Local Government Energy Audit:
Energy Audit Report

Arthur Stanlick Elementary School

Jefferson Township Board of Education

121B East Shawnee Trail
Wharton, NJ 07885

July 19, 2018

Final Report by:
TRC Energy Services

Disclaimer

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

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

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

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

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1 EXECUTIVE SUMMARY

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

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

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

1.1 Facility Summary

Arthur Stanlick Elementary School is a one-story building totaling 65,304 square feet. The building has a flat roof, exterior walls are finished with brick masonry, windows throughout the facility are double paned operable windows and exterior doors are constructed of metal. Interior lighting consists mostly of linear fluorescent lamps and fixtures and lighting control is provided by manual wall switches. Heating is provided by non-condensing oil-fired boilers and cooling is provided by a combination of rooftop packaged and split system air conditioning units.

A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC Energy Services evaluated seven measures which together represent an opportunity for Arthur Stanlick Elementary School to reduce annual energy costs by $13,172 and annual greenhouse gas emissions by 110,569 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 8.4 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Arthur Stanlick Elementary School's annual energy use by 6%.

Figure 1 – Previous 12 Month Utility Costs

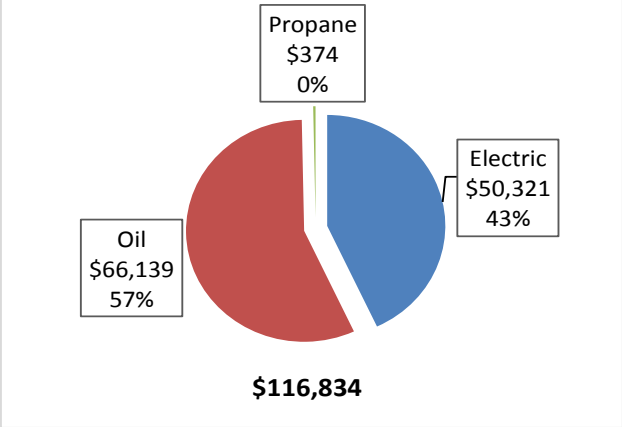
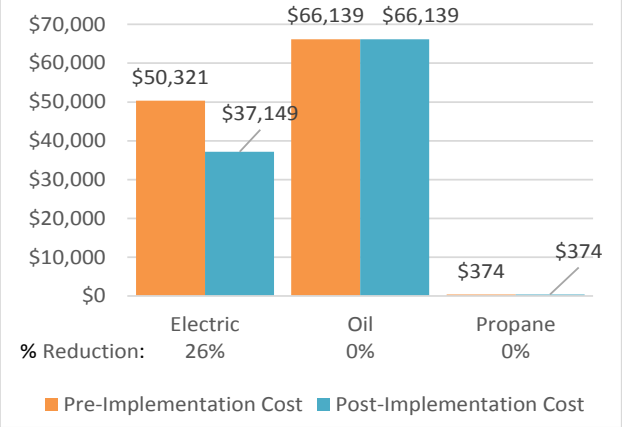


Figure 2 – Potential Post-Implementation Costs



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

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

Figure 3 – Summary of Energy Reduction Opportunities

	Energy Conservation Measure	Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**74,986**	**25.4**	**$8,995.56**	**$76,775.68**	**$13,300.00**	**$63,475.68**	**7.1**	**75,510**
ECM 1	Install LED Fixtures	Yes	11,986	6.4	$1,437.86	$27,792.21	$4,710.00	$23,082.21	16.1	12,070
ECM 2	Retrofit Fixtures with LED Lamps	Yes	62,154	18.9	$7,456.18	$47,477.70	$8,590.00	$38,887.70	5.2	62,588
ECM 3	Install LED Exit Signs	Yes	846	0.1	$101.52	$1,505.77	$0.00	$1,505.77	14.8	852
Lighting Control Measures			**13,486**	**4.1**	**$1,617.85**	**$8,468.00**	**$1,460.00**	**$7,008.00**	**4.3**	**13,581**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	13,486	4.1	$1,617.85	$8,468.00	$1,460.00	$7,008.00	4.3	13,581
Motor Upgrades			**2,489**	**2.4**	**$298.54**	**$6,078.72**	**$0.00**	**$6,078.72**	**20.4**	**2,506**
ECM 5	Premium Efficiency Motors	Yes	2,489	2.4	$298.54	$6,078.72	$0.00	$6,078.72	20.4	2,506
Electric Unitary HVAC Measures			**14,263**	**11.9**	**$1,711.02**	**$35,909.28**	**$2,208.00**	**$33,701.28**	**19.7**	**14,363**
ECM 6	Install High Efficiency Electric AC	Yes	14,263	11.9	$1,711.02	$35,909.28	$2,208.00	$33,701.28	19.7	14,363
Domestic Water Heating Upgrade			**4,578**	**0.0**	**$549.21**	**$107.55**	**$0.00**	**$107.55**	**0.2**	**4,610**
ECM 7	Install Low-Flow Domestic Hot Water Devices	Yes	4,578	0.0	$549.21	$107.55	$0.00	$107.55	0.2	4,610
TOTALS			**109,802**	**43.9**	**$13,172.19**	**$127,339.23**	**$16,968.00**	**$110,371.23**	**8.4**	**110,569**

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

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

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

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

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

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

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

Energy Efficient Practices

TRC also identified 14 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Arthur Stanlick School include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Turn Off Unneeded Motors
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Arthur Stanlick School. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	135	kW DC STC
Electric Generation	160,835	kWh/yr
Displaced Cost	$13,990	/yr
Installed Cost	$351,000	

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- SREC (Solar Renewable Energy Certificate) Registration Program
- Energy Savings Improvement Program (ESIP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 7.

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 7.4 for additional information on the ESIP Program.

Additional information on relevant incentive programs is located in Section 7 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Rita Giacchi	Assistant Business Administrator	rgiacchi@jefftwp.org	973-663-3387
Designated Representative			
Joe Yuhas	Supervisor Custodian		(973) 479-9360
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On February 27, 2017, TRC performed an energy audit at Arthur Stanlick Elementary School located in Wharton, New Jersey. TRC's auditor met with Joe Yuhas to review the facility operations and help focus our investigation on specific energy-using systems.

