



Local Government Energy Audit: Energy Audit Report



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Montclair High School

Montclair Board of Education

100 Chestnut Street
Montclair, New Jersey 07402

January 3, 2019

Final Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPUB) has sponsored this Local Government Energy Audit (LGEA) Report for Montclair High School.

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

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

I.1 Facility Summary

Montclair High School is a 262,855 square foot facility constructed in 1914. The building is a four-story educational facility including but not limited to classrooms, library areas, offices, hallways and auditorium.

Lighting at the facility consists mainly of 32-Watt T8 fluorescent fixtures with a few 40-Watt T12 fluorescent fixtures; all of which are inefficient in performance when compared to the latest lighting technology available in the market. In addition to linear fluorescent technology, the facility also has several circular T9 fluorescent, incandescent, as well as LED lamps. Exterior lighting is provided by a combination of 175-Watt and 400-Watt metal halide fixtures, 400-Watt high pressure sodium, incandescent, and linear fluorescent fixtures. Interior lighting control is provided by a combination of manual switches and occupancy sensors.

Cooling and ventilation is provided by rooftop packaged air conditioning (AC), window AC, and split system AC systems. Heating hot water is provided by three non-condensing hot water boilers.

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

I.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated nine measures and recommended eight measures which together represent an opportunity for Montclair High School to reduce annual energy costs by roughly \$53,673 and annual greenhouse gas emissions by 383,419 lbs CO₂e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 4.5 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 Montclair High School's annual energy use by 12%.

Figure 1 – Previous 12 Month Utility Costs

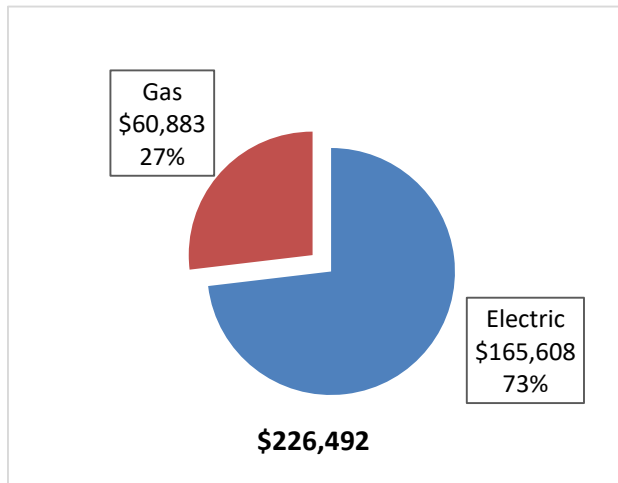
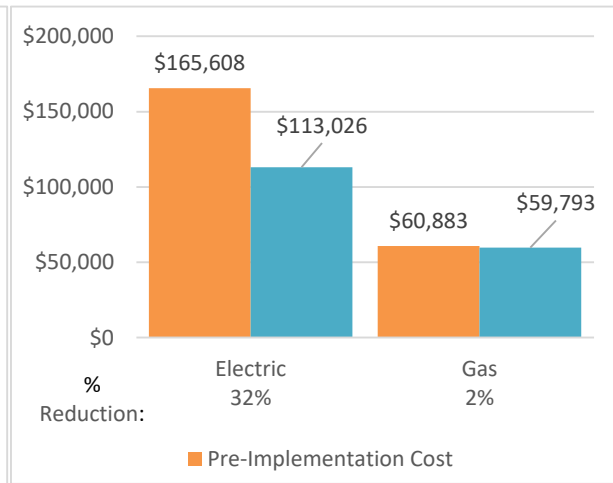


Figure 2 – Potential Post-Implementation Costs



A detailed description of Montclair High School’s existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure	Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades										
ECM 1 Install LED Fixtures	Yes	67,721	10.7	0.0	\$9,747.39	\$60,143.64	\$8,360.00	\$51,783.64	5.3	68,194
ECM 2 Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	1,168	0.3	0.0	\$168.04	\$989.00	\$50.00	\$939.00	5.6	1,176
ECM 3 Retrofit Fixtures with LED Lamps	Yes	222,256	51.0	0.0	\$31,990.33	\$141,543.38	\$24,780.00	\$116,763.38	3.6	223,810
ECM 4 Install LED Exit Signs	Yes	6,850	0.4	0.0	\$986.00	\$3,656.87	\$0.00	\$3,656.87	3.7	6,898
Lighting Control Measures										
ECM 5 Install Occupancy Sensor Lighting Controls	Yes	45,728	10.4	0.0	\$6,581.77	\$59,796.00	\$7,470.00	\$52,326.00	8.0	46,047
Variable Frequency Drive (VFD) Measures										
ECM 6 Install VFDs on Hot Water Pumps	Yes	14,929	1.9	0.0	\$2,148.84	\$9,827.55	\$0.00	\$9,827.55	4.6	15,034
Gas Heating (HVAC/Process) Replacement										
Install High Efficiency Hot Water Boilers	No	0	0.0	812.9	\$6,677.78	\$186,907.92	\$20,088.00	\$166,819.92	25.0	95,184
Domestic Water Heating Upgrade										
ECM 7 Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	132.8	\$1,090.55	\$6,072.40	\$0.00	\$6,072.40	5.6	15,544
Plug Load Equipment Control - Vending Machine										
ECM 8 Vending Machine Control	Yes	6,669	0.0	0.0	\$959.90	\$1,610.00	\$0.00	\$1,610.00	1.7	6,716
TOTALS FOR ALL RECOMMENDED MEASURES		365,320	74.8	132.8	\$53,672.83	\$283,638.84	\$40,660.00	\$242,978.84	4.5	383,419
TOTALS FOR ALL MEASURES		365,320	74.8	945.7	\$60,350.60	\$470,546.76	\$60,748.00	\$409,798.76	6.8	478,603

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

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

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

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

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient than usage of a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

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

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlet when not in use.

Energy Efficient Practices

TRC also identified seven 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 Montclair High School include:

- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Boiler Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

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

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	342	kW DC STC
Electric Generation	407,448	kWh/yr
Displaced Cost	\$58,650	/yr
Installed Cost	\$889,200	

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

I.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)
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- 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.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Emidio D'Andrea	Business Administrator	edandrea@montclair.k12.nj.us	(973) 509-4050
John Eschmann	Director of Facilities	jeschmann@montclair.k12.nj.us	(973) 509-4044
Designated Representative			
Matthew Wolchko	Project Architect	mwolchko@planetpsa.com	(973) 586-2400
TRC Energy Services			
Tom Page	Auditor	tpag@TRCsolutions.com	(732) 855-0033

2.2 General Site Information

On November 08, 2016, TRC performed an energy audit at Montclair High School located in Montclair, New Jersey. TRC's team met with John Eschmann to review the facility operations and help focus our investigation on specific energy-using systems.

Montclair High School is a 262,855 square foot facility constructed in 1914. The building is a four-story educational facility including but not limited to classrooms, library areas, offices, hallways and auditorium.

Lighting at the facility consists mainly of 32-Watt T8 fluorescent fixtures with a few 40-Watt T12 fluorescent fixtures; all of which are inefficient in performance when compared to the latest lighting technology available in the market. In addition to linear fluorescent technology, the facility also has several circular T9 fluorescent, incandescent, as well as LED lamps. Exterior lighting is provided by a combination of 175-Watt and 400-Watt metal halide fixtures, 400-Watt high pressure sodium, incandescent, and linear fluorescent fixtures. Interior lighting control is provided by a combination of manual switches and occupancy sensors.

Cooling and ventilation is provided by rooftop packaged AC, window AC, and split system AC systems. Heating hot water is provided by three non-condensing hot water boilers.

2.3 Building Occupancy

The typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Montclair High School	Weekday	7:00 am - 3:30 pm
Montclair High School	Weekend	CLOSED

2.4 Building Envelope

Montclair High School is a four-story building. The construction is of concrete masonry block with brick exterior and double pane clear windows with operable frames. The flat roof is constructed of built-up roofing material.

Figure 7 – Building Façade



2.5 On-Site Generation

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

Figure 8 – Photovoltaic Potential

Potential	High	
System Potential	342	kW DC STC
Electric Generation	407,448	kWh/yr
Displaced Cost	\$58,650	/yr
Installed Cost	\$889,200	

2.6 Energy-Using Systems

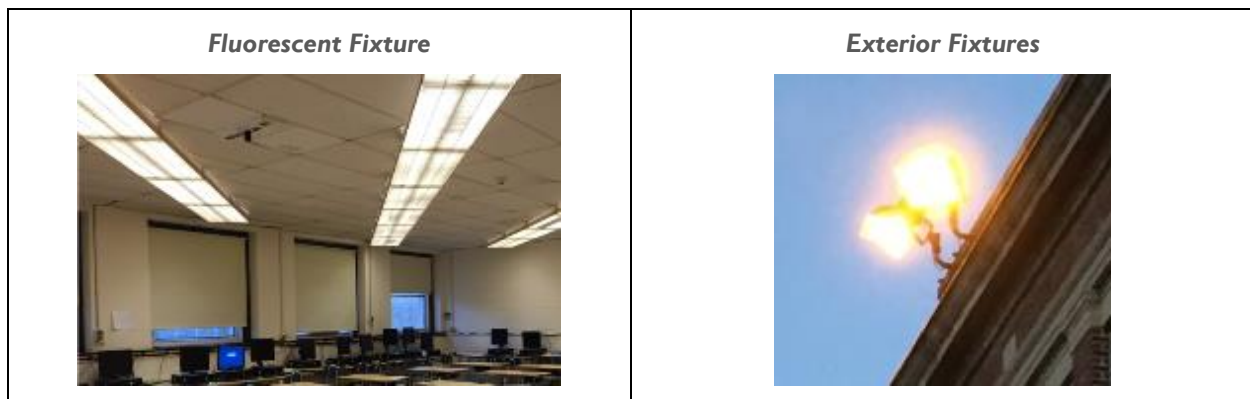
Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

Lighting System

Lighting at Montclair High School consists mainly of 32-Watt T8 fluorescent fixtures with a few 40-Watt T12 fluorescent fixtures. These sources are inefficient in performance when compared to the latest lighting technology available in the market. Linear fluorescent fixtures are 2-foot, 4-foot, or 8-foot long, mainly troffers with diffusers having 1, 2, 3, or 4-lamp configurations. In addition to the fluorescent fixtures, the facility is also served by 60-Watt, 75-Watt, 100-Watt, and 125-Watt incandescent lamps. In addition to linear fluorescent and incandescent lamps, the facility also has LED linear tubes and screw-in lamps. A majority of the exit signs are incandescent based fixtures.

