Local Government Energy Audit:
Energy Audit Report

Livingston Senior

Community Center

Township of Livingston

204 Hillside Ave

Livingston, NJ 07039

June 20, 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 saving are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

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

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

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

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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 Livingston Senior Community Center.

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

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

1.1 Facility Summary

Livingston Senior Community Center is a 45,614 square foot facility comprised of two floors and various space types. The building was originally constructed in 2002 and houses offices as well as meeting and recreational areas.

Lighting consists of aging and inefficient lighting and HVAC equipment is in need of replacement. The facility is all electric with the exception of a back-up generator that is natural gas. According to facility staff, this natural gas connection was installed for the backup generation only and cannot support additional load from the building. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated six measures which together represent an opportunity for Livingston Senior Community Center to reduce annual energy costs by $17,649 and annual greenhouse gas emissions by 144,617 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 6.9 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 Livingston Senior Community Center's annual energy use by 16%.

Figure 1 – Previous 12 Month Utility Costs

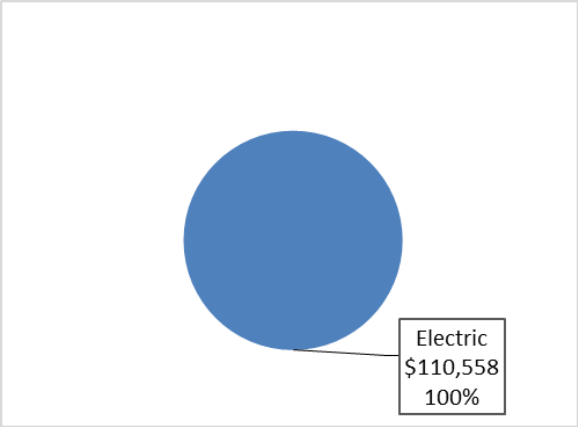
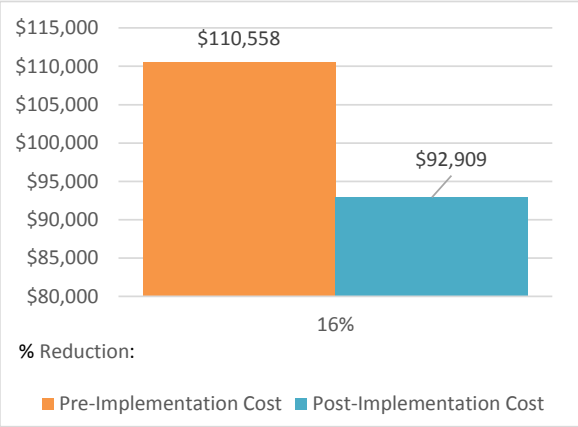


Figure 2 – Potential Post-Implementation Costs



A detailed description of Livingston Senior Community Center's existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**121,311**	**25.8**	**0.0**	**$14,908.49**	**$118,122.59**	**$11,530.00**	**$106,592.59**	**7.1**	**122,159**
ECM 1	Install LED Fixtures	Yes	14,733	2.9	0.0	$1,810.67	$41,519.07	$3,250.00	$38,269.07	21.1	14,836
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	103,221	22.2	0.0	$12,685.34	$75,394.00	$8,220.00	$67,174.00	5.3	103,943
ECM 3	Retrofit Fixtures with LED Lamps	Yes	3,356	0.7	0.0	$412.48	$1,209.52	$60.00	$1,149.52	2.8	3,380
Lighting Control Measures			**2,651**	**0.5**	**0.0**	**$325.81**	**$4,860.00**	**$630.00**	**$4,230.00**	**13.0**	**2,670**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	2,651	0.5	0.0	$325.81	$4,860.00	$630.00	$4,230.00	13.0	2,670
Domestic Water Heating Upgrade			**19,651**	**0.0**	**0.0**	**$2,414.95**	**$10,193.59**	**$0.00**	**$10,193.59**	**4.2**	**19,788**
ECM 5	Install High Efficiency Heat Pump Water Heater	Yes	6,016	0.0	0.0	$739.32	$10,000.00	$0.00	$10,000.00	13.5	6,058
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	13,635	0.0	0.0	$1,675.63	$193.59	$0.00	$193.59	0.1	13,730
TOTALS			**143,613**	**26.3**	**0.0**	**$17,649.25**	**$133,176.18**	**$12,160.00**	**$121,016.18**	**6.9**	**144,617**

* - 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.

