



Local Government Energy Audit: Energy Audit Report



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Ho-Ho-Kus Public School
Ho-Ho-Kus Board of Education
70 Lloyd Road
Ho-Ho-Kus, NJ 07423

June 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 (NJBP) has sponsored this Local Government Energy Audit (LGEA) Report for Ho-Ho-Kus Board of Education.

The goal of a LGEA is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and put you in a position to implement the identified measures. The LGEA program also provides information about available financial incentives from New Jersey's Clean Energy Program (NJCEP) and other sources to help implement ECMs.

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

I.1 Facility Summary

Ho-Ho-Kus Public School is a 98,000 square foot building comprised of various space types. The original building, built in 1935, included only a kindergarten class and a courtyard area. The gym and media center were added in 1975. Added in 2005, the serenity wing consists of the middle school, lunchroom/multi-purpose room and Board of Education office. The building has two floors, of which the second floor has a commercial kitchen and five classrooms.

In 2014 Ho-Ho-Kus Board of Education upgraded the majority of classroom and office spaces with LED lighting. A thorough description of the facility and our observations are located in Section 2, "Facility Information and Existing Conditions".

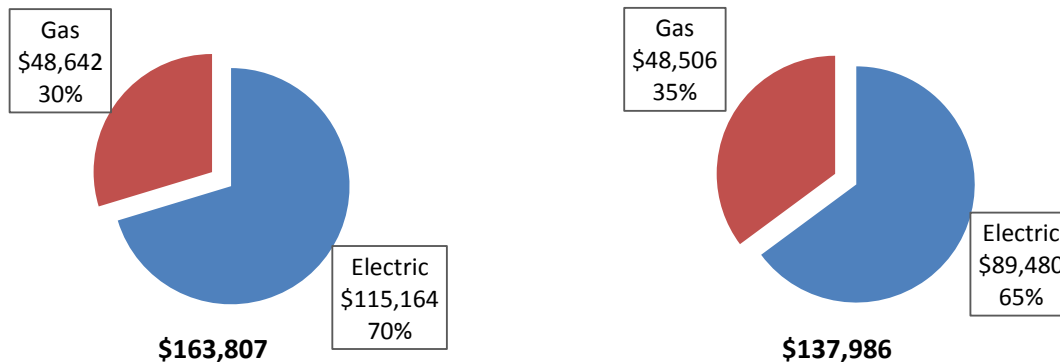
I.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated six measures which together represent an opportunity to reduce annual energy costs by \$17,262 and its annual greenhouse gas emissions by 123,460 lbs CO₂e. We estimate that the measures would pay for themselves in energy savings in 2.9 years. The breakdown of existing and potential utility costs (following the recommended equipment upgrades) is shown in Figure 1 and Figure 2, respectively. These measures would reduce annual energy usage by about 5.2%.

Figure 1 – Previous 12 Month Utility Costs

Figure 2 – Potential Post-Implementation Costs



A detailed description of existing energy usage can be found in Section 3, “Site Energy Use and Costs”.

The recommended measures are grouped by category in Figure 3. Brief descriptions of the categories can be found below. Descriptions of the individual measures can be found in Section 4, “Energy Conservation Measures”.

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										
ECM 1 Install LED Fixtures	Yes	283	0.0	0.0	\$40.08	\$390.68	\$100.00	\$290.68	7.25	285
ECM 2 Retrofit Fixtures with LED Lamps	Yes	30,875	10.7	0.0	\$4,379.77	\$26,427.61	\$4,845.00	\$21,582.61	4.93	31,091
Lighting Control Measures										
ECM 3 Install Occupancy Sensor Lighting Controls	Yes	6,111	2.5	0.0	\$866.85	\$6,496.00	\$1,120.00	\$5,376.00	6.20	6,154
Variable Frequency Drive (VFD) Measures										
ECM 4 Install VFD on Variable Air Volume (VAV) HVAC	Yes	20,351	5.4	0.0	\$2,886.83	\$14,427.20	\$4,650.00	\$9,777.20	3.39	20,493
ECM 5 Install VFDs on Hot Water Pumps	Yes	63,106	6.4	0.0	\$8,951.92	\$12,668.60	\$0.00	\$12,668.60	1.42	63,547
Domestic Water Heating Upgrade										
ECM 6 Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	16.1	\$136.23	\$35.85	\$0.00	\$35.85	0.26	1,891
TOTALS		120,725	25.1	16.1	\$17,261.67	\$60,445.94	\$10,715.00	\$49,730.94	2.88	123,460

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

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

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

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when conditions allow. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Variable Frequency Drives measures generally involve controlling the speed of a motor to achieve a flow or temperature rather than using a valve, damper, or no means at all. These measures save energy by slowing a motor which is an extremely efficient method of control.

Domestic Hot Water Heating System upgrade measures generally involve replacing old inefficient domestic water heating systems or hot water fixtures with modern energy efficient equipment. New domestic hot water heating systems can provide equivalent or greater system, but use less energy. These measures save energy by reducing the fuel used by the domestic water heating systems due to improved efficiency, the removal of standby losses, or reduced demand for hot water.

Energy Efficient Practices

TRC Energy Services also identified four low cost (or no cost) energy efficient practices. A facility’s energy performance can be significantly improved by employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems. Through these practices equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance costs can be reduced. Opportunities identified at the Ho-Ho-Kus Public School include:

- Perform Lighting Maintenance
- Ensure Lighting Controls Are Operating Properly
- Clean and/or Replace HVAC Filters
- Water Conservation

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

On-Site Generation Measures

TRC Energy Services evaluated the potential for installing on-site generation at Ho-Ho-Kus Public School. Based on the configuration of the site and its electric load, there appears to be a high potential for cost-effective installation of a solar photovoltaic (PV) array. We evaluated the potential for installing up to 86kW of solar generating capacity. An estimate of the expected costs and electric savings are shown below.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	86	kWDC STC
Electric Generation	102,458	kWh/yr
Displaced Cost	\$8,910	/yr
Installed Cost	\$246,000	

For details on our evaluation and the 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
- Pay for Performance - Existing Building (P4P)

Incentives are available through the SmartStart program for select individual measures. SmartStart program participants may utilize internal resources, or an outside firm or contractor, to design the ECMs, select the equipment to be installed and submit applications for the incentives. Program pre-approval is required for some SmartStart incentives, so participants should wait for application approval before proceeding with ECM installation. The estimated incentive values listed above in Figure 3 are based on SS program incentives. The differences between incentives for each program will be explained further in Section 77.

Facilities with interest in a more long-term and comprehensive approach to maximizing their energy savings should consider participating in the P4P program. This program has minimum savings requirements for acceptance into the program. The incentives are generally higher than SS, since they are based on actual measured performance savings. The application process is more involved, and requires working with an eligible contractor, but the result be more lucrative incentives that may cover as much as 50% of total project cost.

Additional descriptions of incentive programs for which the facility may qualify are located in Section 7. You may also check the following website for further information on available rebates and incentives:

www.njcleanenergy.com/ci

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Lisa Carson	Green Team Lead	lcarrson@hohokus.org	(201) 612-4427
Dr. Alexis Eckert	Principal	aekert@hohokus.org	(201) 652-4555
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On October 26, 2016, TRC performed an energy audit at Ho-Ho-Kus Public School located in Ho-Ho-Kus, NJ. TRC met with the school’s Principal, Dr. Alexis Eckert, to review the facility operations and focus the investigation on specific energy-using systems.