Interior lighting control in the building is provided by a combination of manual switches and occupancy sensors.

Figure 9 - Building Lighting Systems

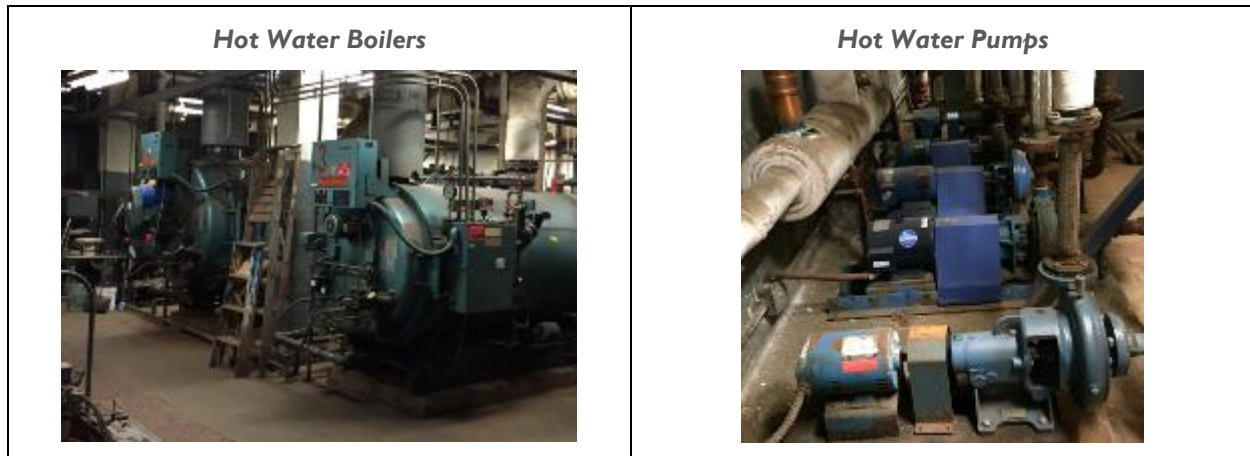


Exterior lighting is provided by a combination of 175-Watt and 400-Watt metal halide fixtures, 400-Watt high pressure sodium, 60-Watt and 100-Watt incandescent, and 32-Watt T8 linear fluorescent fixtures.

Hot Water Heating System

The hot water system consists of three Cleaver-Brooks 3,348 kBtu/hr output, non-condensing hot water boilers. The boilers have a nominal combustion efficiency of 80%. The boilers are configured in a constant flow primary distribution with three hot water pumps. Each boiler is supplied by a dedicated 5 hp pump. Baseboard heaters provide heating to the zones. The boilers are in good condition and well maintained.

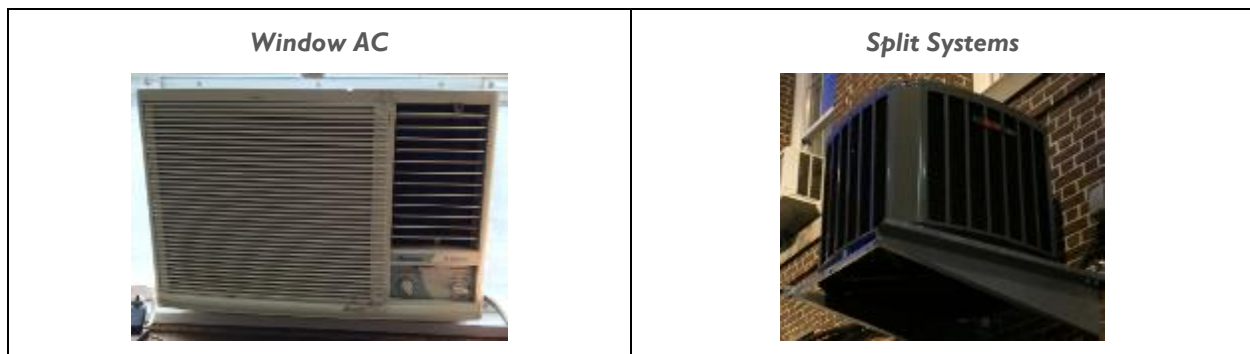
Figure 10 – Hot Water Systems



Direct Expansion Air Conditioning System (DX)

The facility also has several window AC units with capacities ranging between 0.42 ton and 1.71 tons. There are three rooftop package units having capacities between 1-ton and 15-tons. In addition to the window AC units and package units, facility also has several 2-ton and 5-ton split system AC units.

Figure 11 – DX Air Conditioning System



Domestic Hot Water Heating System

The domestic hot water is supplied by the same three Cleaver-Brooks heating hot water boilers by way of a heat exchanger.

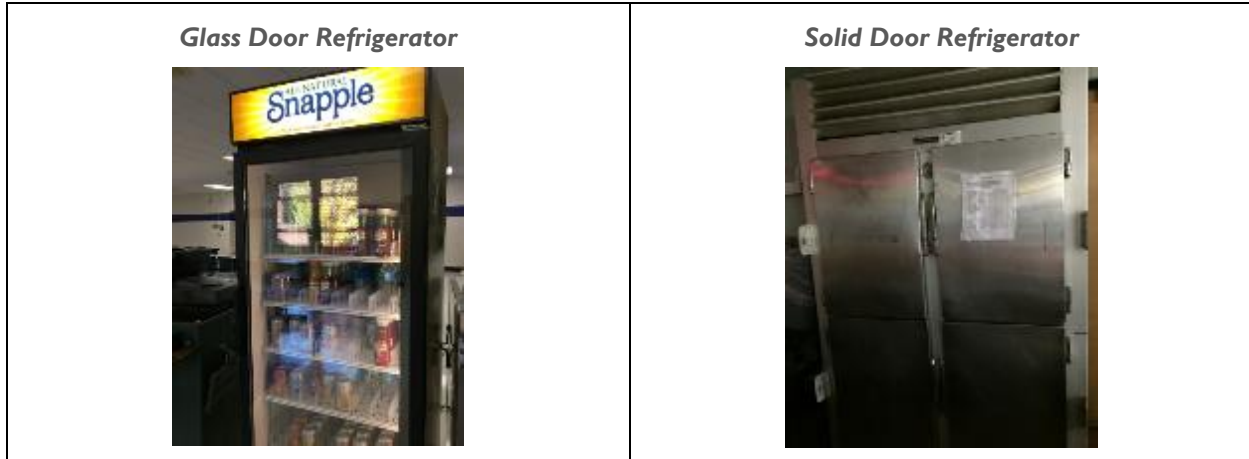
Food Service Equipment

The facility has two full sized gas convection ovens which uses approximately 126 MMBtu gas per year.

Refrigeration

The facility has four stand up refrigerators with glass door and eight stand up refrigerators with solid doors. Volume of the standard refrigerators range between 5 cu. ft. and 50 cu. ft.

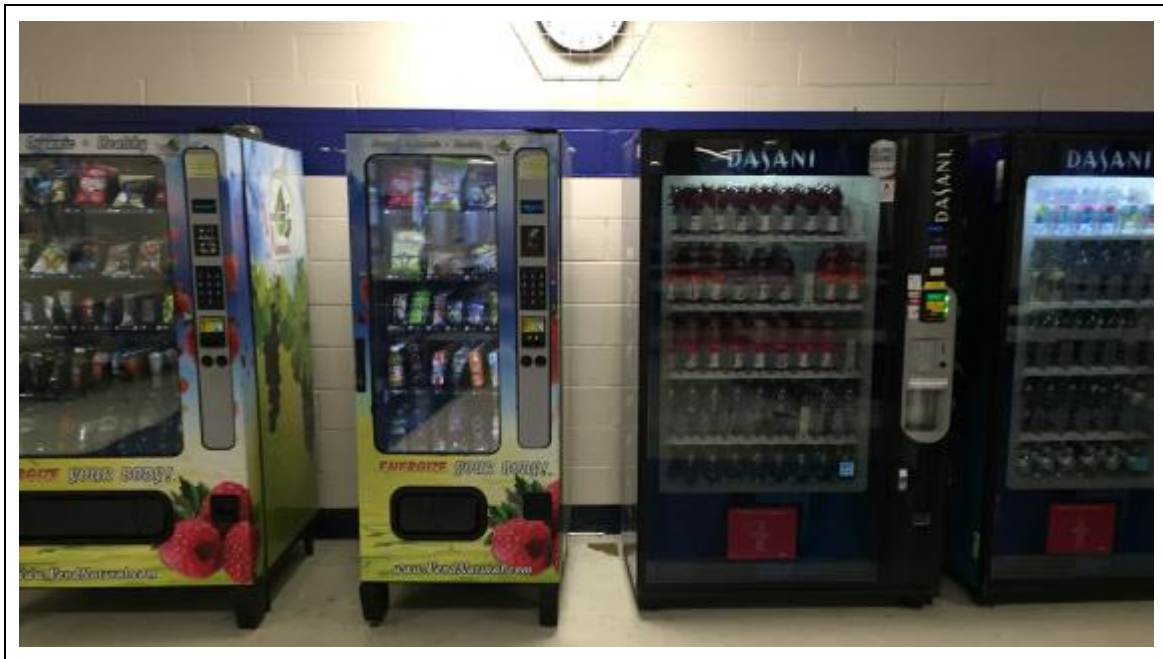
Figure 12 – Refrigeration System



Building Plug Load

There are roughly 310 computer work stations throughout the facility. All the computers are desktop units with LCD monitors. There is no centralized PC power management software installed.