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

- Reduce Air Leakage
- Close Doors and Windows
- Perform Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Install Destratification Fans
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and seal Duct Leakage
- Perform Water Heater Maintenance

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 Livingston Senior Community Center. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Pay for Performance - Existing Building (P4P EB)
- Energy Savings Improvement Program (ESIP)

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

Larger facilities with an interest in a more comprehensive whole building approach to energy conservation should consider participating in the Pay for Performance (P4P) program. Projects eligible for this project program must meet minimum savings requirements. Final incentives are calculated based on actual measured performance achieved at the end of the project. The application process is more involved, and it requires working with a qualified P4P contractor, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

Additional information on relevant incentive programs is located in Section 8 or: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Russell A. Jones	Deputy Township Manager	rjones@livingstonnj.org	(973) 992-5000
Designated Representative			
Esther Lin	Intern	intern2@livingstonnj.org	(973) 992-5000 x5305
TRC Energy Services			
Ignacio Badilla	Auditor	Auditor	(732) 855-0033

2.2 General Site Information

On March 30, 2017, TRC performed an energy audit at Livingston Senior Community Center located in Livingston, New Jersey. TRC's team met with Frank DeNick to review the facility operations and help focus our investigation on specific energy-using systems.

Livingston Senior Community Center is a 45,614 square foot facility constructed in 2002. The facility is a standalone two-story building with offices on the second floor and multipurpose rooms, art studios and classrooms in the first floor.

The building was constructed in 2002. Most of the facility's lighting, primarily T8 troffers, are original to the building. The heating and cooling are original to the building as well and provided by three rooftop units with VAV boxes and electric heat.

2.3 Building Occupancy

The offices are open Monday through Friday and the community areas are open every day. The typical schedule is presented in the table below. The entire facility is used year round by the community. During a typical day, the facility is occupied by approximately 125 staff and visitors.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Community Center Upstairs	Weekday	8AM - 4:30 PM
Community Center Upstairs	Weekend	Closed
Community Center Downstairs	Weekday	8AM - 10PM
Community Center Downstairs	Weekend	8AM - 4:30 PM

2.4 Building Envelope

The facility is constructed of concrete block and structural steel with a brick facade. The building has a flat roof covered with black membrane that is in good condition. The building's insulation could not be verified onsite, and no drawings were available.

The building has low-E double pane windows with aluminum frames. The windows are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of aluminum with insulation or glass panels. The doors and weatherstripping were found to be in good condition without excessive air leakage.

2.5 On-Site Generation

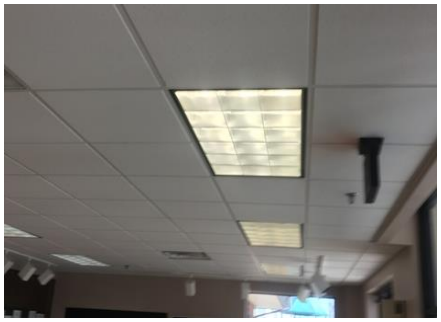
Livingston Senior Community Center installed a 20.28 kW solar energy project in 2012. The project included photovoltaic (PV) arrays on the roof of the facility. There are 79 panels in total.

EMSA Solar, a national power-purchase agreement provider, was the financier of these solar energy systems.

2.6 Energy-Using Systems

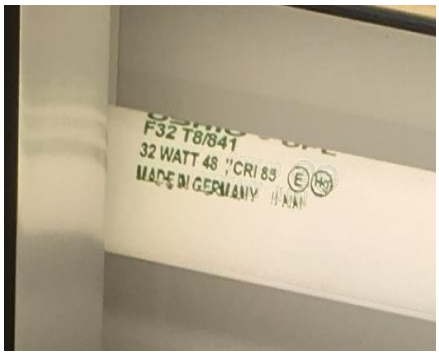
Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

Lighting System



Lighting is mostly provided by 32-Watt linear fluorescent T8 lamps with electronic ballasts as well as some compact fluorescent lamps (CFL). Most of the fixtures are 2-lamp or 3-lamp, 4-foot long troffers with diffusers. There are some LED highhats located in the multipurpose rooms along with a small amount of incandescent lamps.

Lighting control in some spaces is provided by occupancy sensors. The occupancy sensors are either wall or ceiling mounted depending on the space layout. Stairwells, elevator lobbies and main lobby areas do not contain any occupancy sensors and are on 24 hours a day throughout the year.



The building's exterior lighting is minimal and consists primarily of metal halide fixtures that are controlled by photocells.

Direct Expansion Air Conditioning System (DX)

The facility is cooled by three packaged units, each with a VAV system:

- one 60-ton packaged system serves the second floor area
- one 70-ton packaged system serves the first floor area
- one 12-ton unit serves the classrooms.

There are approximately 45 VAV boxes that were counted while on site. The VAV boxes are powered with fans and an electric heater. This is the main source of heating for the facility.

There are approximately 45 thermal zones that can be controlled independently via control system and was programmed with occupied and unoccupied setpoints. Facility staff reported the heating system to be somewhat undersized, however.