Ho-Ho-Kus Public School is a 98,000 square foot facility comprised of various space types within one large building. The original building, built in 1935, included only a kindergarten and a courtyard area. The gym and media center were added in 1975. The serenity wing was added in 2005 and consists of the middle school, lunchroom/multi-purpose room and Board of Education office. The building has two floors, of which the second floor has a commercial kitchen and five classrooms.

Originally the building had no cooling, only heating. Newer sections added after 2002 now have cooling. Most classrooms and offices were upgraded to LED lighting in 2014.

2.3 Building Occupancy

The school building is open Monday through Friday, from 7:00 am to 10:00 pm, September through June. Some staff work in the summer. There are sport activities on the premises some weekends. During a typical day, the facility is occupied by approximately 104 staff and 650 students.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
School	Weekday	7AM - 10PM
School	Weekend	No operation mostly

2.4 Building Envelope

The building is constructed of concrete block, and structural steel with a brick facade. Interior dividing walls are comprised of sheet rock with metal frames on the interior. The buildings have flat roofs covered with a black membrane. The buildings have double-paned windows which were upgraded in 2005. The windows show little signs of excessive air infiltration. The exterior doors are constructed of aluminum. Some door seals show signs of excessive wear, which may increase the level of outside air infiltration, leading to higher energy costs.



2.5 On-Site Generation

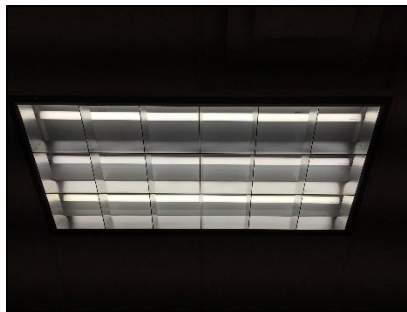
There is no on-site electric generation capacity.

2.6 Energy-Using Systems

Please refer to Appendix A: Equipment Inventory & Recommendations for an inventory of your equipment.

Lighting System

Many classrooms and offices were upgraded to LED lighting in 2014. Lighting is provided predominately by 32-Watt linear fluorescent T8 lamps and LED linear tubes with electronic ballasts. The screw-in light fixtures are LED or compact fluorescent lamps (CFL). Most of the building spaces use 2-lamp or 3-lamp, 4-foot long troffers with diffusers.



Lighting controls in most spaces are provided by wall switches or occupancy sensors. The occupancy sensors are predominantly wall-mounted, depending on the space layout. Stairwells, elevator lobbies and main lobby areas do not contain any occupancy sensors and lighting is on 24 hours per day throughout the year.

The building exterior lighting consists of halogen incandescent wall packs, LED fixtures and wall mount compact fluorescent bulb fixtures that are controlled by wall switches.



Hot Water / Steam System

The heating hot water system consists of four condensing hot water boilers with output capacity 1700 MBH. The boilers have a nominal combustion efficiency of 85%. The boilers are configured in a constant flow primary distribution with two hot water pumps of 20 HP each. Hot water is supplied at 180°F when the outside air temperature is below 50°F and the setpoint is set to 165°F when the outside air is above 65°F. The boilers are 11 years old, in good condition and are well-maintained.

The school also has two warm air unit heaters in the kitchen with an output capacity of 49 MBH each and an 83% efficiency rating. A packaged unit (gas-fired heating and electric cooling) supplies the gym and library. Dr. Eckert noted that the duct work in the library is old and inefficient.

Air Conditioning (DX)

The building has eight window air-conditioning units ranging between 6000 and 18,000 BTUs/hr that are cooling the office spaces.

The technology room, library, auditorium, multi-purpose room, and the front office hallway areas are served by four packaged-AC units, ranging in size from 5 to 21 tons of cooling capacity. The packaged units are manufactured by TRANE and AAON. TRC auditors did not have access to the roof on the day of the site visit, so unfortunately it could not be inspected directly and the information was provided by the school's Green Team. It is suggested that the unit nameplate data be checked and verified as well. The units are constant air volume.

There are also four (4) 3-ton Trane split systems serving the front office of the school. The split units are controlled by individual thermostats.



Domestic Hot Water

The domestic hot water system consists of two A.O. Smith gas-fired condensing hot water heaters. The first heater has an input rating of 150 MBH, nominal efficiency of 98%, has a 100 gallon storage tank and was installed in 2013. The second water heater has an input rating of 154 MBH, nominal efficiency of 80%, has an 81 gallon storage tank and was installed around 2004. Both units appeared to be in good condition.



Food Service, Laundry & Refrigeration

The school has an all-electric kitchen that is used to prepare lunch for the students and staff. The kitchen is also used to prepare hot snacks for three fundraising events each year. Most of the cooking is done using the single burner stove and convection oven. There is also a large double-door refrigerator and a microwave oven. The maintenance personnel room also has one washing machine.



Plug load & Vending Machines

There are approximately 153 computer work stations throughout the facility. Roughly 90% of them are desktop units with LCD monitors. There is no centralized PC power management software installed. Other plug loads include printers, projectors, smartboards, coffee machines and other kitchen equipment.



2.7 Water-Using Systems

All restrooms in the facility have automatic sinks rated at 1.5 gpm or 2.2 gpm. The toilets are rated at 2.5 gallons per flush and the urinals are rated at 2 gallons per flush. Also, most of the restrooms have occupancy sensors.



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

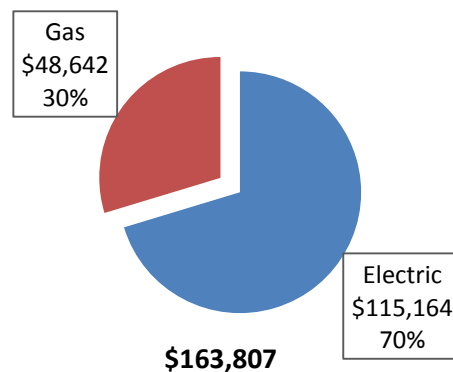
The following energy consumption and cost data is based on the most recent 12-month period of utility billing data that was available. A profile of the annual energy consumption and costs for the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Ho-Ho Kus School District		
Fuel	Usage	Cost
Electricity	743,292 kWh	\$115,164
Natural Gas	57,665 Therms	\$48,642
Total		\$163,807

The current utility cost for this site is \$163,807 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost for a recent 12-month period was \$0.142/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Electric Usage & Demand