Figure 13 – Vending Machines



The facility contains other systems which contribute to plug load including printers, microwaves, and televisions. In addition to the typical plug load equipment, the facility also has refrigerated and non-refrigerated vending machines.

2.7 Water-Using Systems

Facility has several locker rooms with a total of 68 showerheads with flow rates of 3.8 gallons per minute (gpm).

3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

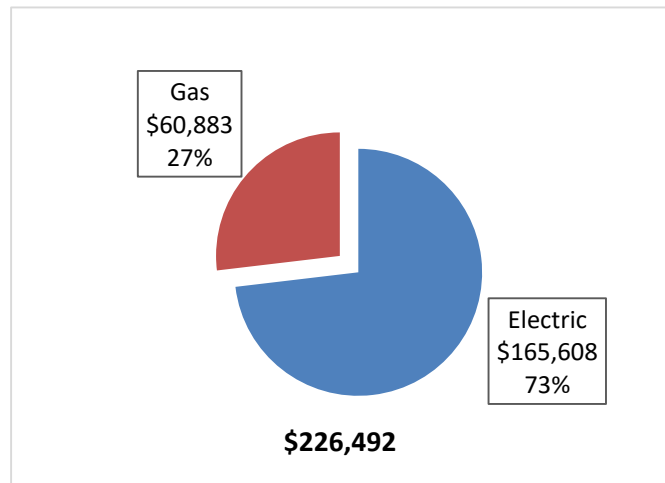
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 14 - Utility Summary

Utility Summary for Montclair High School		
Fuel	Usage	Cost
Electricity	1,150,579 kWh	\$165,608
Natural Gas	74,117 Therms	\$60,883
Total		\$226,492

The current annual energy cost for this facility is \$226,492 as shown in the chart below.

Figure 15 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was \$0.144/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 16 - Electric Usage & Demand

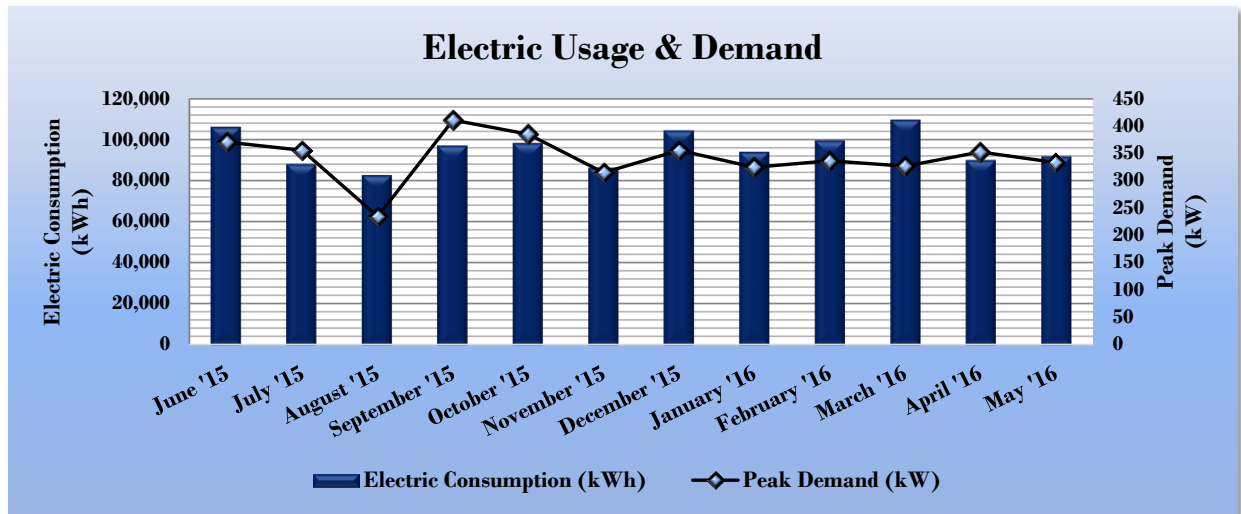


Figure 17 - Electric Usage & Demand

Electric Billing Data for Montclair High School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
6/16/15	32	106,128	371	\$18,170	No
7/20/15	34	87,980	356	\$15,676	No
8/17/15	28	82,671	234	\$13,396	No
9/15/15	29	96,977	411	\$17,107	No
10/14/15	29	98,211	385	\$13,592	No
11/12/15	29	86,293	315	\$11,847	No
12/15/15	33	104,378	356	\$13,818	No
1/15/16	31	93,956	324	\$12,039	No
2/16/16	32	99,546	337	\$12,522	No
3/16/16	29	109,550	327	\$13,660	No
4/14/16	29	90,007	353	\$11,603	No
5/13/16	29	91,730	333	\$11,725	No
Totals	364	1,147,427	411.1	\$165,155	0
Annual	365	1,150,579	411.1	\$165,608	

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is \$0.821/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 18 - Natural Gas Usage

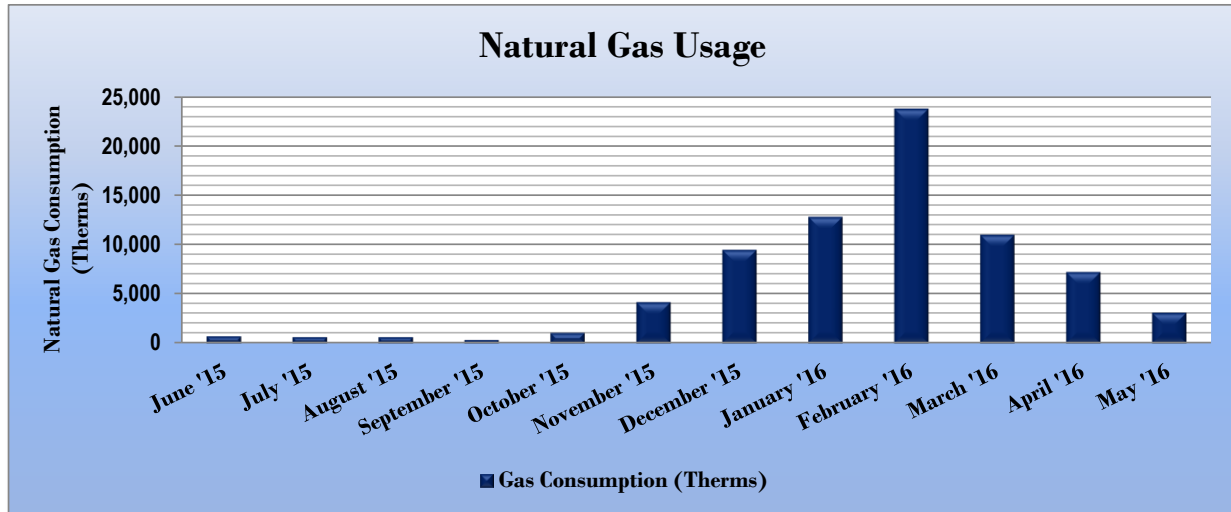


Figure 19 - Natural Gas Usage

Gas Billing Data for Montclair High School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/16/15	32	694	\$542
7/20/15	34	621	\$495
8/17/15	28	608	\$513
9/15/15	29	337	\$1,292
10/14/15	29	1,048	\$501
11/12/15	29	4,172	\$5,080
12/15/15	33	9,448	\$8,656
1/15/16	31	12,794	\$10,342
2/16/16	32	23,718	\$12,882
3/16/16	29	10,986	\$15,079
4/15/16	30	7,216	\$4,147
5/17/16	32	3,084	\$1,855
Totals	368	74,726	\$61,384
Annual	365	74,117	\$60,883

3.4 Benchmarking

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

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

Figure 20 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Montclair High School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	76.5	141.4
Site Energy Use Intensity (kBtu/ft ²)	43.1	58.2

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

Figure 21 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Montclair High School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft ²)	61.1	141.4
Site Energy Use Intensity (kBtu/ft ²)	37.9	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This facility has a current score of 93.