The 65,304 square foot elementary school building is a one-story facility and is comprised of various spaces including classrooms, offices, gymnasium, locker rooms, cafeteria, library, band room, faculty room, conference room, copy rooms, kitchen, multipurpose room, mechanical rooms and storage areas.

During the site visit the roof and exterior walls appeared to be in good condition. The windows throughout the facility are double paned operable windows and also appeared to be in good condition.

Interior lighting consists mostly of T8 fluorescent lamps and fixtures and the exit signs throughout the facility consist of LED and fluorescent fixtures. Lighting control is provided by manual wall switches. The facility has exterior lighting that consists of metal halide and LED fixtures.

Heating is provided by non-condensing oil-fired boilers and cooling is provided by a combination of rooftop packaged and split system air conditioning units. The split systems have reached the end of their useful service lives as they were functioning with a minimal efficiency during the site visit, and as mentioned by the site contact.

2.3 Building Occupancy

The school is open Monday through Friday and the typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Arthur Stanlick School	Weekday	7:00 AM - 3:30 PM
Arthur Stanlick School	Weekend	N/A

2.4 Building Envelope

The foundation consists of cast-in-place concrete perimeter wall footings with concrete foundation walls and exterior walls are finished with brick masonry. The building has a flat roof covered with a multi-ply bituminous built-up membrane and a black membrane that appeared to be in good condition. The windows throughout the facility are double paned operable windows and appeared to be in good condition with no signs of outside air infiltration. Exterior doors are constructed of metal and are fire approved doors. Overall, the building envelope appears to be in acceptable condition with little signs of outside air infiltration.

2.5 On-Site Generation

Arthur Stanlick Elementary School does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

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

Lighting System

Lighting is provided mostly by 32-Watt linear fluorescent T8 lamps and fixtures with electronic ballasts. Most of the fixtures are 2 and 3 lamp 4-foot long troffers with diffusers. The gymnasium is lit with 28-Watt linear 4-foot T5 lamps. The multipurpose room is lit with a combination of linear T5 lamps and incandescent screen in lamps. The library is lit with a combination of linear T8 lamps and recessed compact fluorescent lamps (CFL). Exit signs throughout the facility consist of LED and fluorescents fixtures. The facility has exterior lighting which consists of various wattages of metal halide and LED outdoor wall-mounted fixtures that are controlled with photocells.

Additional energy savings could be achieved by continuing to retrofit the existing lighting system with LED linear tubes and LED lamp fixtures. Installing occupancy sensors in select areas will help yield more energy savings.

Hot Water Heating System

Heating is provided by two non-condensing oil-fired boilers. The boilers are 13 years old, have an output capacity of 3,982 kBtu/hr each, a nominal efficiency of 80% and they operate in lead/lag operation with only one operating at a time.

The heating hot water generated by the boilers is circulated to unit ventilators and the air handlers with four 10 hp hot water supply pumps, and two 1.5 hp return pumps. The hot water supply pumps are equipped with variable frequency drives (VFDs). The boilers are configured in a variable flow distribution and have a full modulation sequencing control system. The boiler internal control system has an outside temperature set at 51°F and interior space temperature set at 72°F. The unit ventilators are equipped with hot water coils for heating and direct-expansion (DX) coils for cooling and dehumidification in the classrooms. The boilers were found to be in good condition and are well maintained.

Direct Expansion Air Conditioning System (DX)

There are six Lennox rooftop packaged units, four Lennox and five Airedale split systems that provide cooling to various spaces. The packaged units utilize a scroll compressor and a direct-expansion (DX) coil. The units are sized from 5 to 12.5 tons. The Lennox packaged and split systems were functioning in good condition. However, the five Airedale split system are 18 years old and have reached the end of their useful service lives and were running with minimum efficiency. The unit ventilators are equipped with hot water coils for space heating and DX coils for cooling and dehumidification.

Ventilation – Air Handling System

The gymnasium has two McQuay air-handlers located on the roof that provide tempered air via duct distribution. There are two other air handler units located in the multi-purpose room and are equipped with hot water coil for heating. The air-handling system appear to be in good condition. Air is exhausted from the toilet rooms, corridors, classrooms, and dining areas through the roof exhausters.

Building Energy Management System (BEMS)

The majority of the facility, with the exception of the hot water system is controlled with a web access building energy management system (BEMS). The BEMS system is manufactured by Automated Logic. This user interface platform provides start and stop scheduling and resets of supply air temperature based on setpoints.

Domestic Hot Water Heating System

Domestic hot water for the facility is provided by one electric Bradford White water heater located in the boiler room, and has a storage tank capacity of 80 gallons. The water heater is 12 years old and appears to be in good condition.

Food Service & Refrigeration

The school houses a small non-commercial kitchen which includes propane cooking ovens as well as stand-up refrigerators and freezers.

Building Plug Load

There are 93 computers with LCD monitors and 88 computers with CRT monitors throughout the facility. The school district should consider replacing the CRT monitors with LCD monitors. There is no centralized PC power management software currently installed. There is one server room that has cooling provided by a split system. There are no vending machines in the facility.

2.7 Water-Using Systems

There are several restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf. The school has no locker rooms.

3 SITE ENERGY USE AND COSTS

Utility data for electricity, No. 2 fuel oil and propane was analyzed to identify opportunities for savings. In addition, data for electricity, No. 2 fuel oil and propane was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.5 for additional information.