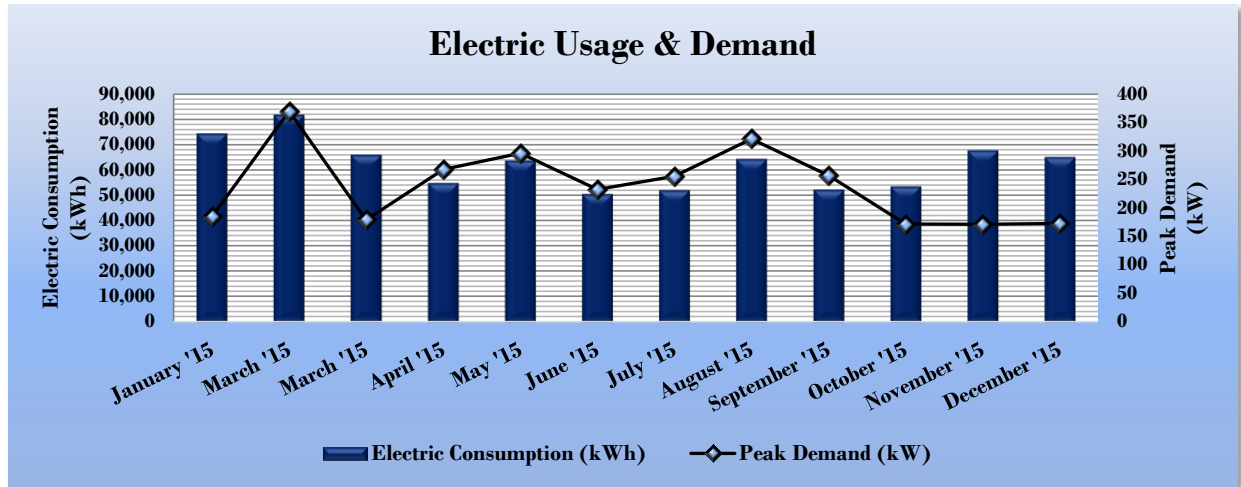


Figure 10 - Electric Usage & Demand

Electric Billing Data for Ho-Ho Kus School District					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
2/12/15	29	74,072	185	\$666	\$10,621
3/16/15	30	81,445	370	\$666	\$11,583
4/15/15	31	65,699	179	\$644	\$9,350
5/14/15	30	54,626	268	\$964	\$8,549
6/15/15	31	63,463	296	\$1,066	\$10,663
7/15/15	30	50,300	233	\$838	\$9,595
8/13/15	31	51,855	256	\$922	\$9,984
9/14/15	31	64,069	321	\$1,161	\$12,133
10/13/15	30	52,112	257	\$931	\$7,921
11/11/15	31	53,318	172	\$622	\$7,466
12/14/15	30	67,487	171	\$619	\$8,950
1/14/16	31	64,846	172	\$625	\$8,348
Feb-16	365	743,292	370	\$9,725	\$115,164
Mar-16	365	743,292	370	\$9,725	\$115,164

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is \$0.844/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

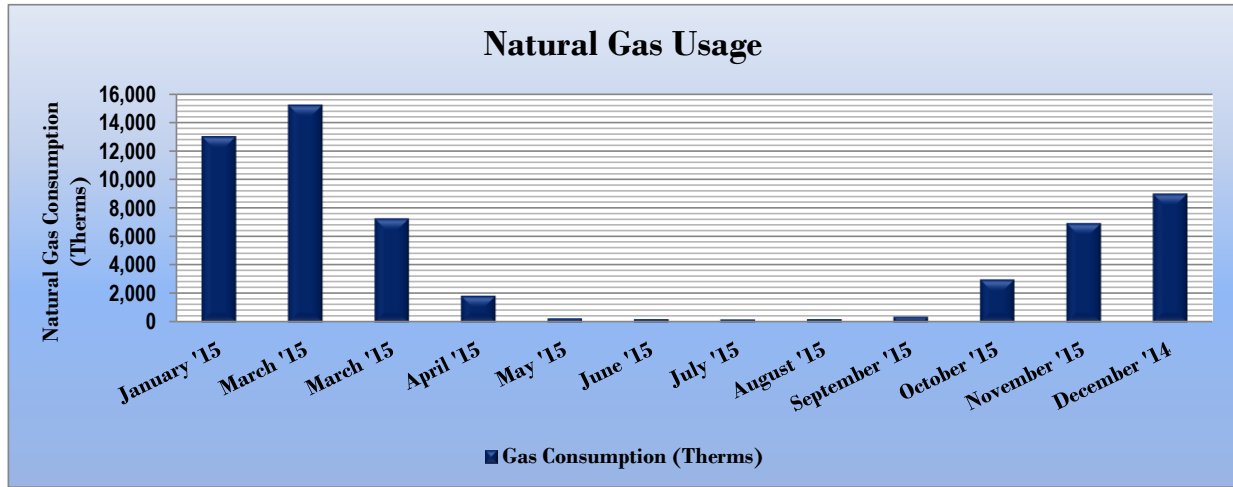


Figure 12 - Natural Gas Usage

Gas Billing Data for Ho-Ho Kus School District			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
2/12/15	29	13,016	\$10,932
3/16/15	30	15,217	\$12,086
4/15/15	31	7,270	\$4,531
5/14/15	30	1,859	\$1,243
6/15/15	31	285	\$279
7/15/15	30	228	\$244
8/13/15	31	206	\$231
9/14/15	31	233	\$262
10/13/15	30	390	\$345
11/11/15	31	3,009	\$3,949
12/14/15	30	6,942	\$6,578
1/14/15	31	9,010	\$7,962
Totals	365	57,665	\$48,642
Annual	365	57,665	\$48,642

3.4 Benchmarking

Facility energy usage was benchmarked using *Portfolio Manager*, an online tool created and managed by the U.S. 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.

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

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Ho-Ho Kus School District	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	143.0	141.4
Site Energy Use Intensity (kBtu/ft ²)	84.7	58.2

By implementing all recommended measures identified in this report, the facility’s estimated EUI would improve as shown in the Table below:

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Ho-Ho Kus School District	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	129.7	141.4
Site Energy Use Intensity (kBtu/ft ²)	80.4	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR™ score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. **This facility has a current score of 48.**

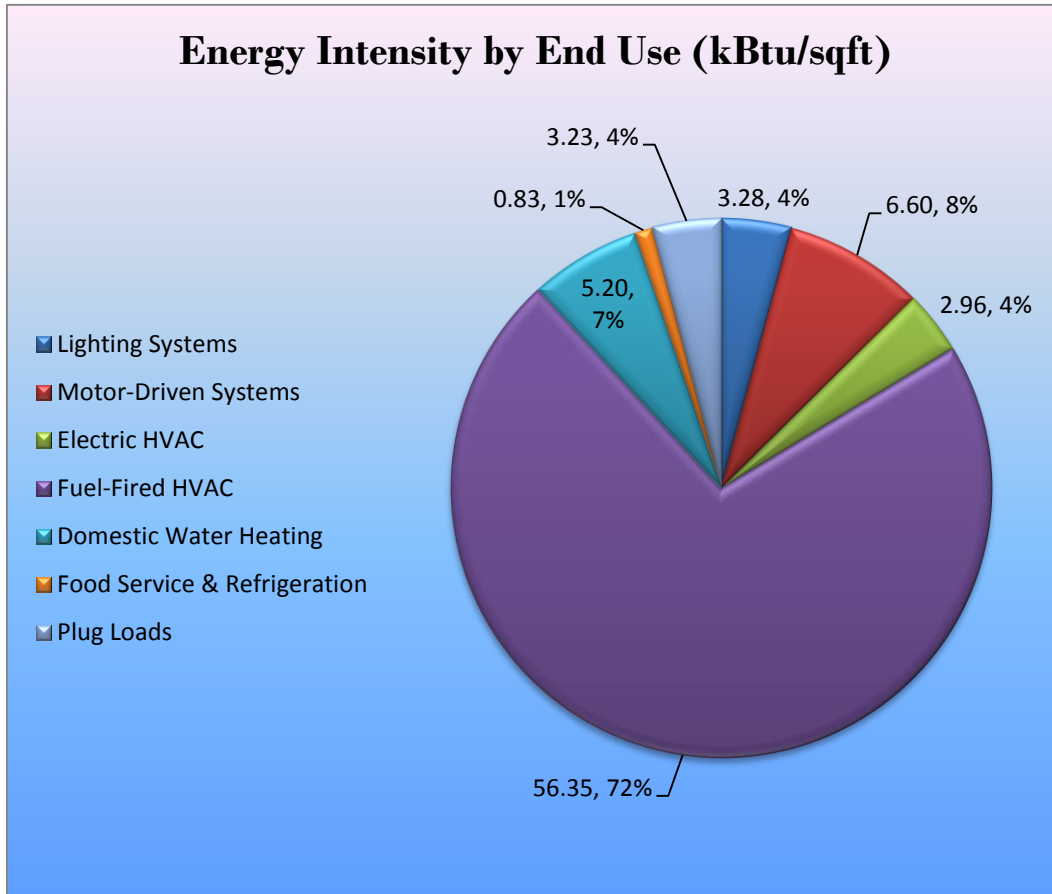
A Portfolio Manager Statement of Energy Performance is in Appendix B. A Portfolio Manager account has also been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager regularly, so 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 and determine their proportional contribution to overall building energy usage. This graphical representation of energy end-uses highlights where the most benefit might be achieved from energy efficiency upgrades and measures.