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

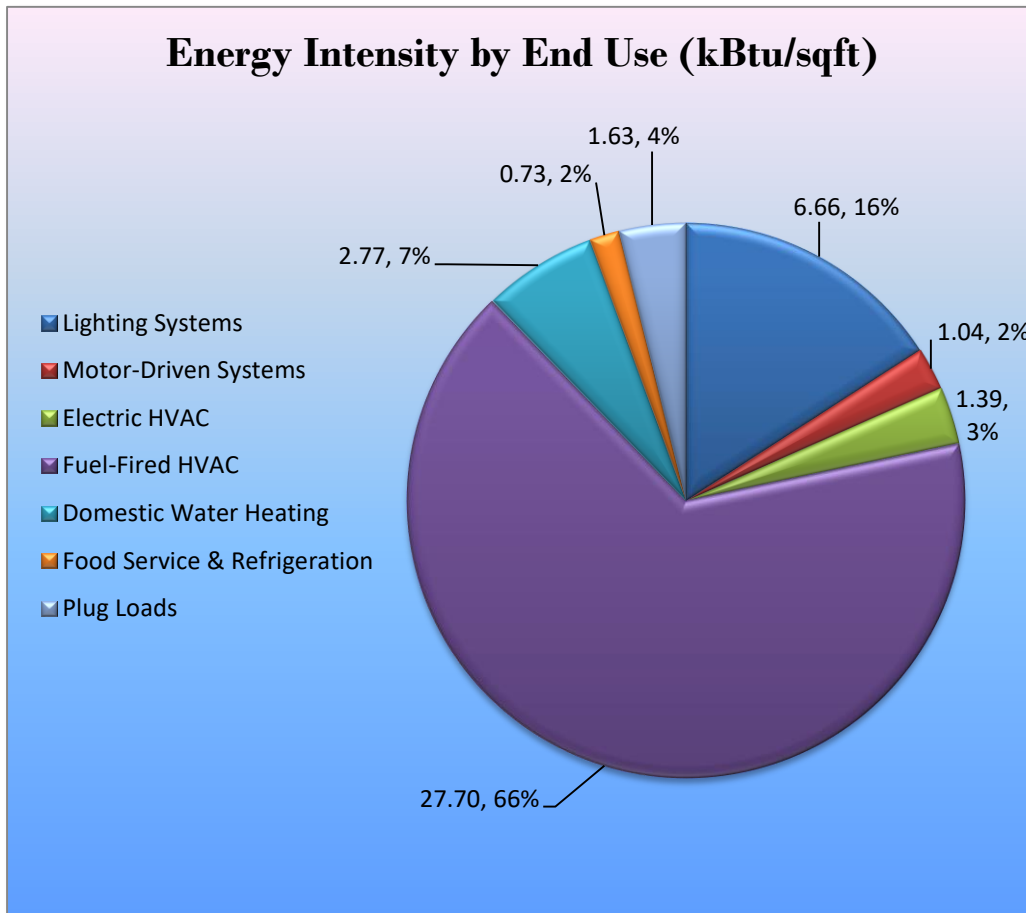
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

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

3.5 Energy End-Use Breakdown

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

Figure 22 - 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 Montclair High School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 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 23 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		297,995	62.4	0.0	\$42,891.77	\$206,332.89	\$33,190.00	\$173,142.89	4.0	300,078
ECM 1	Install LED Fixtures	67,721	10.7	0.0	\$9,747.39	\$60,143.64	\$8,360.00	\$51,783.64	5.3	68,194
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,168	0.3	0.0	\$168.04	\$989.00	\$50.00	\$939.00	5.6	1,176
ECM 3	Retrofit Fixtures with LED Lamps	222,256	51.0	0.0	\$31,990.33	\$141,543.38	\$24,780.00	\$116,763.38	3.6	223,810
ECM 4	Install LED Exit Signs	6,850	0.4	0.0	\$986.00	\$3,656.87	\$0.00	\$3,656.87	3.7	6,898
Lighting Control Measures		45,728	10.4	0.0	\$6,581.77	\$59,796.00	\$7,470.00	\$52,326.00	8.0	46,047
ECM 5	Install Occupancy Sensor Lighting Controls	45,728	10.4	0.0	\$6,581.77	\$59,796.00	\$7,470.00	\$52,326.00	8.0	46,047
Variable Frequency Drive (VFD) Measures		14,929	1.9	0.0	\$2,148.84	\$9,827.55	\$0.00	\$9,827.55	4.6	15,034
ECM 6	Install VFDs on Hot Water Pumps	14,929	1.9	0.0	\$2,148.84	\$9,827.55	\$0.00	\$9,827.55	4.6	15,034
Domestic Water Heating Upgrade		0	0.0	132.8	\$1,090.55	\$6,072.40	\$0.00	\$6,072.40	5.6	15,544
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	132.8	\$1,090.55	\$6,072.40	\$0.00	\$6,072.40	5.6	15,544
Plug Load Equipment Control - Vending Machine		6,669	0.0	0.0	\$959.90	\$1,610.00	\$0.00	\$1,610.00	1.7	6,716
ECM 8	Vending Machine Control	6,669	0.0	0.0	\$959.90	\$1,610.00	\$0.00	\$1,610.00	1.7	6,716
TOTALS		365,320	74.8	132.8	\$53,672.83	\$283,638.84	\$40,660.00	\$242,978.84	4.5	383,419

* - 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 24 below.

Figure 24 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Lighting Upgrades		297,995	62.4	0.0	\$42,891.77	\$206,332.89	\$33,190.00	\$173,142.89	4.0	300,078
ECM 1	Install LED Fixtures	67,721	10.7	0.0	\$9,747.39	\$60,143.64	\$8,360.00	\$51,783.64	5.3	68,194
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	1,168	0.3	0.0	\$168.04	\$989.00	\$50.00	\$939.00	5.6	1,176
ECM 3	Retrofit Fixtures with LED Lamps	222,256	51.0	0.0	\$31,990.33	\$141,543.38	\$24,780.00	\$116,763.38	3.6	223,810
ECM 4	Install LED Exit Signs	6,850	0.4	0.0	\$986.00	\$3,656.87	\$0.00	\$3,656.87	3.7	6,898

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	19,265	4.4	0.0	\$2,772.90	\$45,969.38	\$4,800.00	\$41,169.38	14.8	19,400
Exterior	48,456	6.3	0.0	\$6,974.49	\$14,174.26	\$3,560.00	\$10,614.26	1.5	48,795

Measure Description

We recommend replacing existing fixtures containing HID lamps at this site, including metal halide and high-pressure sodium, 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 HID lamp.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	1,168	0.3	0.0	\$168.04	\$989.00	\$50.00	\$939.00	5.6	1,176
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

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

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	214,714	50.0	0.0	\$30,904.73	\$140,935.50	\$24,620.00	\$116,315.50	3.8	216,215
Exterior	7,542	1.0	0.0	\$1,085.61	\$607.88	\$160.00	\$447.88	0.4	7,595

Measure Description

We recommend retrofitting existing incandescent and fluorescent 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 fluorescent tubes and more than 10 times longer than many incandescent lamps.

ECM 4: Install LED Exit Signs

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Interior	6,850	0.4	0.0	\$986.00	\$3,656.87	\$0.00	\$3,656.87	3.7	6,898
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

Measure Description

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

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 25 below.

Figure 25 – Summary of Lighting Control ECMs

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Lighting Control Measures	45,728	10.4	0.0	\$6,581.77	\$59,796.00	\$7,470.00	\$52,326.00	8.0	46,047
ECM 5 Install Occupancy Sensor Lighting Controls	45,728	10.4	0.0	\$6,581.77	\$59,796.00	\$7,470.00	\$52,326.00	8.0	46,047

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 5: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
45,728	10.4	0.0	\$6,581.77	\$59,796.00	\$7,470.00	\$52,326.00	8.0	46,047

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in restrooms, storage rooms, classrooms, offices areas, etc. 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 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 26 below.

Figure 26 – Summary of Variable Frequency Drive ECMs

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures	14,929	1.9	0.0	\$2,148.84	\$9,827.55	\$0.00	\$9,827.55	4.6	15,034
ECM 6 Install VFDs on Hot Water Pumps	14,929	1.9	0.0	\$2,148.84	\$9,827.55	\$0.00	\$9,827.55	4.6	15,034

ECM 6: Install VFDs on Hot Water Pumps

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
14,929	1.9	0.0	\$2,148.84	\$9,827.55	\$0.00	\$9,827.55	4.6	15,034

Measure Description

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

4.1.4 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 27 below.

Figure 27 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		0	0.0	132.8	\$1,090.55	\$6,072.40	\$0.00	\$6,072.40	5.6	15,544
ECM 7	Install Low-Flow Domestic Hot Water Devices	0	0.0	132.8	\$1,090.55	\$6,072.40	\$0.00	\$6,072.40	5.6	15,544

ECM 7: Install Low-Flow DHW Devices

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
0	0.0	132.8	\$1,090.55	\$6,072.40	\$0.00	\$6,072.40	5.6	15,544

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. Low-flow showerheads can reduce hot water usage, relative to standard showerheads, which saves energy.

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

4.1.5 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment control measures are summarized in Figure 28 below.

Figure 28 - Summary of Plug Load Equipment Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine		6,669	0.0	0.0	\$959.90	\$1,610.00	\$0.00	\$1,610.00	1.7	6,716
ECM 8	Vending Machine Control	6,669	0.0	0.0	\$959.90	\$1,610.00	\$0.00	\$1,610.00	1.7	6,716

ECM 8: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
6,669	0.0	0.0	\$959.90	\$1,610.00	\$0.00	\$1,610.00	1.7	6,716

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

4.2 ECM Evaluated but Not Recommended

The measure below have been evaluated by the auditor but is not recommended for implementation at the facility. Reasons for exclusion can be found in the measure description section.