3.1 Total Cost of Energy

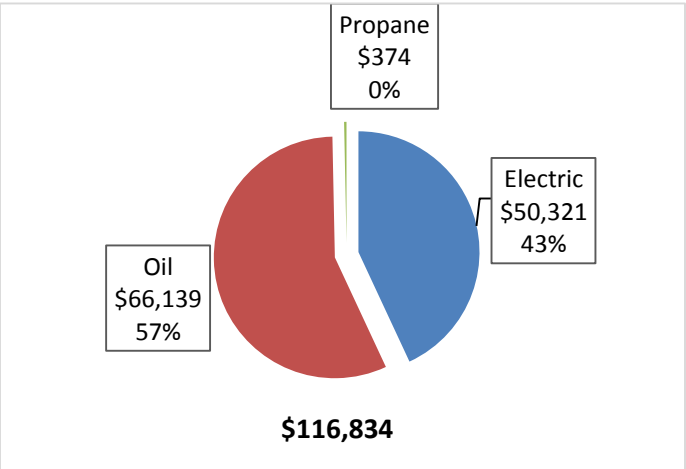
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Arthur Stanlick School		
Fuel	**Usage**	**Cost**
Electricity	419,469 kWh	$50,321
No. 2 Fuel Oil	36,651 Gallons	$66,139
Propane	140 Gallons	$374
Total		**$116,834**

The current annual energy cost for this facility is $116,834 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.120/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

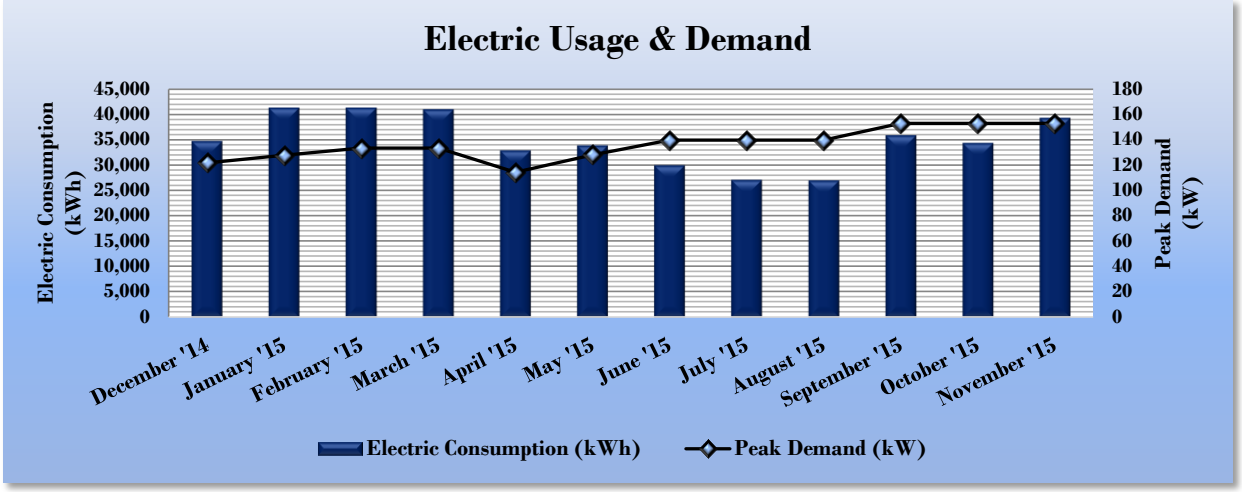


Figure 10 - Electric Usage & Demand

Electric Billing Data for Arthur Stanlick School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
12/31/14	28	34,720	122		$4,099
1/30/15	28	41,280	128		$4,764
3/2/15	31	41,280	134		$4,840
4/1/15	30	40,960	134		$4,810
5/4/15	33	32,880	114		$3,863
6/3/15	30	33,840	128		$4,078
7/2/15	29	29,920	140		$3,477
8/3/15	32	27,040	140		$3,483
9/2/15	30	26,960	140		$3,476
10/2/15	30	35,840	153		$4,363
11/2/15	31	34,320	153		$4,222
12/4/15	32	39,280	153		$4,708
Totals	**364**	**418,320**	**153**	**$0**	**$50,183**
Annual	**365**	**419,469**	**153**	**$0**	**$50,321**

3.3 No. 2 Fuel Oil Usage

No. 2 fuel oil is provided by Finch Fuel. The average oil cost for the past 12 months is $1.805/Gallon, which is the blended rate used throughout the analyses in this report. The oil consumption is shown in the table below.

Figure 11 –No. 2 Fuel Oil Usage

No. 2 Fuel Oil Billing Data for Arthur Stanlick School				
Period Ending	Days in Period	Oil Usage (Gallons)	Fuel Cost	TRC Estimated Usage?
12/5/15	30	4,021	$7,254	Yes
1/4/16	31	4,838	$8,765	Yes
2/5/16	29	5,977	$10,872	Yes
3/4/16	30	5,008	$9,080	Yes
4/5/16	30	3,735	$6,725	Yes
5/5/16	31	769	$1,238	Yes
6/5/16	30	0	$0	Yes
7/5/16	31	0	$0	Yes
8/5/16	31	0	$0	Yes
9/5/16	31	4,037	$7,283	Yes
10/5/16	30	4,185	$7,557	Yes
11/5/16	31	4,081	$7,365	Yes
Totals	**365**	**36,651**	**$66,139**	12
Annual	**365**	**36,651**	**$66,139**	

3.4 Propane Usage

Propane is provided by Suburban Propane. The average propane cost for the past 12 months is $2.675/Gallon, which is the blended rate used throughout the analyses in this report. The propane consumption is shown in the table below.

Figure 12 –Propane Usage

Propane Billing Data for Arthur Stanlick School				
Period Ending	**Days in Period**	**Propane Usage (Gallons)**	**Fuel Cost**	**TRC Estimated Usage?**
2/10/16	29	14	$37	Yes
3/10/16	31	14	$37	Yes
4/10/16	30	14	$37	Yes
5/10/16	31	14	$37	Yes
6/10/16	30	14	$37	Yes
7/10/16	31	0	$0	Yes
8/10/16	31	0	$0	Yes
9/10/16	30	14	$37	Yes
10/10/16	31	14	$37	Yes
11/10/16	30	14	$37	Yes
12/10/16	31	14	$37	Yes
1/10/17	31	14	$37	Yes
Totals	**366**	**140**	**$375**	12
Annual	**365**	**140**	**$374**	

3.5 Benchmarking

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

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

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Arthur Stanlick School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	148.3	141.4
Site Energy Use Intensity (kBtu/ft^2)	151.8	58.2

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

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

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Arthur Stanlick School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft^2)	130.2	141.4
Site Energy Use Intensity (kBtu/ft^2)	94.6	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 59.