Figure 15 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential ECMs, help prioritize specific measures for implementation, and provide Ho-Ho-Kus Board of Education with information and assistance on available financial incentives. 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 considered sufficient to make “Go/No-Go” decisions and to prioritize energy projects. Savings are based on the New Jersey Board of Public Utilities New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016. Further analysis or investigation may be required to calculate more accurate savings to support any custom SmartStart, Pay for Performance, or Large Energy Users incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJ prescriptive SmartStart program. Depending on your implementation strategy, the project may be eligible for more lucrative incentives through other programs as identified in Section 7.

The following sections describe the recommended measures.

4.1 Recommended ECMs

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

Figure 16 – 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		31,158	10.7	0.0	\$4,419.85	\$26,818.29	\$4,945.00	\$21,873.29	4.95	31,375
ECM 1	Install LED Fixtures	283	0.0	0.0	\$40.08	\$390.68	\$100.00	\$290.68	7.25	285
ECM 2	Retrofit Fixtures with LED Lamps	30,875	10.7	0.0	\$4,379.77	\$26,427.61	\$4,845.00	\$21,582.61	4.93	31,091
Lighting Control Measures		6,111	2.5	0.0	\$866.85	\$6,496.00	\$1,120.00	\$5,376.00	6.20	6,154
ECM 3	Install Occupancy Sensor Lighting Controls	6,111	2.5	0.0	\$866.85	\$6,496.00	\$1,120.00	\$5,376.00	6.20	6,154
Variable Frequency Drive (VFD) Measures		83,457	11.9	0.0	\$11,838.74	\$27,095.80	\$4,650.00	\$22,445.80	1.90	84,040
ECM 4	Install VFD on Variable Air Volume (VAV) HVAC	20,351	5.4	0.0	\$2,886.83	\$14,427.20	\$4,650.00	\$9,777.20	3.39	20,493
ECM 5	Install VFDs on Hot Water Pumps	63,106	6.4	0.0	\$8,951.92	\$12,668.60	\$0.00	\$12,668.60	1.42	63,547
Domestic Water Heating Upgrade		0	0.0	16.1	\$136.23	\$35.85	\$0.00	\$35.85	0.26	1,891
ECM 6	Install Low-Flow Domestic Hot Water Devices	0	0.0	16.1	\$136.23	\$35.85	\$0.00	\$35.85	0.26	1,891
TOTALS		120,725	25.1	16.1	\$17,261.67	\$60,445.94	\$10,715.00	\$49,730.94	2.88	123,460

* - 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).

Please refer to Appendix A: Equipment Inventory & Recommendations for a detailed list of the locations and light fixtures affected by this measure.

4.1.1 Lighting Upgrades

Recommended lighting upgrades are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		31,158	10.7	0.0	\$4,419.85	\$26,818.29	\$4,945.00	\$21,873.29	4.95	31,375
ECM 1	Install LED Fixtures	283	0.0	0.0	\$40.08	\$390.68	\$100.00	\$290.68	7.25	285
ECM 2	Retrofit Fixtures with LED Lamps	30,875	10.7	0.0	\$4,379.77	\$26,427.61	\$4,845.00	\$21,582.61	4.93	31,091

ECM 1: Install LED Fixtures

Measure Description

We recommend replacing existing exterior lighting fixtures with new high performance LED fixtures. This measure saves energy by installing LED fixtures which use less power than other comparable lighting technologies.

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

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	27,032	10.0	0.0	\$3,834.66	\$25,791.10	\$4,795.00	\$20,996.10	5.48	27,221
Exterior	3,843	0.7	0.0	\$545.11	\$636.51	\$50.00	\$586.51	1.08	3,870

Measure Description

We recommend replacing compact fluorescent and halogen bulbs with LED lamps. LED lamps can be used as a direct replacement for most other screw-in or plug-in lamps. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

4.1.2 Lighting Control Measures

Recommended lighting control measures are summarized in Figure 18 below.

Figure 18 – 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		6,111	2.5	0.0	\$866.85	\$6,496.00	\$1,120.00	\$5,376.00	6.20	6,154
ECM 3	Install Occupancy Sensor Lighting Controls	6,111	2.5	0.0	\$866.85	\$6,496.00	\$1,120.00	\$5,376.00	6.20	6,154

ECM 3: Install Occupancy Sensor Lighting Controls

Measure Description

We recommend installing occupancy sensors to control light fixtures that are currently manually controlled in private offices and classroom. Sensors detect occupancy using ultrasonic and/or infrared wave technologies. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Occupants will also be able to manually turn off fixtures. Energy savings result 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. Ceiling-mounted or remote-mounted sensors require the use of low voltage switching relays or a wireless signal to the switch. In general, use wall switch replacement sensors for single occupant offices and other small rooms. Install ceiling-mounted or remote mounted sensors in locations without local switching, in situations where the existing wall switches are not in the line-of-sight of the main work area, and in large spaces. We recommend a comprehensive design approach that considers both the technology of the lighting sources and how they are controlled.

4.1.3 Variable Frequency Drive Measures

Recommended variable frequency drive (VFD) measures are summarized in Figure 19 below.

Figure 19 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		83,457	11.9	0.0	\$11,838.74	\$27,095.80	\$4,650.00	\$22,445.80	1.90	84,040
ECM 4	Install VFD on Variable Air Volume (VAV) HVAC	20,351	5.4	0.0	\$2,886.83	\$14,427.20	\$4,650.00	\$9,777.20	3.39	20,493
ECM 5	Install VFDs on Hot Water Pumps	63,106	6.4	0.0	\$8,951.92	\$12,668.60	\$0.00	\$12,668.60	1.42	63,547

ECM 4: Install VFD on Variable Air Volume (VAV) HVAC

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
20,351	5.4	0.0	\$2,886.83	\$14,427.20	\$4,650.00	\$9,777.20	3.39	20,493

Measure Description

We recommend replacing existing volume control devices on air handling units (such as inlet vanes and variable pitch fan blades) with variable frequency drives (VFDs). Inlet guide vanes and variable pitch fan blade are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device would be removed or permanently disabled and the control signal would be redirected to determine VFD output speed. Energy savings result from improved motor turn down performance when there is a reduced load on the fan motors. The magnitude of energy savings is based on the amount of time that the fans typically operate at reduced loads.

Maintenance savings are anticipated since a VFD is solid state electronic device which generally requires less attention than a mechanical volume control device.

ECM 5: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
63,106	6.4	0.0	\$8,951.92	\$12,668.60	\$0.00	\$12,668.60	1.42	63,547

Measure Description

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

4.1.4 Domestic Water Heating Upgrade

Recommended domestic water heating system upgrades are summarized in Figure 20 below.