Figure 29 – Summary of Measure Evaluated, but Not Recommended

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO ₂ e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement	0	0.0	812.9	\$6,677.78	\$186,907.92	\$20,088.00	\$166,819.92	25.0	95,184
Install High Efficiency Hot Water Boilers	0	0.0	812.9	\$6,677.78	\$186,907.92	\$20,088.00	\$166,819.92	25.0	95,184
TOTALS	0	0.0	812.9	\$6,677.78	\$186,907.92	\$20,088.00	\$166,819.92	25.0	95,184

* - 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).

Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO ₂ e Emissions Reduction (lbs)
0	0.0	812.9	\$6,677.78	\$186,907.92	\$20,088.00	\$166,819.92	25.0	95,184

Measure Description

We generally evaluate replacing older inefficient hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F.

Reasons for not Recommending

This measure has a long payback, approximately equal to the rated useful life of the replacement equipment. The measure is not recommended for implementation on the basis of energy savings alone.

5 ENERGY EFFICIENT PRACTICES

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

Close Doors and Windows

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

Perform Proper Lighting Maintenance

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

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Boiler Maintenance

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

Plug Load Controls

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

Water Conservation

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

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

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

6 ON-SITE GENERATION MEASURES

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

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

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

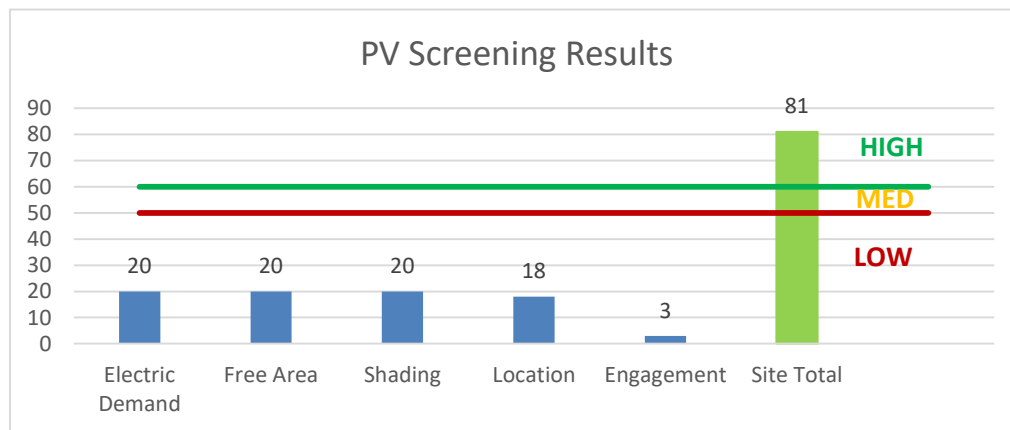
6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential for PV at the site. A PV array located on the roof of the building may be feasible. If Montclair High School is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 30 - Photovoltaic Screening



Potential	High	
System Potential	342	kW DC STC
Electric Generation	407,448	kWh/yr
Displaced Cost	\$58,650	/yr
Installed Cost	\$889,200	

Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project’s eligibility to earn SRECs. Registration of the intent to participate in New Jersey’s solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

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

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

6.2 Combined Heat and Power

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

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

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

A low or infrequent thermal load is the most significant factor contributing to the potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion this building is not is a good candidate for DR curtailment.

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

Figure 31 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
ECM 1	Install LED Fixtures	X			X
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	X			X
ECM 3	Retrofit Fixtures with LED Lamps	X			X
ECM 4	Install LED Exit Signs				X
ECM 5	Install Occupancy Sensor Lighting Controls	X			X
ECM 6	Install VFDs on Hot Water Pumps		X		X
ECM 7	Install Low-Flow Domestic Hot Water Devices	X			X
ECM 8	Vending Machine Control				X

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a “whole-building” energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey’s largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity’s annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers

Electric Unitary HVAC

Gas Cooling

Gas Heating

Gas Water Heating

Ground Source Heat Pumps

Lighting

Lighting Controls

Refrigeration Doors

Refrigeration Controls

Refrigerator/Freezer Motors

Food Service Equipment

Variable Frequency Drives

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

Incentives

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

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

How to Participate

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

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

8.2 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 SREC Registration Program

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

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

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

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

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

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 the incentive programs to help further reduce costs when compiling 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

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
3rd Fir Hallway	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.38	1,650	0.0	\$237.49	\$1,170.00	\$200.00	4.08
Rm 302	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.60	2,638	0.0	\$379.63	\$1,827.00	\$290.00	4.05
Rm 301	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 319	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
C.S.J Study	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 317	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Girls' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.04	190	0.0	\$27.31	\$117.00	\$20.00	3.55
Rm 303	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 316	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 304	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 305	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.14	605	0.0	\$87.15	\$1,593.00	\$250.00	15.41
Rm 315	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Social Studies Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,750	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.17	531	0.0	\$76.47	\$468.00	\$80.00	5.07
Social Studies Office 2	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.17	759	0.0	\$109.25	\$468.00	\$80.00	3.55
Languages Dept	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,750	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.13	398	0.0	\$57.35	\$351.00	\$60.00	5.07
Languages Dept 2	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.17	759	0.0	\$109.25	\$468.00	\$80.00	3.55
Rm 314	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.52	2,278	0.0	\$327.86	\$1,651.50	\$260.00	4.24
Rm 320	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.14	605	0.0	\$87.15	\$1,593.00	\$250.00	15.41
Ante Rm 320	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$40.00	5.59
Ante Rm 320	2	Incandescent: 60W Bulbs	Wall Switch	60	2,500	Relamp	No	2	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.07	293	0.0	\$42.21	\$31.00	\$10.00	0.50
Rm 306	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.52	2,278	0.0	\$327.86	\$1,651.50	\$260.00	4.24
Rm 313	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.52	2,278	0.0	\$327.86	\$1,651.50	\$260.00	4.24
Rm 307	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.52	2,278	0.0	\$327.86	\$1,651.50	\$260.00	4.24
Rm 312	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.52	2,278	0.0	\$327.86	\$1,651.50	\$260.00	4.24
Boys' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.04	190	0.0	\$27.31	\$117.00	\$20.00	3.55

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 310	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.60	2,638	0.0	\$379.63	\$1,827.00	\$290.00	4.05
Rm 311	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.60	2,638	0.0	\$379.63	\$1,827.00	\$290.00	4.05
Mop Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	\$2.90	\$35.90	\$5.00	10.67
Team 3 Office	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.45	1,978	0.0	\$284.72	\$1,097.20	\$200.00	3.15
Team 3 Office 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.16	719	0.0	\$103.54	\$416.80	\$80.00	3.25
Team 3 Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,750	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.06	199	0.0	\$28.68	\$150.40	\$30.00	4.20
Team 3 Office 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,750	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.06	199	0.0	\$28.68	\$150.40	\$30.00	4.20
Team 3 Office 5	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,750	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.06	199	0.0	\$28.68	\$150.40	\$30.00	4.20
Team 3 Office 6	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,750	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.06	199	0.0	\$28.68	\$150.40	\$30.00	4.20
Team 3 Office 7	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	93	1,750	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.06	199	0.0	\$28.68	\$150.40	\$30.00	4.20
Stairwell 1	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Stairwell 2	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Rm 204	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 205	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 206	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 207	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 208	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 209	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Computer Rm 210	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.77	3,357	0.0	\$483.17	\$2,448.00	\$385.00	4.27
Mop Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	1,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.01	20	0.0	\$2.90	\$35.90	\$5.00	10.67
2nd Flr Front Hallway	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	None	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
2nd Flr Front Hallway	20	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	No	20	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.08	360	0.0	\$51.77	\$266.40	\$50.00	4.18
Girls' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.08	360	0.0	\$51.77	\$266.40	\$50.00	4.18
English Dept	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$467.00	\$80.00	3.74