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

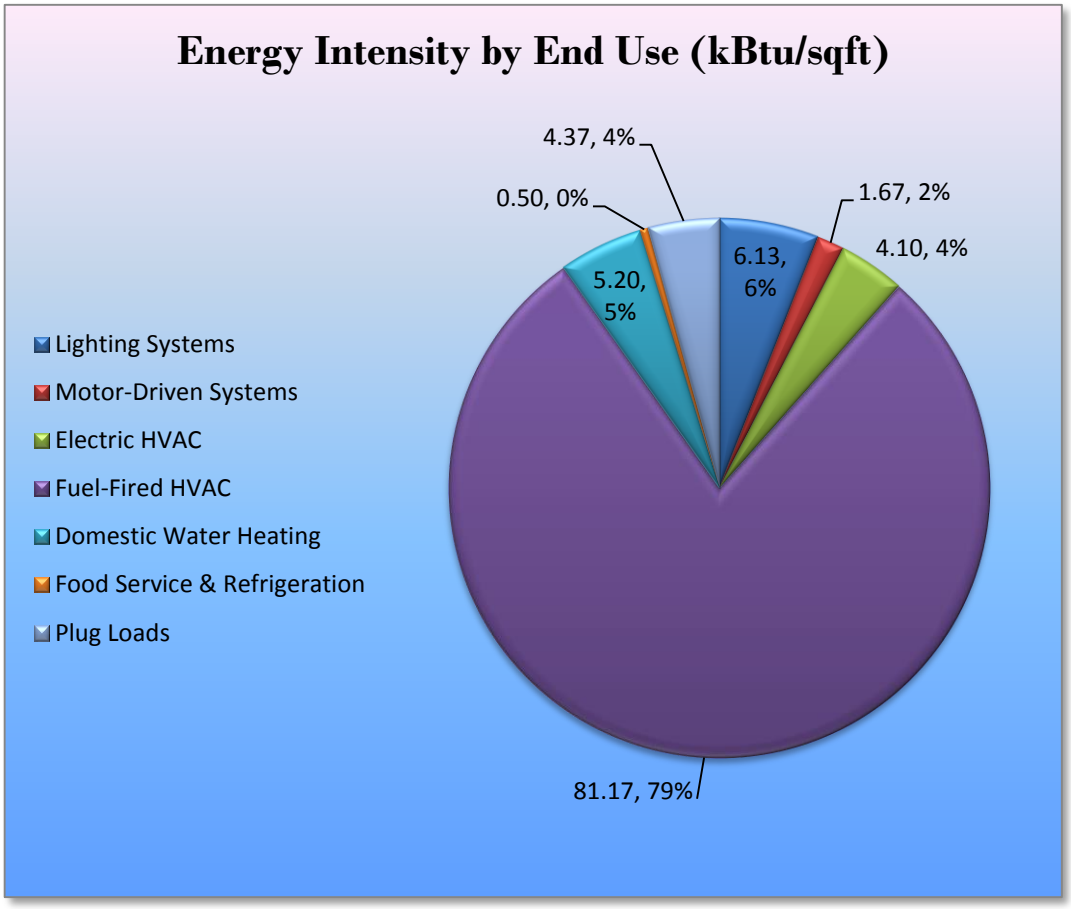
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.6 Energy End-Used Breakdown

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

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



4 ENERGY CONSERVATION MEASURES

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Arthur Stanlick Elementary School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 7.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 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_2e Emissions Reduction (lbs)
Lighting Upgrades		**74,986**	**25.4**	**0.0**	**$8,995.56**	**$76,775.68**	**$13,300.00**	**$63,475.68**	**7.1**	**75,510**
ECM 1	Install LED Fixtures	11,986	6.4	0.0	$1,437.86	$27,792.21	$4,710.00	$23,082.21	16.1	12,070
ECM 2	Retrofit Fixtures with LED Lamps	62,154	18.9	0.0	$7,456.18	$47,477.70	$8,590.00	$38,887.70	5.2	62,588
ECM 3	Install LED Exit Signs	846	0.1	0.0	$101.52	$1,505.77	$0.00	$1,505.77	14.8	852
Lighting Control Measures		**13,486**	**4.1**	**0.0**	**$1,617.85**	**$8,468.00**	**$1,460.00**	**$7,008.00**	**4.3**	**13,581**
ECM 4	Install Occupancy Sensor Lighting Controls	13,486	4.1	0.0	$1,617.85	$8,468.00	$1,460.00	$7,008.00	4.3	13,581
Motor Upgrades		**2,489**	**2.4**	**0.0**	**$298.54**	**$6,078.72**	**$0.00**	**$6,078.72**	**20.4**	**2,506**
ECM 5	Premium Efficiency Motors	2,489	2.4	0.0	$298.54	$6,078.72	$0.00	$6,078.72	20.4	2,506
Electric Unitary HVAC Measures		**14,263**	**11.9**	**0.0**	**$1,711.02**	**$35,909.28**	**$2,208.00**	**$33,701.28**	**19.7**	**14,363**
ECM 6	Install High Efficiency Electric AC	14,263	11.9	0.0	$1,711.02	$35,909.28	$2,208.00	$33,701.28	19.7	14,363
Domestic Water Heating Upgrade		**4,578**	**0.0**	**0.0**	**$549.21**	**$107.55**	**$0.00**	**$107.55**	**0.2**	**4,610**
ECM 7	Install Low-Flow Domestic Hot Water Devices	4,578	0.0	0.0	$549.21	$107.55	$0.00	$107.55	0.2	4,610
TOTALS		**109,802**	**43.9**	**0.0**	**$13,172.19**	**$127,339.23**	**$16,968.00**	**$110,371.23**	**8.4**	**110,569**