Figure 20 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Domestic Water Heating Upgrade	0	0.0	16.1	\$136.23	\$35.85	\$0.00	\$35.85	0.26	1,891
ECM 6 Install Low-Flow Domestic Hot Water Devices	0	0.0	16.1	\$136.23	\$35.85	\$0.00	\$35.85	0.26	1,891

ECM 6: Install Low-Flow DHW Devices

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall water usage in general and cut energy usage for domestic hot water heating. Low-flow faucet aerators reduce the water flow, relative to standard fixtures, which generally reduces the amount of hot water used resulting in energy and water savings.

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 low or no-cost efficiency strategies. By employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance 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.

Perform 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 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.

Water Conservation

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

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

Refer to Section 4.1.4 for any low-flow ECM recommendations.

6 ON-SITE GENERATION MEASURES

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

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

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

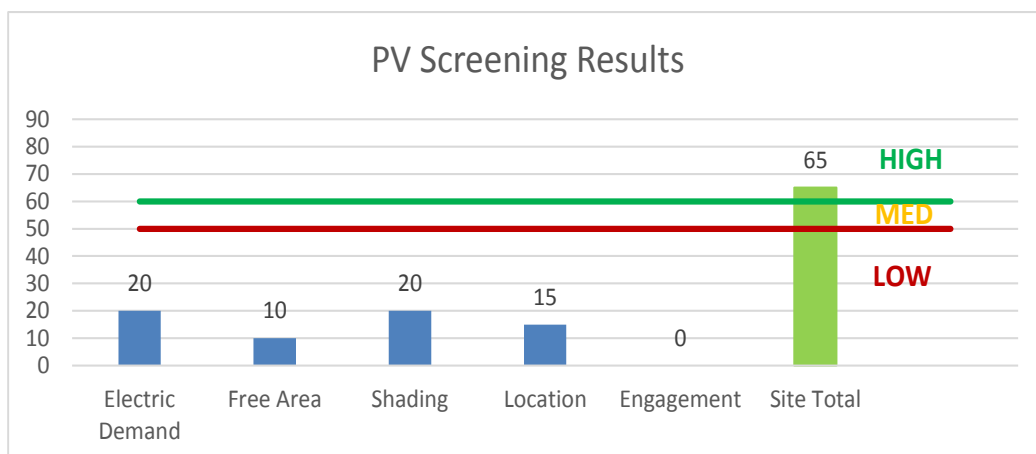
6.1 Photovoltaic

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

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 **High Potential** for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential for PV at the site. A PV array located on the roof of the main building/ground next to the building/over the main parking lot may be feasible. If Ho-Ho-Kus Public School is interested in pursuing the installation of PV, we recommend a full feasibility study be conducted.

Figure 21 - Photovoltaic Screening



Potential	High	
System Potential	86	kW DC STC
Electric Generation	102,458	kWh/yr
Displaced Cost	\$8,910	/yr
Installed Cost	\$246,000	

Owners of solar projects must register their projects in the SREC Registration Program prior to the start of construction in order to establish the project’s eligibility to earn SRECs. Registration of the intent to participate in New Jersey’s solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing. Refer to Section 7.3 for additional information.

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

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

6.2 Combined Heat and Power

In non-industrial settings, combined heat and power (CHP) is the on-site generation of electricity and recovery of heat which is put to beneficial use. Common prime movers in CHP applications include reciprocating engines, microturbines, fuel cells, and (at large facilities) gas turbines. Electricity is typically interconnected to the sites local distribution system. Heat is recovered from the exhaust stream and the ancillary cooling system and interconnected to the existing hot water (or steam) distribution system.

CHP systems are typically used to produce a portion of the electricity needed by a facility, with the balance of electric needs satisfied by purchase from the grid. 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.

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 NJ specializing in commercial CHP cost assessment and installation, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/

7 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and others, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s 1999 Electricity Restructuring Law which requires all customers of investor-owned electric and gas utilities to pay this charge on their monthly energy bills. As a contributor to the fund you are able to participate in the LGEA program and are also eligible to utilize the equipment upgrade incentive programs. 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
ECM 1	Install LED Fixtures	x			x
ECM 2	Retrofit Fixtures with LED Lamps	x			x
ECM 3	Install Occupancy Sensor Lighting Controls	x			x
ECM 4	Install VFD on Variable Air Volume (VAV) HVAC	x			x
ECM 5	Install VFDs on Hot Water Pumps	x			x
ECM 6	Install Low-Flow Domestic Hot Water Devices				x

SmartStart is generally well suited for implementation of individual or small sets of measures, with the flexibility to install projects at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities to bundle measures and simplify participation, 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 and 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; applicants can use in-house staff or preferred contractor.

Generally, the incentive values provided throughout the report assume the SS program is utilized because it provides a consistent comparison of available incentives.

Brief descriptions of all relevant alternative financing and incentive programs are located in the sections below. You may also check the following website for further information, including most current program availability, requirements, and incentive levels: www.njcleanenergy.com/ci

7.1 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 for various energy efficiency equipment based on national/market trends, new technologies or changes in efficiency baselines.

Prescriptive Equipment Incentives 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

All customer sizes and types may be served by this program. This program provides an effective mechanism for securing incentives for individual projects that may be completed at once or over several years.

Incentives

The prescriptive path provides fixed incentives for specific energy efficiency measures whereas the custom measure path provides incentives for unique or specialized technologies that are not addressed through prescriptive offerings.

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 the lesser of 50% of the total installed incremental project cost, or a buy down to a one year payback. 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

7.2 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program the minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings. P4P is a generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing Energy Savings Improvement Program (ESIP) also utilize the P4P program.

Incentives

Incentives are calculated based on estimated and achieved energy savings ranging from \$0.18-\$0.22/kWh and \$1.80-\$2.50/therm, capped at the lesser of 50% total project cost, or \$1 million per electric account and \$1 million per natural gas account, per fiscal year, not to exceed \$2 million per project. An incentive of \$0.10/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

To participate in the P4B EB program you will need to contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements. Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P