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Faculty Rm	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.43	1,899	0.0	\$273.36	\$1,126.20	\$215.00	3.33
Faculty Women's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.08	360	0.0	\$51.77	\$445.50	\$65.00	7.35
Faculty Men's Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.11	480	0.0	\$69.02	\$504.00	\$75.00	6.22
Library	59	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	59	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	1.61	7,073	0.0	\$1,018.10	\$4,801.50	\$765.00	3.96
Library	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.07	325	0.0	\$46.80	\$270.00	\$35.00	5.02
Center for Excellence	5	Halogen Incandescent: 65W Spotlight Bulbs MR16 (Track Lighting)	Wall Switch	65	2,500	Relamp	Yes	5	LED Screw-In Lamps: 9W Plug-In Spotlights (MR16)	Occupancy Sensor	9	1,750	0.19	844	0.0	\$121.45	\$485.00	\$60.00	3.50
Center for Excellence	11	Halogen Incandescent: 65W Spotlight Bulbs MR16 (Recessed Cans)	Wall Switch	65	2,500	Relamp	Yes	11	LED Screw-In Lamps: 9W Plug-In Spotlights (MR16)	Occupancy Sensor	9	1,750	0.42	1,856	0.0	\$267.20	\$743.00	\$90.00	2.44
Library Computer Rm 1	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.01	50	0.0	\$7.20	\$116.00	\$0.00	16.11
Library Computer Rm 2	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.01	50	0.0	\$7.20	\$116.00	\$0.00	16.11
Library Computer Rm 3	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.01	50	0.0	\$7.20	\$116.00	\$0.00	16.11
Library Computer Rm 4	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.01	50	0.0	\$7.20	\$116.00	\$0.00	16.11
Library Computer Rm 5	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.01	50	0.0	\$7.20	\$116.00	\$0.00	16.11
Library Storage	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.09	389	0.0	\$56.03	\$350.00	\$40.00	5.53
Library Storage	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,500	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 8' Lamps	Occupancy Sensor	72	1,750	0.14	619	0.0	\$89.05	\$520.00	\$20.00	5.61
Storage Rm	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	840	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.13	191	0.0	\$27.53	\$351.00	\$60.00	10.57
Rm 202	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 203	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 211	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 212	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 213	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 214	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 215	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Unit 2 Office	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	0	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	0	0.19	0	0.0	\$0.00	\$526.50	\$90.00	0.00
Unit 2 Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	0	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	0	0.04	0	0.0	\$0.00	\$117.00	\$20.00	0.00
Unit 2 Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	0	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	0	0.04	0	0.0	\$0.00	\$117.00	\$20.00	0.00

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Unit 2 Office 4	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	0	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	0	0.04	0	0.0	\$0.00	\$117.00	\$20.00	0.00
Unit 2 Speech Therapy	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	0	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	0	0.09	0	0.0	\$0.00	\$234.00	\$40.00	0.00
Unit 2 Conf Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	0	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	0	0.09	0	0.0	\$0.00	\$234.00	\$40.00	0.00
End Connecting Hallway	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	No	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lab Rm 216	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.74	3,237	0.0	\$465.91	\$1,893.60	\$340.00	3.33
Rm 216 Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.41	1,798	0.0	\$258.84	\$1,022.00	\$185.00	3.23
Rm 217	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.66	2,877	0.0	\$414.14	\$1,743.20	\$310.00	3.46
2nd Flr Center Hallway	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Lab Rm 225	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.62	2,697	0.0	\$388.26	\$1,668.00	\$295.00	3.54
Lab Rm 224	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.62	2,697	0.0	\$388.26	\$1,668.00	\$295.00	3.54
Lab Rm 223	24	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	24	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.98	4,316	0.0	\$621.21	\$2,614.80	\$465.00	3.46
Rm 223 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.08	360	0.0	\$51.77	\$266.40	\$50.00	4.18
Chemical Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.16	719	0.0	\$103.54	\$416.80	\$80.00	3.25
Display Case	2	Incandescent: 60W Bulbs	Wall Switch	60	2,500	Relamp	No	2	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.07	293	0.0	\$42.21	\$31.00	\$10.00	0.50
Science Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.06	285	0.0	\$40.97	\$175.50	\$30.00	3.55
Science Office	3	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,500	Relamp & Reballast	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.13	584	0.0	\$84.05	\$467.00	\$50.00	4.96
2nd Flr Connecting Hallway	22	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	No	22	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Rm 218	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.74	3,237	0.0	\$465.91	\$1,893.60	\$340.00	3.33
Rm 218 Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.02	95	0.0	\$13.66	\$58.50	\$10.00	3.55
Girls' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.08	360	0.0	\$51.77	\$266.40	\$50.00	4.18
Boys' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.08	360	0.0	\$51.77	\$420.40	\$65.00	6.87
Faculty Restroom 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.08	360	0.0	\$51.77	\$445.50	\$65.00	7.35
Faculty Restroom 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.08	360	0.0	\$51.77	\$445.50	\$65.00	7.35
Mop Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,500	0.01	50	0.0	\$7.24	\$35.90	\$5.00	4.27
Rm 219	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.62	2,697	0.0	\$388.26	\$1,668.00	\$295.00	3.54

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 220	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.62	2,697	0.0	\$388.26	\$1,668.00	\$295.00	3.54
Rm 221	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.62	2,697	0.0	\$388.26	\$1,668.00	\$295.00	3.54
Rm 222	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.62	2,697	0.0	\$388.26	\$1,668.00	\$295.00	3.54
Dental Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Back Stairwell 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.06	285	0.0	\$40.97	\$175.50	\$30.00	3.55
Back Stairwell 1	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Back Stairwell 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.06	285	0.0	\$40.97	\$175.50	\$30.00	3.55
Back Stairwell 2	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Main Office	42	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	42	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	1.15	5,035	0.0	\$724.75	\$3,267.00	\$525.00	3.78
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.02	95	0.0	\$13.66	\$58.50	\$10.00	3.55
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,750	0.01	61	0.0	\$8.73	\$48.20	\$30.00	2.08
Conf Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,750	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.09	266	0.0	\$38.24	\$234.00	\$40.00	5.07
Copy Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	114	1,750	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.15	451	0.0	\$64.89	\$380.53	\$80.00	4.63
Communication Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Main Office 2	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.27	1,199	0.0	\$172.56	\$855.00	\$135.00	4.17
Restroom 1	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,750	0.01	61	0.0	\$8.73	\$164.20	\$10.00	17.66
Restroom 2	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,750	0.01	61	0.0	\$8.73	\$164.20	\$10.00	17.66
Office 100A	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Office 100B	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Office 100C	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Office 100D	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Office 100E	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Office 100F	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Rm 100	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.20	879	0.0	\$126.59	\$772.60	\$105.00	5.27
Guidance Center	23	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	23	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.63	2,757	0.0	\$396.89	\$1,885.50	\$300.00	3.99

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Guidance Center	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.05	211	0.0	\$30.37	\$95.13	\$55.00	1.32
Main Hallway (Front)	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.41	1,798	0.0	\$258.84	\$1,417.50	\$220.00	4.63
Main Hallway (Front)	6	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	6	LED Exit Signs: 2 W Lamp	None	2	8,760	0.09	1,390	0.0	\$200.10	\$645.33	\$0.00	3.23
Boys' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Connecting Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.17	759	0.0	\$109.25	\$468.00	\$80.00	3.55
Health Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Attendance Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Athletic Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Stairwell 9	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Stairwell 10	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Back Stairwell	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Display Case	2	Incandescent: 2 x 60W Screw-in Bulbs	Wall Switch	120	2,500	Relamp	No	2	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.15	638	0.0	\$91.87	\$31.00	\$20.00	0.12
Foyer	3	Incandescent: 60W Screw-in Bulbs	Wall Switch	60	2,500	Relamp	No	3	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.10	440	0.0	\$63.31	\$93.00	\$15.00	1.23
Foyer	6	Metal Halide: (1) 70W Lamp	Wall Switch	95	2,500	Relamp	No	6	LED Screw-In Lamps: 18W Conncob LED Bulb	Wall Switch	18	2,500	0.30	1,328	0.0	\$191.18	\$273.00	\$0.00	1.43
Foyer	3	Metal Halide: (1) 100W Lamp	Wall Switch	128	2,500	Relamp	No	3	LED Screw-In Lamps: 30W Conncob LED Bulb	Wall Switch	30	2,500	0.19	845	0.0	\$121.66	\$298.20	\$0.00	2.45
MFEE	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.03	120	0.0	\$17.26	\$174.50	\$10.00	9.53
Rm 102	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.30	1,319	0.0	\$189.88	\$1,293.90	\$175.00	5.89
Rm 103	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.30	1,319	0.0	\$189.88	\$1,293.90	\$175.00	5.89
Rm 105	21	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	21	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.30	1,319	0.0	\$189.88	\$1,293.90	\$175.00	5.89
Rm 106	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.17	754	0.0	\$108.50	\$970.80	\$130.00	7.75
Rm 107	24	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	24	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.34	1,508	0.0	\$217.00	\$1,401.60	\$190.00	5.58
Math Office	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	1,750	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.45	1,395	0.0	\$200.74	\$1,228.50	\$210.00	5.07
Rm 109	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.26	1,131	0.0	\$162.75	\$1,186.20	\$160.00	6.31
Stair 8	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Girls' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 101	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,750	0.26	1,131	0.0	\$162.75	\$1,186.20	\$160.00	6.31
End Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.32	1,423	0.0	\$204.84	\$877.50	\$150.00	3.55
End Hallway	1	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	2	8,760	0.02	232	0.0	\$33.35	\$107.56	\$0.00	3.23
Small Gym	32	Metal Halide: (1) 250W Lamp	Wall Switch	295	2,500	Fixture Replacement	Yes	32	LED - Fixtures: Low-Bay	Occupancy Sensor	58	1,750	5.34	23,405	0.0	\$3,368.76	\$46,512.80	\$4,940.00	12.34
Small Gym	2	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	2	8,760	0.03	463	0.0	\$66.70	\$215.11	\$0.00	3.23
Back Entrance Gym (Display Cases)	18	Incandescent 60W Screw-in Bulbs	Wall Switch	60	2,500	Relamp	No	18	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.60	2,639	0.0	\$379.88	\$279.00	\$90.00	0.50
Back Entrance Gym	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.06	285	0.0	\$40.97	\$175.50	\$30.00	3.55
Faculty Women's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Gym Stairwell	3	Incandescent 75W Screw-in Bulbs	Wall Switch	75	2,500	Relamp	No	3	LED Screw-In Lamps: 13W LED Screw-In Bulbs	Wall Switch	13	2,500	0.12	535	0.0	\$76.97	\$69.93	\$15.00	0.71
Main Gym	49	LED Screw-In Lamps: 23W Screw-In Bulbs	Wall Switch	23	2,500	None	Yes	49	LED Screw-In Lamps: 23W Screw-In Bulbs	Occupancy Sensor	23	1,750	0.22	972	0.0	\$139.91	\$1,350.00	\$175.00	8.40
Main Gym	2	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	2	8,760	0.03	463	0.0	\$66.70	\$215.11	\$0.00	3.23
Stairwell 1 to Locker Rms	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.06	285	0.0	\$40.97	\$175.50	\$30.00	3.55
Stairwell 2 to Locker Rms	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.06	285	0.0	\$40.97	\$175.50	\$30.00	3.55
Locker Rm	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.82	3,597	0.0	\$517.68	\$2,565.00	\$405.00	4.17
Locker Rm	2	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	2	8,760	0.03	463	0.0	\$66.70	\$215.11	\$0.00	3.23
Showers	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.22	949	0.0	\$136.56	\$585.00	\$100.00	3.55
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Math Center	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.11	480	0.0	\$69.02	\$350.00	\$60.00	4.20
Balcony Stairwell	2	Incandescent 60W Screw-in Bulbs	Wall Switch	60	2,500	Relamp	No	2	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.07	293	0.0	\$42.21	\$31.00	\$10.00	0.50
Stair 2	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.15	664	0.0	\$95.59	\$409.50	\$70.00	3.55
Drivers Ed	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.41	1,798	0.0	\$258.84	\$1,417.50	\$220.00	4.63
Back Hallway	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	26	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.56	2,467	0.0	\$355.05	\$1,521.00	\$260.00	3.55
Back Hallway	2	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	2	8,760	0.03	463	0.0	\$66.70	\$215.11	\$0.00	3.23
Cafeteria	44	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	44	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	2.12	9,285	0.0	\$1,336.45	\$5,535.87	\$1,055.00	3.35
Cafeteria	5	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	5	LED Exit Signs: 2 W Lamp	None	2	8,760	0.08	1,159	0.0	\$166.75	\$537.78	\$0.00	3.23