The rooftop units are approximately 15 years old and have some useful life left. Replacing them as well as all the VAV boxes would fall under a capital improvement project, though a heat pump VRV system could provide savings.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of one Lochinvar 250 gallon electric storage water heater with a total of 108 kW of heating elements. The water heater supplies hot water to the restrooms as well as the kitchen areas of the facility.

Refrigeration

The facility has one commercial freezer and one commercial refrigerator located in the kitchen area. There is minimal food preparation done.

Building Plug Load

There are 45 computer work stations throughout the facility. Ninety percent of the computers are desktop units with LCD monitors. However, most are set to enter sleep mode after a period of inactivity.

2.7 Water-Using Systems

There are two large restrooms at this facility. Faucets are rated for 2.2 gallons per minute (gpm) or higher, toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity was analyzed to identify opportunities for savings. In addition, data for electricity 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 3.3 for additional information.

3.1 Total Cost of Energy

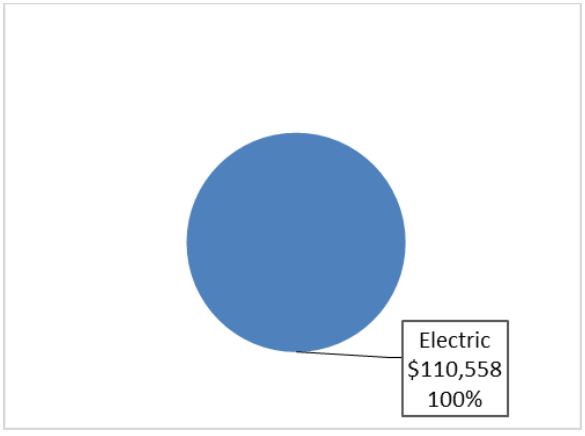
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Livingston Senior Community Center		
Fuel	**Usage**	**Cost**
Electricity	899,619 kWh	$110,558
Total		**$110,558**

The current annual energy cost for this facility is $110,558 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was $0.123/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 facility is billed for demand and has a peak of 241 kW which occurs during the winter months due to the electric resistance heat. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

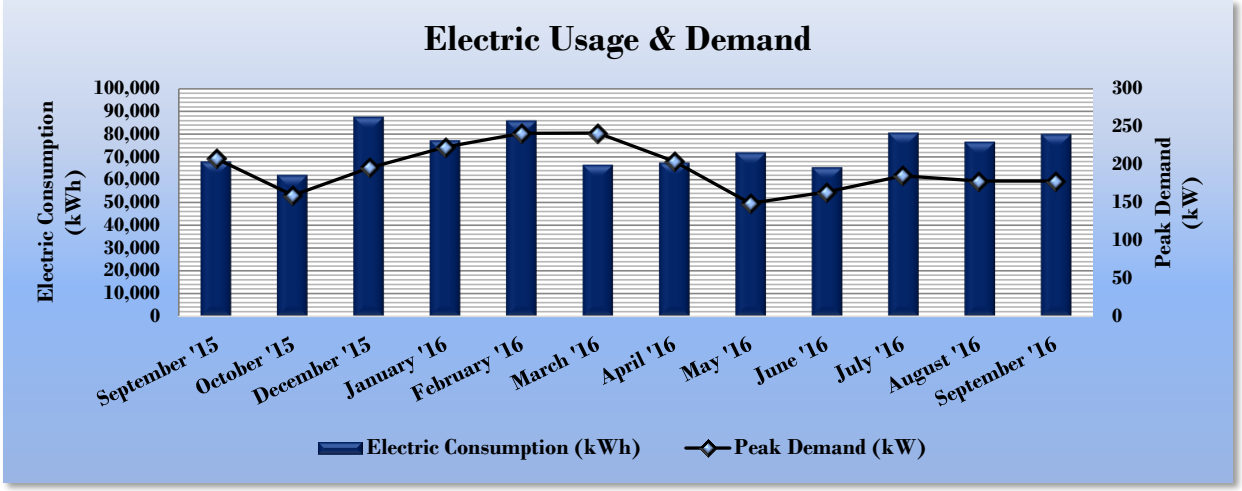


Figure 9 - Electric Usage & Demand

Electric Billing Data for Livingston Senior Community Center					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
9/29/15	29	68,000	208		$8,561
10/30/15	32	62,080	159		$7,660
12/31/15	30	87,680	196		$8,454
2/1/16	32	77,280	223		$9,674
3/1/16	29	85,920	241		$10,719
3/31/16	29	66,560	241		$8,609
4/30/16	29	67,520	204		$8,505
6/1/16	33	72,000	149		$8,761
6/28/16	28	65,440	164		$8,132
7/28/16	30	80,640	185		$10,251
8/26/16	29	76,640	178		$9,772
9/26/16	31	80,000	178		$10,249
Totals	**361**	**889,760**	**241.4**	**$0**	**$109,347**
Annual	**365**	**899,619**	**241.4**	**$0**	**$110,558**

3.3 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 10 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Livingston Senior Community Center	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/ft^2)	211.3	148.1
Site Energy Use Intensity (kBtu/ft^2)	67.3	67.3

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

Figure 11 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Livingston Senior Community Center	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/ft^2)	177.6	148.1
Site Energy Use Intensity (kBtu/ft^2)	56.6	67.3

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75% of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is not one of the building categories that are eligible to receive a score. This building type does not currently qualify to receive a score as community centers are not currently one of the eligible building types.