7.3 SREC Registration Program

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

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

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

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

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

8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

8.1 Retail Electric Supply Options

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

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

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

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

8.2 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
Main entrance	4	Compact Fluorescent Recessed fixtures	Wall Switch	60	1,760	Relamp	No	4	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	1,760	0.13	397	0.0	\$56.27	\$215.01	\$40.00	3.11
Board office	3	LED Screw-In Lamps: Recessed fixtures	Wall Switch	14	1,760	None	No	3	LED Screw-In Lamps: Recessed fixtures	Wall Switch	14	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Board office	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,760	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,232	0.57	1,772	0.0	\$251.43	\$1,168.80	\$230.00	3.73
A19 - Superintendent office	6	Compact Fluorescent Recessed fixtures	Wall Switch	52	1,760	Relamp	Yes	6	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	1,232	0.17	538	0.0	\$76.31	\$761.04	\$140.00	8.14
A19 - Superintendent office	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,760	Relamp	No	4	LED - Linear Tubes: (2) 3' Lamps	Wall Switch	21	1,760	0.08	259	0.0	\$36.75	\$213.60	\$0.00	5.81
A20-Business Administrator	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,760	Relamp	Yes	4	LED - Linear Tubes: (2) 3' Lamps	Occupancy Sensor	21	1,232	0.10	310	0.0	\$43.99	\$329.60	\$20.00	7.04
Restroom	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	660	None	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	660	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Conference Room	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	416	None	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	416	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Conference Room	6	LED Screw-In Lamps: Recessed fixtures	Wall Switch	28	416	None	No	6	LED Screw-In Lamps: Recessed fixtures	Wall Switch	28	416	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,320	Relamp	No	5	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,320	0.06	133	0.0	\$18.84	\$179.50	\$25.00	8.20
Hallway	2	LED Screw-In Lamps: Recessed fixtures	Wall Switch	14	1,320	None	No	2	LED Screw-In Lamps: Recessed fixtures	Wall Switch	14	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	12	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	1,320	Relamp	Yes	12	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	924	0.13	292	0.0	\$41.47	\$498.80	\$80.00	10.10
Hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Main entrance	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Mail Room	2	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,320	Relamp	No	2	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,320	0.04	83	0.0	\$11.84	\$123.40	\$30.00	7.89
Main lobby	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,760	Relamp	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	0.29	902	0.0	\$127.91	\$676.80	\$135.00	4.24
Main lobby	6	Compact Fluorescent Recessed fixtures	Wall Switch	52	1,760	Relamp	No	6	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	1,760	0.16	498	0.0	\$70.63	\$645.04	\$120.00	7.43
A12 - Principal	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,320	0.06	150	0.0	\$21.32	\$150.40	\$30.00	5.65
A12 - Principal	4	Compact Fluorescent Recessed fixtures	Wall Switch	52	1,320	Relamp	Yes	4	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	924	0.12	269	0.0	\$38.16	\$546.02	\$20.00	13.79
A11 - Guidance	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.08	190	0.0	\$26.94	\$266.40	\$50.00	8.03
Hall office	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,320	Relamp	Yes	4	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	924	0.09	213	0.0	\$30.28	\$362.80	\$80.00	9.34
A14-CST	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.08	190	0.0	\$26.94	\$266.40	\$50.00	8.03
A15-CST	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.08	190	0.0	\$26.94	\$266.40	\$50.00	8.03
A16-CST	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.08	190	0.0	\$26.94	\$266.40	\$50.00	8.03
Kindergarden 1	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,760	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,232	0.13	398	0.0	\$56.46	\$439.10	\$65.00	6.63

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
Kindergarden 1	7	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,760	Relamp	Yes	7	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,232	0.16	498	0.0	\$70.64	\$547.90	\$125.00	5.99
Kindergarden 2	9	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,760	Relamp	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,232	0.13	398	0.0	\$56.46	\$439.10	\$65.00	6.63
Kindergarden 2	7	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,760	Relamp	Yes	7	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,232	0.16	498	0.0	\$70.64	\$547.90	\$125.00	5.99
B84 - Assistant Principal Office	8	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,320	Relamp	Yes	8	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	924	0.18	427	0.0	\$60.55	\$609.60	\$140.00	7.76
Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.05	169	0.0	\$23.95	\$233.00	\$40.00	8.06
2nd Grade hallway	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.38	1,182	0.0	\$167.62	\$935.00	\$160.00	4.62
B74-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B67-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	660	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	462	0.06	66	0.0	\$9.41	\$259.60	\$40.00	23.34
Boys Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	660	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	660	0.02	21	0.0	\$2.96	\$61.70	\$15.00	15.77
2nd Grade hallway	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B76-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B93-Faculty room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.12	285	0.0	\$40.41	\$341.60	\$65.00	6.85
B93-Faculty room	1	Incandescent: Recessed fixtures	Wall Switch	100	1,320	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	14	1,320	0.06	131	0.0	\$18.52	\$53.75	\$10.00	2.36
B93-Faculty room	1	Exit Signs: LED - 2 W Lamp	None	6	2,080	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	2,080	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Teacher's bathroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	660	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	462	0.12	142	0.0	\$20.20	\$341.60	\$65.00	13.69
Teacher's bathroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	660	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	660	0.02	21	0.0	\$2.96	\$61.70	\$15.00	15.77
Custodial Closet	1	Compact Fluorescent: Wall hanging fixture	Wall Switch	40	104	Relamp	No	1	LED Screw-In Lamps: Wall hanging fixture	Wall Switch	9	104	0.02	4	0.0	\$0.53	\$53.75	\$10.00	83.19
Girl's Bathroom	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Girl's Bathroom	1	Compact Fluorescent: Recessed fixtures	Wall Switch	26	660	Relamp	Yes	1	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	7	462	0.01	16	0.0	\$2.27	\$169.75	\$20.00	65.92
B69-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B78-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.71	2,194	0.0	\$311.29	\$1,637.00	\$280.00	4.36
Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,760	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,760	0.07	213	0.0	\$30.15	\$215.40	\$30.00	6.15
Hallway	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

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
B35-SGI	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.25	570	0.0	\$80.82	\$567.20	\$110.00	5.66
B37-SGI	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.25	570	0.0	\$80.82	\$567.20	\$110.00	5.66
B39-SGI	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.49	1,139	0.0	\$161.63	\$1,018.40	\$200.00	5.06
B41-Classroom	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B43-Classroom	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B45-SGI	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.21	475	0.0	\$67.35	\$492.00	\$95.00	5.89
B48-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B47-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B49-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B50-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B52-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,080	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,080	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys Restroom	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys Restroom	1	Compact Fluorescent Recessed fixtures	Wall Switch	52	660	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	660	0.03	31	0.0	\$4.41	\$107.51	\$20.00	19.82
Custodial Closet	1	Incandescent: Wall hanging fixture	Wall Switch	40	52	Relamp	No	1	LED Screw-In Lamps: Wall hanging fixture	Wall Switch	9	52	0.02	2	0.0	\$0.26	\$53.75	\$10.00	166.38
Girl's Bathroom	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Girl's Bathroom	1	Compact Fluorescent Recessed fixtures	Wall Switch	52	660	Relamp	Yes	1	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	462	0.03	34	0.0	\$4.77	\$223.51	\$40.00	38.47
Hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.49	1,519	0.0	\$215.51	\$1,169.00	\$200.00	4.50
B51-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B56-Teacher Training	12	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,320	None	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.10	238	0.0	\$33.72	\$116.00	\$20.00	2.85
B61-Classroom	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	None	No	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B54-SGI	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,320	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.25	570	0.0	\$80.82	\$567.20	\$110.00	5.66
Hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.49	1,519	0.0	\$215.51	\$1,169.00	\$200.00	4.50
B60-Faculty work room	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,320	None	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	924	0.03	79	0.0	\$11.24	\$116.00	\$20.00	8.54
B63-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B60-Faculty work room	2	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,320	None	No	2	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

