saybrook Administration Annex

Primary Property Type: Office
Gross Floor Area (ft²): 12,000
Built: 1922

For Year Ending: July 31, 2017
Date Generated: April 09, 2018

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
Saybrook Administration Annex
171 Virginia Street
Hillside, New Jersey 07205

Property Owner
Hillside Board of Education
195 Virginia Street
Hillside, NJ 07205
908-352-7664

Primary Contact
Darice Gonzalez
195 Virginia Street
Hillside, NJ 07205
908-352-7664 ext 6429
dgonzalez@hillsidek12.org

Property ID: 6288740

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison	
62.9 kBtu/ft ²	Electric - Grid (kBtu) 129,740 (17%)	National Median Site EUI (kBtu/ft ²)	92
	Natural Gas (kBtu) 625,406 (83%)	National Median Source EUI (kBtu/ft ²)	129.6
		% Diff from National Median Source EUI	-32%
Source EUI		Annual Emissions	
88.7 kBtu/ft ²		Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	48

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)