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

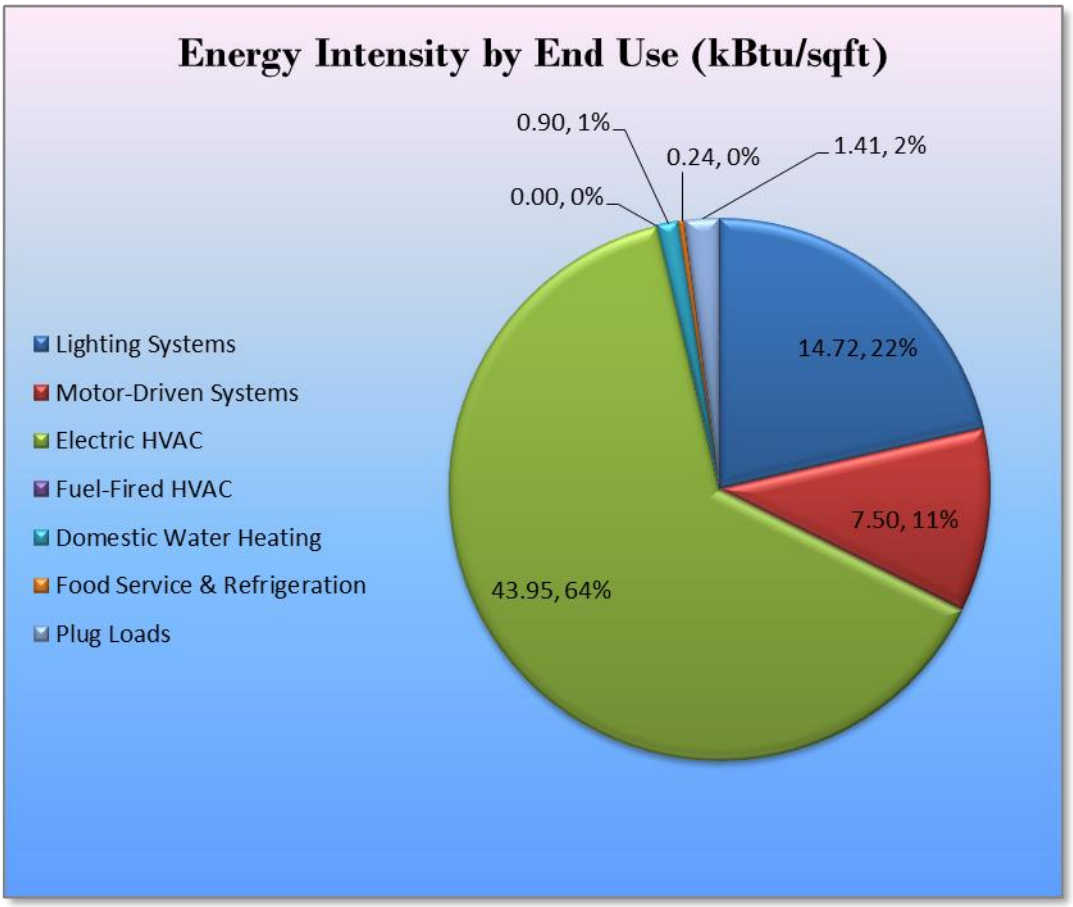
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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.

3.4 Energy End-Use Breakdown

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

Figure 12 - 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 Livingston Senior Community Center regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 13 – 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		**121,311**	**25.8**	**0.0**	**$14,908.49**	**$118,122.59**	**$11,530.00**	**$106,592.59**	**7.1**	**122,159**
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ECM 3	Retrofit Fixtures with LED Lamps	3,356	0.7	0.0	$412.48	$1,209.52	$60.00	$1,149.52	2.8	3,380
Lighting Control Measures		**2,651**	**0.5**	**0.0**	**$325.81**	**$4,860.00**	**$630.00**	**$4,230.00**	**13.0**	**2,670**
ECM 4	Install Occupancy Sensor Lighting Controls	2,651	0.5	0.0	$325.81	$4,860.00	$630.00	$4,230.00	13.0	2,670
Domestic Water Heating Upgrade		**19,651**	**0.0**	**0.0**	**$2,414.95**	**$10,193.59**	**$0.00**	**$10,193.59**	**4.2**	**19,788**
ECM 5	Install High Efficiency Heat Pump Water Heater	6,016	0.0	0.0	$739.32	$10,000.00	$0.00	$10,000.00	13.5	6,058
ECM 6	Install Low-Flow Domestic Hot Water Devices	13,635	0.0	0.0	$1,675.63	$193.59	$0.00	$193.59	0.1	13,730
TOTALS		**143,613**	**26.3**	**0.0**	**$17,649.25**	**$133,176.18**	**$12,160.00**	**$121,016.18**	**6.9**	**144,617**

* - 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 14 below.