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,500	0.55	2,415	0.0	\$347.60	\$1,427.00	\$300.00	3.24
Kitchen	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,500	0.08	334	0.0	\$48.00	\$252.80	\$0.00	5.27
Rm 110	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.68	2,997	0.0	\$431.40	\$2,002.50	\$320.00	3.90
Rm 111	25	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	25	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	1.20	5,276	0.0	\$759.35	\$2,918.33	\$570.00	3.09
Faculty Men's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.03	120	0.0	\$17.26	\$174.50	\$10.00	9.53
Girls' Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.08	360	0.0	\$51.77	\$445.50	\$65.00	7.35
Auditorium Foyer	20	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,500	Relamp	No	20	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,500	0.23	1,006	0.0	\$144.83	\$718.00	\$100.00	4.27
Auditorium Foyer	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.35	1,518	0.0	\$218.49	\$936.00	\$160.00	3.55
Auditorium Foyer	35	Halogen Incandescent: 65W Spotlight Bulbs MR16 (Track Lighting)	Wall Switch	65	2,500	Relamp	No	35	LED Screw-In Lamps: 9W Plug-In Spotlights	Wall Switch	9	2,500	1.28	5,635	0.0	\$811.07	\$1,505.00	\$175.00	1.64
Men's Rm	1	Circular Fluorescent - T9: Circline 30W T9 Fluorescent	Wall Switch	30	2,500	LED Retrofit	Yes	1	LED - Fixtures: 17W LED Circline Retrofit	Occupancy Sensor	17	1,750	0.01	52	0.0	\$7.49	\$65.26	\$0.00	8.71
Men's Rm	1	Polylux 2D Fluorescent: F382D/835	Wall Switch	38	2,500	LED Retrofit	Yes	1	LED - Fixtures: 16W LED 2D Polylux	Occupancy Sensor	16	1,750	0.02	77	0.0	\$11.09	\$188.51	\$0.00	17.00
Women's Rm	1	Circular Fluorescent - T9: Circline 30W T9 Fluorescent	Wall Switch	30	2,500	LED Retrofit	Yes	1	LED - Fixtures: 17W LED Circline Retrofit	Occupancy Sensor	17	1,750	0.01	52	0.0	\$7.49	\$65.26	\$0.00	8.71
Women's Rm	1	Polylux 2D Fluorescent: F382D/835	Wall Switch	38	2,500	LED Retrofit	Yes	1	LED - Fixtures: 16W LED 2D Polylux	Occupancy Sensor	16	1,750	0.02	77	0.0	\$11.09	\$188.51	\$0.00	17.00
Display Cases	16	Halogen Incandescent: 65W Spotlight Bulbs MR16 (Track Lighting)	Wall Switch	65	2,500	Relamp	No	16	LED Screw-In Lamps: 9W Plug-In Spotlights (MR16)	Wall Switch	9	2,500	0.59	2,576	0.0	\$370.78	\$688.00	\$80.00	1.64
Front of Auditorium	12	Incandescent: 60W Screw-in Bulbs	Wall Switch	60	4,380	Relamp	No	12	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	4,380	0.40	3,083	0.0	\$443.70	\$186.00	\$60.00	0.28
Auditorium Stairwell	4	Circular Fluorescent - T9: Circline 30W T9 Fluorescent	Wall Switch	30	2,500	LED Retrofit	No	4	LED - Fixtures: 17W LED Circline Retrofit	Wall Switch	17	2,500	0.03	150	0.0	\$21.52	\$261.04	\$0.00	12.13
Auditorium Stairwell	1	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	2	8,760	0.02	232	0.0	\$33.35	\$107.56	\$0.00	3.23
Mop Closet	1	Incandescent 60W Screw-in Bulbs	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	1,000	0.03	59	0.0	\$8.44	\$15.50	\$5.00	1.24
Basement Hallways	64	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	64	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	1.38	6,072	0.0	\$873.97	\$3,744.00	\$640.00	3.55
Basement Hallways	6	Incandescent: 60W Screw-in Bulbs	Wall Switch	60	2,500	Relamp	No	6	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	2,500	0.20	880	0.0	\$126.63	\$93.00	\$30.00	0.50
Basement Hallways	9	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	9	LED Exit Signs: 2 W Lamp	None	2	8,760	0.14	2,085	0.0	\$300.15	\$968.00	\$0.00	3.23
Wrestling Rm	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.38	1,678	0.0	\$241.58	\$1,359.00	\$210.00	4.76
Boys' Locker Rm	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.57	2,518	0.0	\$362.38	\$2,038.50	\$315.00	4.76
Boys' Locker Rm	2	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	2	8,760	0.03	463	0.0	\$66.70	\$215.11	\$0.00	3.23
Showers	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.17	759	0.0	\$109.25	\$468.00	\$80.00	3.55

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mop Closet	1	Incandescent 60W Screw-in Bulbs	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	1,000	0.03	59	0.0	\$8.44	\$15.50	\$5.00	1.24
Girls' Locker Rm	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.57	2,518	0.0	\$362.38	\$2,038.50	\$315.00	4.76
Girls' Locker Rm	2	Exit Signs: Incandescent	None	25	8,760	Fixture Replacement	No	2	LED Exit Signs: 2 W Lamp	None	2	8,760	0.03	463	0.0	\$66.70	\$215.11	\$0.00	3.23
Showers	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.17	759	0.0	\$109.25	\$468.00	\$80.00	3.55
Rm 1A	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.41	1,798	0.0	\$258.84	\$1,417.50	\$220.00	4.63
Rm 1B	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.41	1,798	0.0	\$258.84	\$1,417.50	\$220.00	4.63
Food Science	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.74	3,237	0.0	\$465.91	\$2,389.50	\$375.00	4.32
Women's Rm 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Women's Rm 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Rm 2A	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.41	1,798	0.0	\$258.84	\$1,417.50	\$220.00	4.63
Rm 11	23	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	23	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.63	2,757	0.0	\$396.89	\$1,885.50	\$300.00	3.99
Rm 2B	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 10	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.66	2,877	0.0	\$414.14	\$1,944.00	\$310.00	3.95
Storage Rm 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Storage Rm 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Rm 9	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.96	4,221	0.0	\$607.48	\$2,442.67	\$470.00	3.25
Rm 8	26	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,500	Relamp	Yes	26	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	1.25	5,487	0.0	\$789.72	\$3,013.47	\$580.00	3.07
Rm 7	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32
Rm 3	44	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	44	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	1.20	5,275	0.0	\$759.26	\$3,654.00	\$580.00	4.05
Men's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.08	360	0.0	\$51.77	\$445.50	\$65.00	7.35
Team Offices	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.55	2,398	0.0	\$345.12	\$1,710.00	\$270.00	4.17
Mop Closet	1	Incandescent 60W Screw-in Bulbs	Wall Switch	65	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	Wall Switch	9	1,000	0.04	64	0.0	\$9.27	\$15.50	\$5.00	1.13
Rm 5	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.33	1,439	0.0	\$207.07	\$972.00	\$155.00	3.95
Rm 4	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.46	2,038	0.0	\$293.35	\$1,534.50	\$240.00	4.41
Rm 13A	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.49	2,158	0.0	\$310.61	\$1,593.00	\$250.00	4.32