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
Girl's Bathroom	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	462	0.01	10	0.0	\$1.41	\$116.00	\$20.00	68.32
Girl's Bathroom	1	Compact Fluorescent Recessed fixtures	Wall Switch	52	660	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	660	0.03	31	0.0	\$4.41	\$53.75	\$10.00	9.91
Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,760	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,232	0.25	760	0.0	\$107.75	\$567.20	\$110.00	4.24
B62	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,320	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	924	0.14	334	0.0	\$47.42	\$401.40	\$80.00	6.78
Boys Restroom	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	462	0.01	10	0.0	\$1.41	\$116.00	\$20.00	68.32
Boys Restroom	1	Compact Fluorescent Recessed fixtures	Wall Switch	52	660	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	660	0.03	31	0.0	\$4.41	\$53.75	\$10.00	9.91
B65-Classroom	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B64-Nurse Room	7	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,320	None	Yes	7	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	924	0.02	54	0.0	\$7.69	\$116.00	\$20.00	12.49
Restroom - Nurse Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	660	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	0.01	13	0.0	\$1.88	\$35.90	\$5.00	16.40
Restroom - Nurse Room	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	660	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	660	0.02	24	0.0	\$3.45	\$96.40	\$20.00	22.17
B66-SGI	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,320	Relamp	Yes	4	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	924	0.09	213	0.0	\$30.28	\$362.80	\$80.00	9.34
B68-SGI	6	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,320	Relamp	Yes	6	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	924	0.14	320	0.0	\$45.41	\$486.20	\$110.00	8.28
B72-Pre School	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,320	None	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	924	0.05	119	0.0	\$16.86	\$116.00	\$20.00	5.69
Bathroom - Pre School	2	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,320	Relamp	No	2	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,320	0.04	83	0.0	\$11.84	\$123.40	\$30.00	7.89
Kindergarden	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,320	None	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	924	0.09	211	0.0	\$29.97	\$116.00	\$20.00	3.20
Kindergarden	2	Incandescent: Wall hanging fixture	Wall Switch	75	1,320	Relamp	No	2	LED Screw-In Lamps: Wall hanging fixture	Wall Switch	11	1,320	0.08	194	0.0	\$27.56	\$107.51	\$20.00	3.17
Kindergarden restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	660	Relamp	Yes	2	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	462	0.05	53	0.0	\$7.57	\$239.40	\$50.00	25.02
Kindergarden	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
Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	No	1	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	1,760	0.02	57	0.0	\$8.04	\$76.53	\$20.00	7.03
Stairwell	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	No	2	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	1,760	0.04	113	0.0	\$16.08	\$153.07	\$40.00	7.03
Closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	No	3	LED - Linear Tubes: (4) 2' Lamps	Wall Switch	34	52	0.06	5	0.0	\$0.71	\$229.60	\$60.00	238.01
214-Classroom	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
2nd Floor Hallway	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.08	247	0.0	\$34.97	\$116.00	\$20.00	2.75
2nd Floor Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Faculty Bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	660	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	660	0.02	25	0.0	\$3.55	\$58.50	\$10.00	13.65

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
Library	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	None	No	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Library	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Tech hallway	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.25	760	0.0	\$107.75	\$642.50	\$110.00	4.94
Tech hallway	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B31-Tech Room	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.30	928	0.0	\$131.70	\$759.50	\$130.00	4.78
B33-Classroom	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B33-Classroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Occupancy Sensor	53	1,320	Relamp	No	2	LED - Linear Tubes: (3) 2' Lamps	Occupancy Sensor	26	1,320	0.04	83	0.0	\$11.84	\$123.40	\$30.00	7.89
B33-Classroom	2	Incandescent: Wall mount fixture	Occupancy Sensor	75	1,320	Relamp	No	2	LED Screw-In Lamps: Wall mount fixture - 1 lamp	Occupancy Sensor	9	1,320	0.09	200	0.0	\$28.42	\$107.51	\$20.00	3.08
Mech room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	104	None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	104	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway (Math)	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	None	No	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway (Math)	2	Compact Fluorescent: Recessed fixtures	Occupancy Sensor	52	1,232	Relamp	No	2	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	1,232	0.05	116	0.0	\$16.48	\$215.01	\$40.00	10.62
Hallway (Math)	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C142-Classroom	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C144-Classroom	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C146-Classroom	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C139-Music Room	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,500	None	No	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway (Art)	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,232	None	No	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,232	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C137-Career Lab	27	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	None	No	27	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C137-Career Lab	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,760	None	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway (Art)	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C135-Art Room	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	None	No	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Restroom	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Storage	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	32	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,232	None	No	32	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,232	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	2	Compact Fluorescent: Recessed fixtures	Occupancy Sensor	52	1,232	Relamp	No	2	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	1,232	0.05	116	0.0	\$16.48	\$215.01	\$40.00	10.62

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
Attic	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	208	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	208	0.02	8	0.0	\$1.12	\$58.50	\$10.00	43.31
Attic	1	Incandescent: Wall hanging fixture	Wall Switch	60	208	Relamp	No	1	LED Screw-In Lamps: Wall hanging fixture	Wall Switch	11	208	0.03	12	0.0	\$1.66	\$53.75	\$10.00	26.32
212-Classroom	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,320	None	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	924	0.07	158	0.0	\$22.48	\$116.00	\$20.00	4.27
Custodial Closet	1	Compact Fluorescent: Wall mount fixture	Wall Switch	40	52	Relamp	No	1	LED Screw-In Lamps: Wall mount fixture	Wall Switch	11	52	0.02	2	0.0	\$0.25	\$53.75	\$10.00	177.85
Boys Restroom	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	462	0.01	13	0.0	\$1.87	\$116.00	\$20.00	51.24
Boys Restroom	1	Compact Fluorescent Recessed fixtures	Wall Switch	52	660	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	660	0.03	31	0.0	\$4.41	\$53.75	\$10.00	9.91
210-SGI	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,320	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	924	0.03	79	0.0	\$11.24	\$116.00	\$20.00	8.54
208-SGI	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,320	None	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	924	0.03	79	0.0	\$11.24	\$116.00	\$20.00	8.54
Girl's Bathroom	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	660	None	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	462	0.01	13	0.0	\$1.87	\$116.00	\$20.00	51.24
Girl's Bathroom	1	Compact Fluorescent: Recessed fixtures	Wall Switch	52	660	Relamp	No	1	LED Screw-In Lamps: Recessed fixture	Wall Switch	11	660	0.03	31	0.0	\$4.41	\$53.75	\$10.00	9.91
206-Classroom	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
202-Classroom	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	None	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	104	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	104	0.04	8	0.0	\$1.12	\$117.00	\$20.00	86.63
Stairwell	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.04	134	0.0	\$18.95	\$117.00	\$20.00	5.12
Hallway (Gym)	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.06	176	0.0	\$24.98	\$116.00	\$20.00	3.84
Hallway (Gym)	1	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
A25 - Girl's Restroom	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	728	None	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	510	0.04	55	0.0	\$7.75	\$116.00	\$20.00	12.39
Girl's Locker Room	23	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	None	Yes	23	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	510	0.13	168	0.0	\$23.76	\$116.00	\$20.00	4.04
Boys Restroom	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	728	None	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	510	0.04	55	0.0	\$7.75	\$116.00	\$20.00	12.39
Boys Locker Room	23	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	None	Yes	23	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	510	0.13	168	0.0	\$23.76	\$116.00	\$20.00	4.04
Gym	16	LED - Fixtures: High-Bay	Wall Switch	154	1,760	None	No	16	LED - Fixtures: High-Bay	Wall Switch	154	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Gym	8	LED Screw-In Lamps: Wall mount fixture	Wall Switch	14	1,760	None	No	8	LED Screw-In Lamps: Wall mount fixture	Wall Switch	14	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Library	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,760	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.06	200	0.0	\$28.42	\$175.50	\$30.00	5.12
Library	16	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,760	Relamp	No	16	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,760	0.29	891	0.0	\$126.33	\$987.20	\$240.00	5.91
Library	6	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,760	Relamp	No	6	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,760	0.11	334	0.0	\$47.37	\$370.20	\$90.00	5.91