Figure 14 – 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		**121,311**	**25.8**	**0.0**	**$14,908.49**	**$118,122.59**	**$11,530.00**	**$106,592.59**	**7.1**	**122,159**
ECM 1	Install LED Fixtures	14,733	2.9	0.0	$1,810.67	$41,519.07	$3,250.00	$38,269.07	21.1	14,836
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	103,221	22.2	0.0	$12,685.34	$75,394.00	$8,220.00	$67,174.00	5.3	103,943
ECM 3	Retrofit Fixtures with LED Lamps	3,356	0.7	0.0	$412.48	$1,209.52	$60.00	$1,149.52	2.8	3,380

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0
Exterior	14,733	2.9	0.0	$1,810.67	$41,519.07	$3,250.00	$38,269.07	21.1	14,836

Measure Description

We recommend replacing existing fixtures containing fluorescent, HID, and 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 ten times longer than many incandescent lamps.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	103,221	22.2	0.0	$12,685.34	$75,394.00	$8,220.00	$67,174.00	5.3	103,943
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

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

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	3,356	0.7	0.0	$412.48	$1,209.52	$60.00	$1,149.52	2.8	3,380
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 ten times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 15 below.

Figure 15 – 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		**2,651**	**0.5**	**0.0**	**$325.81**	**$4,860.00**	**$630.00**	**$4,230.00**	**13.0**	**2,670**
ECM 4	Install Occupancy Sensor Lighting Controls	2,651	0.5	0.0	$325.81	$4,860.00	$630.00	$4,230.00	13.0	2,670

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)
2,651	0.5	0.0	$325.81	$4,860.00	$630.00	$4,230.00	13.0	2,670

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 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 16 below.

Figure 16 - 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		**19,651**	**0.0**	**0.0**	**$2,414.95**	**$10,193.59**	**$0.00**	**$10,193.59**	**4.2**	**19,788**
ECM 5	Install High Efficiency Heat Pump Water Heater	6,016	0.0	0.0	$739.32	$10,000.00	$0.00	$10,000.00	13.5	6,058
ECM 6	Install Low-Flow Domestic Hot Water Devices	13,635	0.0	0.0	$1,675.63	$193.59	$0.00	$193.59	0.1	13,730

ECM 5: Install High Efficiency Heat Pump Water Heater

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)
6,016	0.0	0.0	$739.32	$10,000.00	$0.00	$10,000.00	13.5	6,058

Measure Description

We recommend replacing the existing tank water heater with a high efficiency heat pump tank water heater. Heat pump water heaters move heat from one place to another and can therefore be two to three times more efficient than the electric resistance water heater that is currently in place.

ECM 6: 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)
13,635	0.0	0.0	$1,675.63	$193.59	$0.00	$193.59	0.1	13,730

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 can reduce hot water usage, relative to standard aerators, which saves energy.

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

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

Perform Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

Install Destratification Fans

Allowing air to thermally stratify in spaces with high ceilings results in additional energy consumption by requiring the heating system to heat a volume of space much larger than the actual occupied space. Additional inefficiencies also occur because there are higher temperatures at the ceiling level than at the floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, requiring additional energy consumption by the heating equipment in order to compensate for the accelerated heat transfer.

Destratification fans are specially designed to deliver a columnar, laminar flow of air balancing the air temperature from floor to ceiling. In addition to fuel savings, the use of destratification fans will reduce the recovery time necessary to warm the space after nightly temperature setbacks and will increase the comfort level of the occupants.

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.

Check for and Seal Duct Leakage

Duct leakage in commercial buildings typically accounts for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building, significantly increasing cooling and heating costs. By sealing sources of leakage, cooling, heating, and ventilation energy use can be reduced significantly, depending on the severity of air leakage.

Perform 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.