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 13B	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.27	1,199	0.0	\$172.56	\$855.00	\$135.00	4.17
Boys' Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Boys' Rm	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,500	Relamp	Yes	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,750	0.01	61	0.0	\$8.73	\$48.20	\$10.00	4.37
Faculty Men's Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.05	240	0.0	\$34.51	\$233.00	\$20.00	6.17
Custodial Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.05	96	0.0	\$13.80	\$233.00	\$20.00	15.43
Custodian	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,750	0.16	719	0.0	\$103.54	\$621.00	\$95.00	5.08
Auditorium	54	Incandescent: 125W Screw-in Bulbs	Wall Switch	100	2,500	Relamp	No	54	LED Screw-In Lamps: 20W LED Screw-In Bulbs	Wall Switch	20	2,500	2.83	12,420	0.0	\$1,787.67	\$2,458.62	\$270.00	1.22
Cleaning Supplies Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.08	144	0.0	\$20.71	\$291.50	\$50.00	11.66
Auditorium Back Stage	6	Incandescent: 100W Screw-in Bulbs	Wall Switch	100	1,500	Relamp	No	6	LED Screw-In Lamps: 15W LED Screw-In Bulbs	Wall Switch	15	1,500	0.33	880	0.0	\$126.63	\$160.50	\$30.00	1.03
Rm 112	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.66	2,877	0.0	\$414.14	\$1,743.20	\$310.00	3.46
Rm 113	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,500	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,750	0.66	2,877	0.0	\$414.14	\$1,743.20	\$310.00	3.46
Aud. Exterior Perimeter	20	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	20	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	146	4,380	4.18	32,136	0.0	\$4,625.49	\$7,813.54	\$2,000.00	1.26
Aud. Exterior Perimeter	2	Metal Halide: (1) 400W Lamp	None	458	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	146	4,380	0.41	3,143	0.0	\$452.40	\$781.35	\$200.00	1.29
Aud. Exterior Perimeter	7	Metal Halide: (1) 175W Lamp	None	215	4,380	Fixture Replacement	No	7	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	50	4,380	0.76	5,818	0.0	\$837.37	\$1,232.56	\$700.00	0.64
Main Entrance	6	High-Pressure Sodium: (1) 400W Lamp	None	465	4,380	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	146	4,380	1.25	9,641	0.0	\$1,387.65	\$2,344.06	\$600.00	1.26
Main Entrance	3	Incandescent: 100W Screw-in Bulbs	None	100	4,380	Relamp	No	3	LED Screw-In Lamps: 15W LED Screw-In Bulbs	None	15	4,380	0.17	1,284	0.0	\$184.87	\$80.25	\$15.00	0.35
Side Entrance	1	Incandescent: 60W Screw-in Bulbs	None	60	4,380	Relamp	No	1	LED Screw-In Lamps: 9W LED Screw-In Bulbs	None	9	4,380	0.03	257	0.0	\$36.97	\$15.50	\$5.00	0.28
Gym Entrance	2	Metal Halide: (1) 175W Lamp	None	215	4,380	Fixture Replacement	No	2	LED - Fixtures: Wall Sconces	None	50	4,380	0.22	1,662	0.0	\$239.25	\$667.58	\$20.00	2.71
Gym Entrance	8	Incandescent: 60W Screw-in Bulbs	None	60	4,380	Relamp	No	8	LED Screw-In Lamps: 9W LED Screw-In Bulbs	None	9	4,380	0.27	2,055	0.0	\$295.80	\$124.00	\$40.00	0.28
Trash Area	4	Incandescent: 100W Screw-in Bulbs	None	100	4,380	Relamp	No	4	LED Screw-In Lamps: 15W LED Screw-In Bulbs	None	15	4,380	0.22	1,713	0.0	\$246.50	\$107.00	\$20.00	0.35
Trash Area	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	114	4,380	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	None	58	4,380	0.04	282	0.0	\$40.60	\$95.13	\$20.00	1.85
Boiler Rm	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,500	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,500	0.35	1,518	0.0	\$218.49	\$936.00	\$160.00	3.55
Boiler Rm	1	Incandescent: 100W Screw-in Bulbs	Wall Switch	100	2,500	Relamp	No	1	LED Screw-In Lamps: 15W LED Screw-In Bulbs	Wall Switch	15	2,500	0.06	244	0.0	\$35.17	\$26.75	\$5.00	0.62
Courtyard	4	Metal Halide: (1) 175W Lamp	None	215	4,380	Fixture Replacement	No	4	LED - Fixtures: Wall Sconces	None	50	4,380	0.43	3,324	0.0	\$478.50	\$1,335.16	\$40.00	2.71
Whole School	36	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	36	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Classrooms	69	Supply Fan	0.3	69.5%	No	2,745	No	69.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Classrooms	Boiler Rm	2	Air Compressor	1.0	82.5%	No	4,957	No	82.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Classroom Labs	Classroom Labs	4	Exhaust Fan	0.5	82.5%	No	1,000	No	82.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Auditorium Restrooms / Lobby	Auditorium Restrooms / Lobby	5	Supply Fan	0.3	69.5%	No	2,745	No	69.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm	Whole School	3	Heating Hot Water Pump	5.0	89.5%	No	2,745	No	89.5%	Yes	3	1.88	14,929	0.0	\$2,148.84	\$9,827.55	\$0.00	4.57
Boiler Rm	Whole School	2	Boiler Feed Water Pump	1.5	84.0%	No	2,745	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions							Energy Impact & Financial Analysis							
		System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Classrooms & Offices	Classrooms & Offices	2	Window AC	0.42		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Classrooms & Offices	Classrooms & Offices	9	Window AC	0.58		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Classrooms & Offices	Classrooms & Offices	7	Window AC	0.83		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Classrooms & Offices	Classrooms & Offices	13	Window AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Classrooms & Offices	Classrooms & Offices	6	Window AC	1.25		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Math Office	Math Office	1	Window AC	1.71		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Offices	Offices	2	Ductless Mini-Split AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Science Office	1	Packaged AC	1.50		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	L.G.I.	1	Packaged AC	15.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Library	1	Packaged AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Outside	Auditorium Area	5	Split-System AC	5.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis									
		System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	Whole School	2	Non-Condensing Hot Water Boiler	3,348.00	Yes	2	Condensing Hot Water Boiler	3,348.00	93.00%	Ec	0.00	0	542.0	\$4,451.85	\$124,605.28	\$13,392.00	24.98
Boiler Rm	Whole School	1	Non-Condensing Hot Water Boiler	3,348.00	Yes	1	Condensing Hot Water Boiler	3,348.00	93.00%	Ec	0.00	0	271.0	\$2,225.93	\$62,302.64	\$6,696.00	24.98

Low-Flow Device Recommendations

Location	Recommendation Inputs				Energy Impact & Financial Analysis						
	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Locker Room Showers	68	Showerhead	3.50	2.00	0.00	0	132.8	\$1,090.55	\$6,072.40	\$0.00	5.57

Commercial Refrigerator/Freezer Inventory & Recommendations

Location	Existing Conditions			Proposed Condition	Energy Impact & Financial Analysis						
	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Stand-Up Refrigerator, Glass Door (31 - 50 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Various	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Various	5	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Cafeteria	2	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Cooking Equipment Inventory & Recommendations

Location	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Equipment Type	High Efficiency Equipment?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00


Plug Load Inventory

Location	Existing Conditions			
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Montclair HS	310	Desktop Computer + Monitor	150.0	Yes
Montclair HS	12	TVs (med. CRT)	150.0	No
Montclair HS	14	Printers (sm.)	80.0	Yes
Montclair HS	8	Copy Machine (Lg.)	240.0	Yes
Montclair HS	4	Server Racks	360.0	No
Montclair HS	5	Microwave Ovens (med.)	900.0	No
Montclair HS	30	Smart Boards	316.0	No

Vending Machine Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Montclair HS	2	Refrigerated	Yes	0.00	3,224	0.0	\$464.00	\$460.00	\$0.00	0.99
Montclair HS	3	Non-Refrigerated	Yes	0.00	1,028	0.0	\$147.90	\$690.00	\$0.00	4.67
Montclair HS	2	Glass Fronted Refrigerated	Yes	0.00	2,418	0.0	\$348.00	\$460.00	\$0.00	1.32

Appendix B: ENERGY STAR® Statement of Energy Performance



ENERGY STAR® Statement of Energy Performance

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ENERGY STAR®
Score¹

Montclair High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 262,855
Built: 1914

For Year Ending: April 30, 2016
Date Generated: December 25, 2017

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

Property & Contact Information		
Property Address Montclair High School 100 Chestnut Street Montclair, New Jersey 07042	Property Owner Montclair Board of Education 22 Valley Road Montclair, NJ 07042 (973) 509-4050	Primary Contact Steve DiGeronimo 22 Valley Road Montclair, NJ 07042 (973) 509-4050 bfleischer@montclair.k12.nj.us
Property ID: 5724557		

Energy Consumption and Energy Use Intensity (EUI)			
Site EUI 43.2 kBtu/ft²	Annual Energy by Fuel		National Median Comparison
	Electric - Grid (kBtu)	3,960,838 (35%)	National Median Site EUI (kBtu/ft²) 75.4
	Natural Gas (kBtu)	7,392,776 (65%)	National Median Source EUI (kBtu/ft²) 134.2
			% Diff from National Median Source EUI -43%
Source EUI 76.8 kBtu/ft²			Annual Emissions
			Greenhouse Gas Emissions (Metric Tons CO2e/year) 832

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)