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

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

4.1.1 Lighting Upgrades

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

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**74,986**	**25.4**	**0.0**	**$8,995.56**	**$76,775.68**	**$13,300.00**	**$63,475.68**	**7.1**	**75,510**
ECM 1	Install LED Fixtures	11,986	6.4	0.0	$1,437.86	$27,792.21	$4,710.00	$23,082.21	16.1	12,070
ECM 2	Retrofit Fixtures with LED Lamps	62,154	18.9	0.0	$7,456.18	$47,477.70	$8,590.00	$38,887.70	5.2	62,588
ECM 3	Install LED Exit Signs	846	0.1	0.0	$101.52	$1,505.77	$0.00	$1,505.77	14.8	852

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	2,961	0.9	0.0	$355.24	$5,561.01	$75.00	$5,486.01	15.4	2,982
Exterior	9,025	5.5	0.0	$1,082.62	$22,231.20	$4,635.00	$17,596.20	16.3	9,088

Measure Description

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

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

ECM 2: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	62,154	18.9	0.0	$7,456.18	$47,477.70	$8,590.00	$38,887.70	5.2	62,588
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

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

ECM 3: Install LED Exit Signs

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	846	0.1	0.0	$101.52	$1,505.77	$0.00	$1,505.77	14.8	852
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

We recommend replacing all compact fluorescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.

4.1.2 Lighting Control Measures

Our recommendations for 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_2e Emissions Reduction (lbs)
Lighting Control Measures		**13,486**	**4.1**	**0.0**	**$1,617.85**	**$8,468.00**	**$1,460.00**	**$7,008.00**	**4.3**	**13,581**
ECM 4	Install Occupancy Sensor Lighting Controls	13,486	4.1	0.0	$1,617.85	$8,468.00	$1,460.00	$7,008.00	4.3	13,581

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

ECM 4: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
13,486	4.1	0.0	$1,617.85	$8,468.00	$1,460.00	$7,008.00	4.3	13,581

Measure Description

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

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

4.1.3 Motor Upgrades

Our recommendations for motor upgrades are summarized in Figure 19 below.

Figure 19 – Summary of Motor Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**2,489**	**2.4**	**$298.54**	**$6,078.72**	**$0.00**	**$6,078.72**	**20.4**	**2,506**
ECM 5	Premium Efficiency Motors	2,489	2.4	$298.54	$6,078.72	$0.00	$6,078.72	20.4	2,506

ECM 5: Premium Efficiency Motors

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,489	2.4	0.0	$298.54	$6,078.72	$0.00	$6,078.72	20.4	2,506

Measure Description

We recommend replacing standard efficiency motors with *NEMA Premium™* efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor's current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

4.1.4 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 20 below.

Figure 20 - Summary of Unitary HVAC ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**14,263**	**11.9**	**0.0**	**$1,711.02**	**$35,909.28**	**$2,208.00**	**$33,701.28**	**19.7**	**14,363**
ECM 6	Install High Efficiency Electric AC	14,263	11.9	0.0	$1,711.02	$35,909.28	$2,208.00	$33,701.28	19.7	14,363

ECM 6: Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
14,263	11.9	0.0	$1,711.02	$35,909.28	$2,208.00	$33,701.28	19.7	14,363

Measure Description

We recommend replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

4.1.5 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 21 below.

Figure 21 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**4,578**	**0.0**	**0.0**	**$549.21**	**$107.55**	**$0.00**	**$107.55**	**0.2**	**4,610**
ECM 7	Install Low-Flow Domestic Hot Water Devices	4,578	0.0	0.0	$549.21	$107.55	$0.00	$107.55	0.2	4,610

ECM 7: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
4,578	0.0	0.0	$549.21	$107.55	$0.00	$107.55	0.2	4,610

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators and low-flow showerheads can reduce hot water usage, relative to standard showerheads and aerators, which saves energy. Low-flow devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day 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 many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

Close Doors and Windows

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Turn Off Unneeded Motors

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Reducing run hours for these motors can result in significant energy savings. Whenever possible, use automatic devices such as twist timers or occupancy sensors to ensure that motors are turned off when not needed.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Replace Computer Monitors

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

Water Conservation

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

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

Refer to Section 4.1.5 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

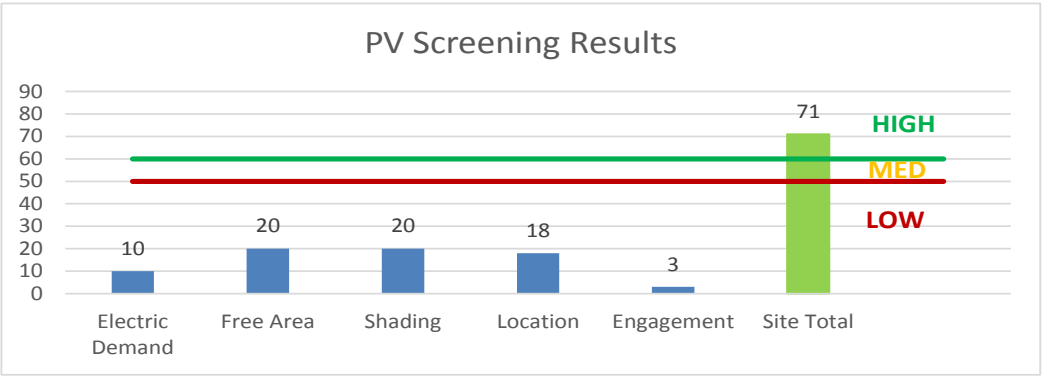
6.1 Photovoltaic

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

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.

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear to meet these minimum criteria for cost-effective PV installation.