6 On-Site Generation Measures

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

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

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

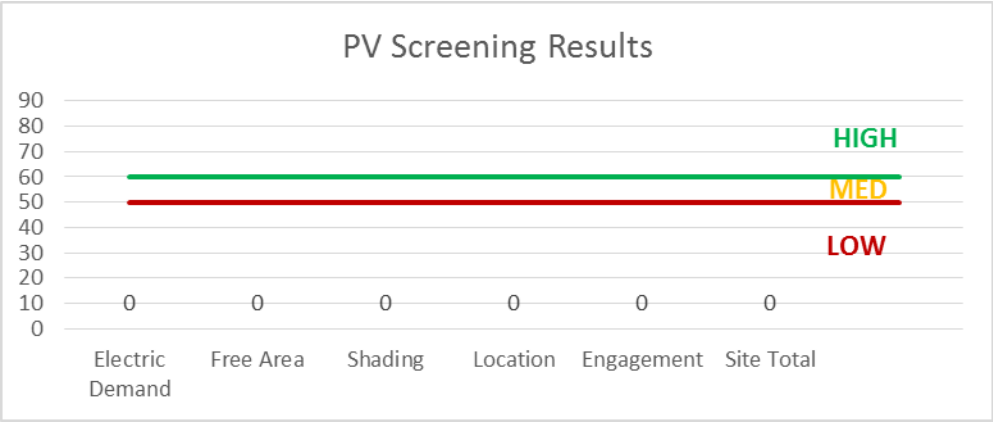
6.1 Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a low potential for installing a PV array.

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 not meet these minimum criteria for cost-effective PV installation.

Figure 17 - Photovoltaic Screening



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

- **Basic Info on Solar PV in NJ**: http://www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-esources/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.

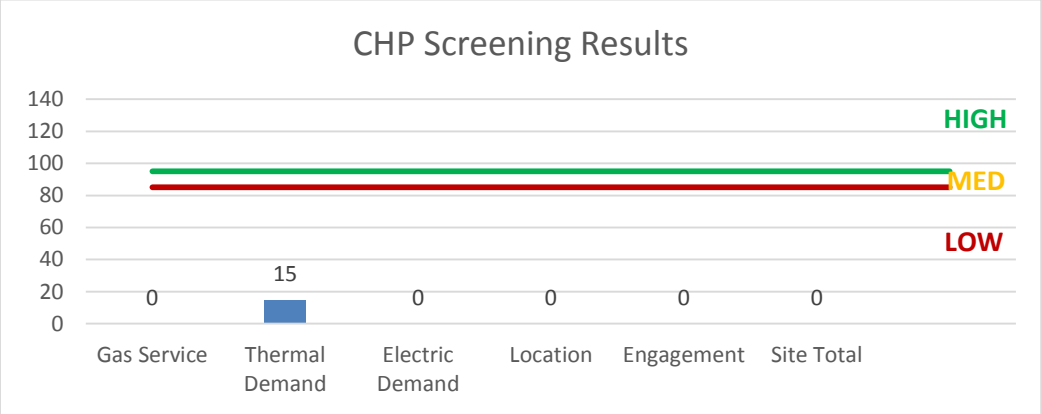
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste 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.

In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation, mainly due to lack of gas service and heating distribution system.

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 18 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 19 for a list of the eligible programs identified for each recommended ECM.

Figure 19 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x			x		
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	x			x		
ECM 3	Retrofit Fixtures with LED Lamps	x			x		
ECM 4	Install Occupancy Sensor Lighting Controls	x			x		
ECM 5	Install High Efficiency Heat Pump Water Heater	x			x		
ECM 6	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. The Pay for Performance (P4P) program is a "whole-building" energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants.

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

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

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Pay for Performance - Existing Buildings

Overview

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

Incentives

Incentives are calculated based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

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

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

8.3 Demand Response Energy Aggregator

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

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

See Section 7 for additional information.

8.4 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.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Top Entrance Lobby	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.24	1,222	0.0	$150.13	$789.00	$90.00	4.66
Top Entrance	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.12	611	0.0	$75.07	$394.50	$45.00	4.66
Lobby	16	Compact Fluorescent: Track Lights	Wall Switch	23	3,640	Relamp	No	16	LED Screw-In Lamps: track lights	Wall Switch	14	3,640	0.12	592	0.0	$72.79	$623.28	$0.00	8.56
left hallway	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.72	3,665	0.0	$450.39	$2,367.00	$270.00	4.66
storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.03	136	0.0	$16.68	$117.00	$10.00	6.41
electrical	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.17	858	0.0	$105.39	$855.00	$85.00	7.31
221	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.10	515	0.0	$63.24	$621.00	$65.00	8.79
mens	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	713	0.0	$87.58	$657.50	$75.00	6.65
womens	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	713	0.0	$87.58	$657.50	$75.00	6.65
halway	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.36	1,832	0.0	$225.20	$1,183.50	$135.00	4.66
office	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	15	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.60	3,054	0.0	$375.33	$1,972.50	$225.00	4.66
side office	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54
side office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54
rear office 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54
rear office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54
Heath open office	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.32	1,629	0.0	$200.17	$1,052.00	$120.00	4.66
rear office 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.15	772	0.0	$94.86	$664.50	$80.00	6.16
rear office 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	3,640	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,548	0.02	87	0.0	$10.67	$377.00	$45.00	31.13
rear office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54
front office	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	NO	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.36	1,832	0.0	$225.20	$1,183.50	$135.00	4.66
recreation dept	30	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	30	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	1.21	6,108	0.0	$750.65	$3,945.00	$450.00	4.66
recreation dept	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.03	136	0.0	$16.68	$117.00	$10.00	6.41
216	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54
215	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.10	515	0.0	$63.24	$533.00	$65.00	7.40
214	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.20	1,029	0.0	$126.47	$796.00	$95.00	5.54