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
Hallway	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C125-Classroom	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C127-Classroom	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C123-Classroom	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C121-Classroom	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C120-Classroom	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C119-Science Room	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C115A-Prep Room	26	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	None	No	26	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,320	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Electrical Closet	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	208	None	No	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	208	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Storage	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	104	None	No	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	104	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
C113-Classroom	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,232	None	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,232	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	2	Compact Fluorescent Recessed fixtures	Occupancy Sensor	52	1,232	Relamp	No	2	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	1,232	0.05	116	0.0	\$16.48	\$215.01	\$0.00	13.05
Storage	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Hallway	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	None	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lunch room	12	LED - Fixtures: High-Bay	Wall Switch	154	1,760	None	No	12	LED - Fixtures: High-Bay	Wall Switch	154	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lunch room	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	None	No	7	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Girl's Room	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	728	None	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	728	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boy's Room	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	728	None	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	728	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Girl's Room	3	Compact Fluorescent Recessed fixtures	Occupancy Sensor	52	728	Relamp	No	2	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	728	0.09	112	0.0	\$15.91	\$215.01	\$40.00	11.00
Girl's Room	3	Compact Fluorescent Recessed fixtures	Occupancy Sensor	52	728	Relamp	No	2	LED Screw-In Lamps: Recessed fixture	Occupancy Sensor	11	728	0.09	112	0.0	\$15.91	\$215.01	\$40.00	11.00
Band Room	15	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,760	None	No	15	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Band Room hall	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,760	None	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Band Room Hall	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B59-Maintenance Staff Room	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,232	0.03	88	0.0	\$12.49	\$116.00	\$20.00	7.69

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
Storage Room	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Auditorium	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,500	Relamp	No	4	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,500	0.07	190	0.0	\$26.92	\$246.80	\$60.00	6.94
Auditorium	5	Incandescent: Chandelier - 8 bulbs per fixture	Wall Switch	480	1,760	Relamp	No	5	LED Screw-In Lamps: Chandelier	Wall Switch	14	1,760	1.53	4,716	0.0	\$668.98	\$2,150.12	\$400.00	2.62
Staff Restroom	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	728	None	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	728	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Entrance	1	Incandescent: Chandelier - 3 bulbs per fixture	Wall Switch	120	1,760	Relamp	No	1	LED Screw-In Lamps: Chandelier	Wall Switch	11	1,760	0.07	221	0.0	\$31.30	\$161.26	\$30.00	4.19
Exterior Entrance	1	LED Screw-In Lamps: Chandelier	Wall Switch	14	1,760	None	No	1	LED Screw-In Lamps: Chandelier	Wall Switch	14	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Small Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,760	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,760	0.01	35	0.0	\$5.02	\$35.90	\$5.00	6.15
Boiler Room	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	No	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	2	Compact Fluorescent: Wall mount fixture	Wall Switch	40	1,760	Relamp	No	2	LED Screw-In Lamps: Wall mount fixture	Wall Switch	9	1,760	0.04	125	0.0	\$17.80	\$107.51	\$20.00	4.92
Elevator Room	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	None	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Exterior lights	1	Halogen Incandescent: Wall pack	Wall Switch	150	3,276	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	3,276	0.05	283	0.0	\$40.08	\$390.68	\$100.00	7.25
Exterior lights	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	3,276	None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	75	3,276	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Exterior lights	10	Compact Fluorescent: Wall mount fixture	Wall Switch	120	3,276	Relamp	No	10	LED Screw-In Lamps: Wall mount fixture	Wall Switch	18	3,276	0.67	3,843	0.0	\$545.11	\$636.51	\$50.00	1.08

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
Elevator Room	Elevator Shaft	1	Other	20.0	91.0%	No	3,391	No	91.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
HVAC Unit fans	HVAC unit fans	4	Other	7.5	89.5%	No	3,391	No	89.5%	Yes	4	5.40	20,351	0.0	\$2,886.83	\$14,427.20	\$4,650.00	3.39
Boiler Room	Boilers	2	Boiler Feed Water Pump	20.0	93.0%	No	3,391	No	93.0%	Yes	2	6.45	63,106	0.0	\$8,951.92	\$12,668.60	\$0.00	1.42
Boiler Room	Boilers	2	Water Supply Pump	0.5	60.0%	No	2,745	No	60.0%	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
B93	B93	1	Window AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B78	B78	1	Window AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B43	B43	1	Window AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CR202	CR202	2	Window AC	1.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B31	B31	1	Window AC	1.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Mechanical Room	Techroom, Library	1	Packaged AC	21.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Maintenance Room	Maintenance Room	2	Window AC	0.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Attic	Auditorium	2	Packaged AC	10.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
MPR Attic	MPR Attic	2	Packaged AC	10.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Front office	Front Office	4	Split-System AC	3.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Front Hallway	Front Office	1	Packaged AC	5.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions							Energy Impact & Financial Analysis						
		System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical room	Gym	1	Furnace	300.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Mechanical room	Techroom, Library	1	Furnace	300.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	Kitchen	1	Warm Air Unit Heater	49.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	Boiler Room	4	Condensing Hot Water Boiler	1,700.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	Kitchen	1	Warm Air Unit Heater	49.00	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
Kitchen	New wing, Lunch Rooms	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Room	Classroom	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Low-Flow Device Recommendations

Location	Recommendation Inputs				Energy Impact & Financial Analysis						
	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Janitor's closet	4	Faucet Aerator (Kitchen)	3.00	2.20	0.00	0	11.0	\$92.75	\$28.68	\$0.00	0.31
Restroom Nurse's office	1	Faucet Aerator (Lavatory)	2.50	1.00	0.00	0	5.2	\$43.48	\$7.17	\$0.00	0.16

Cooking Equipment Inventory & Recommendations

Location	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Equipment Type	High Efficiency Equipment?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Electric Combination Oven/Steam Cooker (<15 Pans)	Yes	No	0.00	0	0.0	\$0.00	\$15,789.30	\$1,000.00	0.00
Kitchen	1	Electric Convection Oven (Half Size)	Yes	No	0.00	0	0.0	\$0.00	\$4,011.37	\$350.00	0.00
Kitchen	1	Electric Griddle (≤2 Feet Width)	Yes	No	0.00	0	0.0	\$0.00	\$1,361.82	\$300.00	0.00

Plug Load Inventory

Location	Existing Conditions			
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
School	153	Computer	75.0	Yes
School	19	Laptops	40.0	Yes
School	12	Printer - Small	20.0	Yes
School	16	Printer - Medium	60.0	Yes
School	4	Printer - Large	400.0	Yes
School	4	Projector	200.0	Yes
School	7	Microwave	1,000.0	No
School	1	Refrigerator - Small	27.6	No
School	4	Refrigerator - Large	400.0	No
School	1	Refrigerator - Double Door	600.0	Yes
School	7	Coffee Machine	400.0	No
School	2	Toaster Over	1,200.0	No
School	16	Television - CRT	120.0	No
School	2	Television - LCD	120.0	Yes
School	1	Space Heater	1,500.0	No
Classrooms	37	Smart Board	530.0	Yes
School	2	Standing fan	40.0	No
School	11	Ceiling fan	60.0	No
School	1	Humidifier	280.0	Yes
Maintenance Room	1	Washing Machine	700.0	No

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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**ENERGY STAR®
Score¹**

Ho-Ho Kus Public Schools

Primary Property Type: K-12 School
Gross Floor Area (ft²): 98,000
Built: 1935

For Year Ending: February 29, 2016
Date Generated: February 17, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Ho-Ho Kus Public Schools 70, Lloyd Road Ho-Ho Kus, New Jersey 07423	_____ () - _____	_____ () - _____ _____
Property ID: 5529582		

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison	
80.3 kBtu/ft ²	Natural Gas (kBtu) 5,363,458 (68%)	National Median Site EUI (kBtu/ft ²)	79.5
	Electric - Grid (kBtu) 2,502,660 (32%)	National Median Source EUI (kBtu/ft ²)	136.3
		% Diff from National Median Source EUI	1%
Source EUI	Annual Emissions		
137.7 kBtu/ft ²	Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)		572

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)**