Figure 22 - Photovoltaic Screening



Potential	High	
System Potential	135	kW DC STC
Electric Generation	160,835	kWh/yr
Displaced Cost	$13,990	/yr
Installed Cost	$351,000	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (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 developed new solar projects 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

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

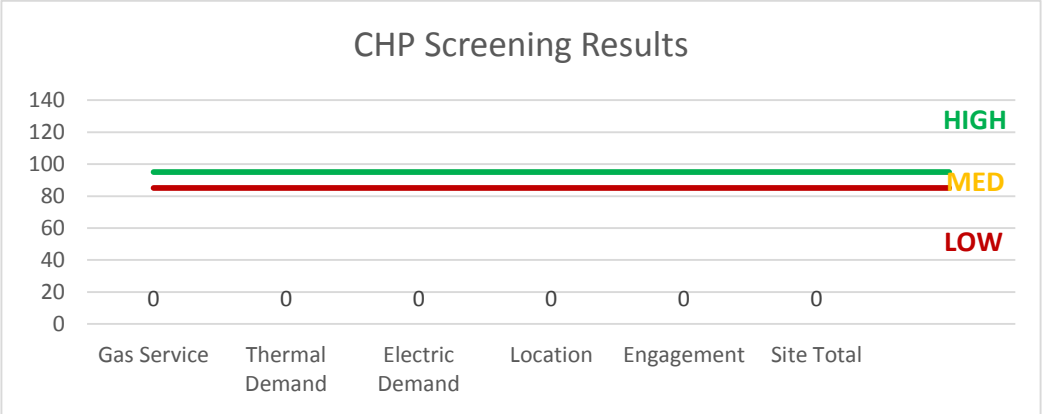
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

Figure 23 - Combined Heat and Power Screening



7 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 24 for a list of the eligible programs identified for each recommended ECM.

Figure 24 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install
ECM 1	Install LED Fixtures	x		x
ECM 2	Retrofit Fixtures with LED Lamps	x		x
ECM 3	Install LED Exit Signs			x
ECM 4	Install Occupancy Sensor Lighting Controls	x		x
ECM 5	Premium Efficiency Motors			x
ECM 6	Install High Efficiency Electric AC	x		x
ECM 7	Install Low-Flow Domestic Hot Water Devices			x

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors.

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

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

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 from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: www.njcleanenergy.com/SSB.

7.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with a peak electric demand that does not exceed 200 kW for any recent 12-month period. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

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

How to Participate

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

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

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

7.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) 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.

7.4 Energy Savings Improvement Program

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

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

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

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

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

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

8 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

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.15	497	0.0	$59.59	$409.50	$70.00	5.70
Main Corridor	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.46	1,524	0.0	$182.88	$1,110.50	$190.00	5.03
Storage Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.22	717	0.0	$86.06	$584.00	$100.00	5.62
CST Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,870	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,309	0.19	631	0.0	$75.74	$496.53	$100.00	5.24
CST Room	1	Incandescent: 60W A Lamp	Wall Switch	60	1,870	Fixture Replacement	No	1	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,870	0.03	110	0.0	$13.16	$63.65	$5.00	4.46
CST Conference Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.11	359	0.0	$43.03	$350.00	$60.00	6.74
Restroom	1	Incandescent: 60W A Lamp	Wall Switch	60	1,870	Fixture Replacement	No	1	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,870	0.03	110	0.0	$13.16	$63.65	$5.00	4.46
Kitchen	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.35	1,135	0.0	$136.21	$936.00	$160.00	5.70
Kitchen	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.01	38	0.0	$4.51	$35.90	$5.00	6.84
Kitchen	2	Incandescent: 60W A Lamp	Wall Switch	60	1,870	Fixture Replacement	No	2	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,870	0.07	219	0.0	$26.31	$127.30	$10.00	4.46
Multipurpose Room	10	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	1,870	Relamp	No	10	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,870	0.41	1,333	0.0	$159.95	$951.33	$200.00	4.70
Multipurpose Room	4	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	4	LED Exit Signs: 2 W Lamp	None	6	8,760	0.02	242	0.0	$29.00	$430.22	$0.00	14.83
Storage Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.14	448	0.0	$53.79	$408.50	$70.00	6.29
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.01	38	0.0	$4.51	$35.90	$5.00	6.84
Storage Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,870	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,870	0.04	120	0.0	$14.45	$95.13	$20.00	5.20
Room 250 - Main Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,309	0.10	335	0.0	$40.14	$368.80	$20.00	8.69
Room 250 - Main Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,870	0.19	639	0.0	$76.62	$451.20	$90.00	4.71
Room 250 - Main Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.04	142	0.0	$17.03	$117.00	$20.00	5.70
Room 250A	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.08	269	0.0	$32.27	$266.40	$50.00	6.71
Room 250B	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.16	538	0.0	$64.55	$416.80	$80.00	5.22
Room 251	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.08	269	0.0	$32.27	$266.40	$50.00	6.71
Corridor - Front Entrance	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.06	213	0.0	$25.54	$175.50	$30.00	5.70
Corridor - Front Entrance	4	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	53	1,870	Relamp	No	4	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,870	0.07	237	0.0	$28.38	$246.80	$60.00	6.58
Corridor - Front Entrance	1	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	60	0.0	$7.25	$107.56	$0.00	14.83
Room 252 - Nurse Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,870	0.16	532	0.0	$63.85	$376.00	$75.00	4.71

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 252 - Nurse Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.02	71	0.0	$8.51	$58.50	$10.00	5.70
Room 109	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Custodian Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.05	179	0.0	$21.52	$233.00	$40.00	8.97
Boys Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,309	0.06	188	0.0	$22.55	$259.60	$40.00	9.74
Room 107	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Room 105	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Room 103	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Room 100	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.66	2,152	0.0	$258.19	$1,319.20	$260.00	4.10
Room 100	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,870	0.08	249	0.0	$29.93	$252.80	$0.00	8.45
Room 100	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.01	38	0.0	$4.51	$35.90	$5.00	6.84
Room 100	2	Incandescent: 60W A Lamp	Wall Switch	60	1,870	Fixture Replacement	No	2	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	9	1,870	0.07	219	0.0	$26.31	$127.30	$10.00	4.46
Room 100C	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.04	135	0.0	$16.14	$191.20	$35.00	9.68
Art Supply Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.03	90	0.0	$10.76	$174.50	$30.00	13.43
Room 324	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,309	0.10	335	0.0	$40.14	$368.80	$20.00	8.69
Room 325	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.11	359	0.0	$43.03	$350.00	$60.00	6.74
Room 104	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Room 106	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Room 108	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Corridor - Middle	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.22	710	0.0	$85.13	$585.00	$100.00	5.70
Corridor - Middle	1	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	60	0.0	$7.25	$107.56	$0.00	14.83
Corridor - Gym Wing	17	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	No	17	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,870	0.55	1,810	0.0	$217.09	$1,278.40	$255.00	4.71
Corridor - Gym Wing	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,870	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,870	0.04	138	0.0	$16.51	$192.80	$40.00	9.25
Corridor - Gym Wing	13	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	13	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.15	489	0.0	$58.69	$466.70	$65.00	6.84
Corridor - Gym Wing	2	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	121	0.0	$14.50	$215.11	$0.00	14.83
Corridor - Gym Wing	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