	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
213	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.10	515	0.0	$63.24	$533.00	$65.00	7.40
218	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.10	515	0.0	$63.24	$533.00	$65.00	7.40
217	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.08	285	0.0	$35.03	$263.00	$30.00	6.65
219	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.16	814	0.0	$100.09	$526.00	$60.00	4.66
212	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.16	814	0.0	$100.09	$526.00	$60.00	4.66
211	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.08	407	0.0	$50.04	$263.00	$30.00	4.66
hallway	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	3,640	0.14	716	0.0	$87.96	$702.00	$0.00	7.98
file room	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.04	204	0.0	$25.02	$131.50	$15.00	4.66
219	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.08	285	0.0	$35.03	$263.00	$30.00	6.65
open office	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	16	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.64	3,258	0.0	$400.35	$2,104.00	$240.00	4.66
main downstairs hallway	25	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	25	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	1.01	5,090	0.0	$625.54	$3,287.50	$375.00	4.66
nurse	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.16	814	0.0	$100.09	$526.00	$60.00	4.66
side office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.08	407	0.0	$50.04	$263.00	$30.00	4.66
side office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.08	407	0.0	$50.04	$263.00	$30.00	4.66
tahaney2	12	LED - Fixtures: Downlight Recessed	Wall Switch	15	3,640	None	No	12	LED - Fixtures: Downlight Recessed	Wall Switch	15	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
tahaney2	36	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	36	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	1.45	7,330	0.0	$900.78	$4,734.00	$540.00	4.66
107	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.32	1,629	0.0	$200.17	$1,052.00	$120.00	4.66
T-3	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	24	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.97	4,886	0.0	$600.52	$3,156.00	$360.00	4.66
T-3	8	LED - Fixtures: Downlight Recessed	Wall Switch	15	3,640	None	No	8	LED - Fixtures: Downlight Recessed	Wall Switch	15	3,640	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
104	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.16	570	0.0	$70.06	$702.00	$60.00	9.16
103	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.08	285	0.0	$35.03	$263.00	$30.00	6.65
142	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.16	570	0.0	$70.06	$702.00	$60.00	9.16
102	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.08	407	0.0	$50.04	$263.00	$30.00	4.66
eletrical room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.21	760	0.0	$93.41	$936.00	$80.00	9.16
office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.05	190	0.0	$23.35	$234.00	$20.00	9.16

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
storage	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.27	950	0.0	$116.77	$1,170.00	$100.00	9.16
hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.24	1,222	0.0	$150.13	$789.00	$90.00	4.66
elevator room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.05	271	0.0	$33.36	$234.00	$20.00	6.41
141	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.03	172	0.0	$21.08	$387.00	$45.00	16.22
janitors	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.03	95	0.0	$11.68	$117.00	$10.00	9.16
mens room	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.28	998	0.0	$122.61	$920.50	$105.00	6.65
womens	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.28	998	0.0	$122.61	$920.50	$105.00	6.65
132	39	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	39	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	1.05	3,706	0.0	$455.40	$4,563.00	$390.00	9.16
140	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,640	0.05	271	0.0	$33.36	$234.00	$20.00	6.41
131	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	9	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.36	1,832	0.0	$225.20	$1,183.50	$135.00	4.66
hallway	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	11	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.44	2,240	0.0	$275.24	$1,446.50	$165.00	4.66
130	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.24	1,222	0.0	$150.13	$789.00	$90.00	4.66
storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.08	407	0.0	$50.04	$263.00	$30.00	4.66
127	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.32	1,629	0.0	$200.17	$1,052.00	$120.00	4.66
126	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.24	1,222	0.0	$150.13	$789.00	$90.00	4.66
125	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.24	1,222	0.0	$150.13	$789.00	$90.00	4.66
124	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.24	1,222	0.0	$150.13	$789.00	$90.00	4.66
T-1	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	24	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.97	4,886	0.0	$600.52	$3,156.00	$360.00	4.66
T-1	12	Incandescent: HighHat	Wall Switch	75	3,640	Relamp	No	12	LED Screw-In Lamps: Par30	Wall Switch	19	3,640	0.55	2,764	0.0	$339.69	$586.24	$60.00	1.55
117	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.16	814	0.0	$100.09	$526.00	$60.00	4.66
electrical	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.16	814	0.0	$100.09	$526.00	$60.00	4.66
116	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.10	515	0.0	$63.24	$533.00	$65.00	7.40
115	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.08	285	0.0	$35.03	$263.00	$30.00	6.65
118	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.15	772	0.0	$94.86	$664.50	$80.00	6.16
113	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	15	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.60	3,054	0.0	$375.33	$1,972.50	$225.00	4.66