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Girls Restroom	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,309	0.06	188	0.0	$22.55	$259.60	$40.00	9.74
Room D21	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Music Room	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.53	1,749	0.0	$209.78	$1,093.60	$215.00	4.19
Room 104A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.05	179	0.0	$21.52	$233.00	$40.00	8.97
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.12	404	0.0	$48.41	$341.60	$65.00	5.71
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.12	404	0.0	$48.41	$341.60	$65.00	5.71
Room 153	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.33	1,076	0.0	$129.09	$717.60	$140.00	4.47
Room 154 - Band Room	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,870	0.06	187	0.0	$22.44	$189.60	$0.00	8.45
Room 154 - Band Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.25	807	0.0	$96.82	$567.20	$110.00	4.72
Room 150A	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.11	359	0.0	$43.03	$350.00	$60.00	6.74
Room 150B	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.08	269	0.0	$32.27	$266.40	$50.00	6.71
Room 113	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.55	1,794	0.0	$215.16	$1,286.00	$220.00	4.95
Room 113	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,309	0.06	188	0.0	$22.55	$259.60	$40.00	9.74
Room 113	2	Incandescent: 60W A Lamp	Wall Switch	60	1,870	Fixture Replacement	Yes	2	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	9	1,309	0.07	231	0.0	$27.71	$243.30	$30.00	7.70
Gymnasium	12	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	1,870	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,309	0.62	2,049	0.0	$245.80	$1,257.60	$260.00	4.06
Gymnasium	2	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	121	0.0	$14.50	$215.11	$0.00	14.83
Gymnasium	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 Restroom	1	Incandescent: 60W A Lamp	Wall Switch	60	1,870	Fixture Replacement	Yes	1	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	9	1,309	0.04	115	0.0	$13.85	$179.65	$25.00	11.16
Boys Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,309	0.04	141	0.0	$16.91	$223.70	$35.00	11.16
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,309	0.04	141	0.0	$16.91	$223.70	$35.00	11.16
Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.01	38	0.0	$4.51	$35.90	$5.00	6.84
Room 120	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	None	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.07	225	0.0	$26.93	$116.00	$20.00	3.56
Room 114	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.41	1,345	0.0	$161.37	$993.50	$170.00	5.10
Room 115	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.41	1,345	0.0	$161.37	$993.50	$170.00	5.10
Room 119	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.41	1,345	0.0	$161.37	$993.50	$170.00	5.10

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 118	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.41	1,345	0.0	$161.37	$993.50	$170.00	5.10
Room 116	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.41	1,345	0.0	$161.37	$993.50	$170.00	5.10
Room 111	1	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.00	60	0.0	$7.25	$107.56	$0.00	14.83
Room 117	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.41	1,345	0.0	$161.37	$993.50	$170.00	5.10
Corridor	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.06	213	0.0	$25.54	$175.50	$30.00	5.70
Corridor	31	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	No	31	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,870	1.01	3,300	0.0	$395.87	$2,331.20	$465.00	4.71
Corridor	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
Room 312	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 313	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 311	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 310	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 309	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 308	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 314	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.25	807	0.0	$96.82	$567.20	$110.00	4.72
Room 315	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.25	807	0.0	$96.82	$567.20	$110.00	4.72
Room 316	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.33	1,076	0.0	$129.09	$717.60	$140.00	4.47
Room 317	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.33	1,076	0.0	$129.09	$717.60	$140.00	4.47
Closet	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.12	404	0.0	$48.41	$341.60	$65.00	5.71
Room 306	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 307	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.49	1,614	0.0	$193.64	$1,018.40	$200.00	4.23
Room 320	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.37	1,211	0.0	$145.23	$792.80	$155.00	4.39
Room 321	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.37	1,211	0.0	$145.23	$792.80	$155.00	4.39
Room 322	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.16	538	0.0	$64.55	$416.80	$80.00	5.22
Room 323	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.16	538	0.0	$64.55	$416.80	$80.00	5.22
Boys Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.08	269	0.0	$32.27	$266.40	$50.00	6.71