	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
preschool hall	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	No	12	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,640	0.48	2,443	0.0	$300.26	$1,578.00	$180.00	4.66
office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.08	285	0.0	$35.03	$263.00	$30.00	6.65
office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,548	0.05	190	0.0	$23.35	$234.00	$20.00	9.16
241	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.24	855	0.0	$105.09	$789.00	$90.00	6.65
class1	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.44	1,568	0.0	$192.67	$1,446.50	$165.00	6.65
class1	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
bath1	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
bath2	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
class 2	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.40	1,425	0.0	$175.15	$1,315.00	$150.00	6.65
bath1	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
bath2	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
pantry	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.16	570	0.0	$70.06	$526.00	$60.00	6.65
bathroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,640	Relamp & Reballast	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.05	257	0.0	$31.62	$401.50	$50.00	11.12
class 12	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.48	1,710	0.0	$210.18	$1,578.00	$180.00	6.65
bathroom1	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
bathroom2	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.04	143	0.0	$17.52	$131.50	$15.00	6.65
hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.08	285	0.0	$35.03	$263.00	$30.00	6.65
playroom	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	2,548	Relamp & Reballast	No	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,548	0.44	1,568	0.0	$192.67	$1,446.50	$165.00	6.65
exterior	8	Metal Halide: (1) 70W Lamp	None	95	3,640	Fixture Replacement	No	8	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	35	3,640	0.39	1,974	0.0	$242.64	$3,125.42	$800.00	9.58
exterior	8	Metal Halide: (1) 100W Lamp	None	128	3,640	Fixture Replacement	No	8	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	35	3,640	0.61	3,060	0.0	$376.09	$15,623.94	$800.00	39.42
exterior	9	Metal Halide: (1) 200W Lamp	None	232	3,640	Fixture Replacement	No	9	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	None	70	3,640	1.19	5,997	0.0	$737.01	$17,576.94	$900.00	22.63
exterior	15	Metal Halide: (1) 70W Lamp	None	95	3,640	Fixture Replacement	No	15	LED - Fixtures: Outdoor Pole/Arm-Mounted Decorative Fixture	None	35	3,640	0.73	3,702	0.0	$454.94	$5,192.78	$750.00	9.77

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
roof	second floor	1	Supply Fan	30.0	93.0%	No	1,000	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
roof	second floor	1	Return Fan	7.5	91.0%	no	1,000	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
roof	first floor	1	Supply Fan	30.0	91.0%	No	1,000	No	91.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
roof	first floor	1	Return Fan	10.0	93.0%	No	1,000	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
throughout	throughout	45	Supply Fan	0.5	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
exhaust fans	roof	2	Exhaust Fan	1.5	75.0%	no	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
exhaust fans	roof	1	Exhaust Fan	0.2	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
elevator	elevator mechanical	1	Other	20.0	75.0%	No	3,391	No	75.0%	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	2nd floor	1	Packaged AC	60.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	first floor	1	Packaged AC	70.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Classrooms	1	Packaged AC	12.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
interior	interior	45	Electric Forced Air Furnace		50.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	All Building	1	Storage Tank Water Heater (> 50 Gal)	Yes	1	Heat Pump Water Heater	Electric	200.00%	COP	0.00	6,016	0.0	$739.32	$10,000.00	$0.00	13.53

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
Bathrooms	27	Faucet Aerator (Lavatory)	2.20	1.00	0.00	13,635	0.0	$1,675.63	$193.59	$0.00	0.12

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
lower level kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
lower level kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	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?
computers	40	computers	200.0	yes
offices	2	Refrigerator	350.0	yes
offices	3	copy machine	250.0	yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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N/A

ENERGY STAR® Score[1]

Livingston Senior Community Center

Primary Property Type: Social/Meeting Hall
Gross Floor Area (ft²): 45,614
Built: 2005

For Year Ending: July 31, 2016
Date Generated: October 03, 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
Livingston Senior Community Center
204 Hillside Ave
Livingston, New Jersey 07039

Property Owner
_____
,
(___)___-_____

Primary Contact
Ignacio Badilla
1430 Broadway 10th Floor
New York, NY 10018
2015721187
ibadilla@trcsolutions.com

Property ID: 5861218

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
61.3 kBtu/ft²

Source EUI
192.4 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	2,795,421 (100%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	22.2
National Median Source EUI (kBtu/ft²)	69.8
% Diff from National Median Source EUI	176%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	310

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)