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Girls Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.12	404	0.0	$48.41	$341.60	$65.00	5.71
Room 304 - Computer Room	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,309	0.27	897	0.0	$107.58	$701.00	$120.00	5.40
Men Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.01	38	0.0	$4.51	$35.90	$5.00	6.84
Women Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,870	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,870	0.01	38	0.0	$4.51	$35.90	$5.00	6.84
Library	21	Compact Fluorescent: 13W 2-pin	Wall Switch	13	1,870	Fixture Replacement	No	21	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	5	1,870	0.11	361	0.0	$43.34	$1,336.67	$0.00	30.84
Library	21	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	21	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.86	2,825	0.0	$338.87	$1,695.20	$335.00	4.01
Library	13	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	Yes	13	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,309	0.33	1,088	0.0	$130.46	$937.60	$20.00	7.03
Library	2	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	Wall Switch	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Library - Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.21	673	0.0	$80.68	$492.00	$95.00	4.92
Room 302 - Faculty Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.33	1,076	0.0	$129.09	$717.60	$140.00	4.47
Room 300	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.25	807	0.0	$96.82	$567.20	$110.00	4.72
Room 301	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,870	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,309	0.25	807	0.0	$96.82	$567.20	$110.00	4.72
Exterior Perimeter	6	Metal Halide: (1) 150W Lamp	Daylight Dimming	190	935	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	0.65	1,064	0.0	$127.70	$2,344.06	$600.00	13.66
Exterior Perimeter	17	Metal Halide: (1) 175W Lamp	Daylight Dimming	215	935	Fixture Replacement	No	17	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	2.12	3,473	0.0	$416.64	$6,641.51	$1,700.00	11.86
Exterior Perimeter	21	Metal Halide: (1) 100W Lamp	Daylight Dimming	128	935	Fixture Replacement	No	21	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	15	935	1.56	2,552	0.0	$306.10	$8,204.22	$2,100.00	19.94
Exterior Perimeter	2	Metal Halide: (1) 250W Lamp	Daylight Dimming	295	935	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Daylight Dimming	25	935	0.35	581	0.0	$69.66	$781.35	$200.00	8.35
Walkway Pole Light	7	Metal Halide: (1) 175W Lamp	Daylight Dimming	215	935	Fixture Replacement	No	7	LED - Fixtures: Downlight Pendant	Daylight Dimming	35	935	0.83	1,355	0.0	$162.53	$4,260.06	$35.00	26.00
Walkway Pole Light	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	35	935	None	No	1	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Daylight Dimming	35	935	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Multipurpose Room	6	Incandescent: 150W Spot Light	Wall Switch	150	1,870	Fixture Replacement	No	6	LED - Fixtures: Downlight Pendant	Wall Switch	25	1,870	0.49	1,613	0.0	$193.49	$3,651.48	$30.00	18.72
Main Corridor	3	Exit Signs: Fluorescent	None	12	8,760	Fixture Replacement	No	3	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	181	0.0	$21.75	$322.67	$0.00	14.83
Room 305 - Mechanical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,870	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,870	0.06	213	0.0	$25.54	$175.50	$30.00	5.70

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Boilers	2	Combustion Air Fan	0.8	77.0%	No	1,040	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	School Building	3	Heating Hot Water Pump	10.0	82.3%	Yes	750	Yes	91.7%	No		1.55	1,568	0.0	$188.10	$4,030.65	$0.00	21.43
Boiler Room	School Building	1	Heating Hot Water Pump	10.0	78.5%	Yes	750	Yes	91.7%	No		0.76	769	0.0	$92.31	$1,343.55	$0.00	14.55
Boiler Room	Boilers	2	Other	0.5	65.0%	No	1,040	Yes	78.2%	No		0.11	151	0.0	$18.13	$704.52	$0.00	38.86
Boiler Room	Boilers	2	Heating Hot Water Pump	1.5	84.0%	No	1,040	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Multipurpose Room	Multipurpose Room	2	Return Fan	1.0	82.0%	No	1,040	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	Gymnasium HV1, HV2	2	Supply Fan	5.0	84.0%	No	1,040	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
School	School Building	41	Other	0.3	77.0%	No	1,040	No	77.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof Top	Main Office	2	Split-System AC	1.00		Yes	2	Split-System AC	1.00		14.00		No	1.00	1,189	0.0	$142.59	$2,992.44	$184.00	19.70
Roof Top	Main Office	2	Split-System AC	3.00		Yes	2	Split-System AC	3.00		14.00		No	2.99	3,566	0.0	$427.76	$8,977.32	$552.00	19.70
Roof Top	School Building	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	Classrooms	4	Split-System AC	3.50		Yes	4	Split-System AC	3.50		14.00		No	6.97	8,320	0.0	$998.10	$20,947.08	$1,288.00	19.70
Roof Top	Classrooms	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.50	594	0.0	$71.29	$1,496.22	$92.00	19.70
Roof Top	Classrooms	2	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	Corridor	1	Packaged AC	5.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	Corridor	1	Packaged AC	8.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	School Building	1	Packaged AC	12.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	School Building	1	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	Classrooms	1	Packaged AC	6.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	Music Room	1	Split-System AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	School Building	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof Top	School Building	1	Split-System AC	1.00		Yes	1	Split-System AC	1.00		14.00		No	0.50	594	0.0	$71.29	$1,496.22	$92.00	19.70

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	High School & Middle School	1	Non-Condensing Hot Water Boiler	3,982.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Boiler Room	High School & Middle School	1	Non-Condensing Hot Water Boiler	3,982.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

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

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
School	15	Faucet Aerator (Lavatory)	2.20	1.00	0.00	4,578	0.0	$549.21	$107.55	$0.00	0.20

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

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

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Boiler Room	1	Electric Unit heater	2,200.0	No
Kitchen	3	Refrigerator	44.0	Yes
Kitchen	5	Refrigerator	258.0	Yes
Kitchen	1	Refrigerator	372.0	Yes
Kitchen	1	Electric Food warmer	1,250.0	Yes
Room 100C	1	Science Lab Equipment	1,100.0	No
School	93	Desktop LCD Computer	125.0	Yes
School	88	Desktop Non LCD Computer	175.0	No
School	5	Small Freezer	85.0	Yes
School	7	Microwave	1,000.0	No
School	21	Small Printer	46.0	Yes
School	2	Copy Machine	900.0	Yes
School	4	Printer	125.0	Yes
School	4	Refrigerator	185.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Arthur Stanlick Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 65,304
Built: 1962

For Year Ending: August 31, 2016
Date Generated: April 25, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Arthur Stanlick Elementary School 121B East Shawnee Trail Wharton, New Jersey 07885	Jefferson Township Public Schools 31 Route 181 Lake Hopatcong, NJ 07849 (____)____-_____	Rita Giacchi 31 Route 181 Lake Hopatcong, NJ 07849 (973) 663-3387 rgiacchi@jefftwp.org

Property ID: 5845404

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
72 kBtu/ft²

Source EUI
123.8 kBtu/ft²

Annual Energy by Fuel	
Propane (kBtu)	3,018 (0%)
Electric - Grid (kBtu)	1,566,588 (33%)
Fuel Oil (No. 2) (kBtu)	3,130,806 (67%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	78
National Median Source EUI (kBtu/ft²)	134.2
% Diff from National Median Source EUI	-8%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	412

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)