Local Government Energy Audit:
Energy Audit Report

Furlong Field House and Woodman Field

Montclair Board of Education

28 Essex Avenue

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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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Furlong Field House.

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 and public schools in controlling their energy costs and help protect our environment by reducing energy consumption statewide.

1.1 Facility Summary

The Furlong Field House at Woodman Field is a 13,184 square foot facility comprised of a main field house, plus a few smaller buildings adjacent to a large football field with running track and bleachers. The field and bleacher area has no lighting or other energy-using equipment. The Furlong Field House consists primarily of locker rooms, restrooms, and workout areas with gym equipment. There is an adjoining building connected by a covered walkway which contains a large multipurpose room, which is used for awards ceremonies and other special events. Next to the field house is a small building which houses the Building and Grounds Office. This building has a connected garage for storage and a machine shop. There is also small concession stand building with kitchen equipment used to store and prepare food sold at athletic events.

Building occupancy varies widely. The Building and Grounds Office and garage area is usually occupied by facility staff every weekday. The field house and multipurpose room are typically open every weekday (from about 7:00 AM to 5:00 PM) during the school year, with additional hours on some evenings and weekends for sporting events or awards ceremonies. The concession stand is typically occupied only on during sporting events. The field house and multipurpose room is often occupied by just a few students and coaches during most of the day, but may be occupied by hundreds of people when there are sporting events, team practices, or special events.

Interior lighting at Furlong Field House consist mostly of 2 to 4-lamp T8 fluorescent fixtures. There are also some compact fluorescent (CFL) and high intensity discharge (HID) fixtures in some areas. Building exteriors are lit by HID fixtures. The Field House is heated by natural gas. It has a 643-MBh Weil-McLain boiler, plus there are four rooftop units (RTUs) which supply about 790 MBH of supplementary heating and 78 tons of cooling capacity, as needed. The Building and Grounds Office and the garage are heated and cooled by an electric warm air unit heater and a window air conditioning (AC) unit. The concession stand has no heating or cooling. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated five energy conservation measures (ECMs). We recommend four ECMs for implementation. The four measures together represent an opportunity to reduce the annual energy cost of the facility by about $4,302 and annual greenhouse gas emissions by 29,180 lbs CO_2e. We estimate that if these measures are implemented as recommended, the project would pay for itself in energy savings alone in about 5.0 years. The breakdown of annual utility costs and the potential utility cost savings, following project implementation, are shown in Figure 1 and Figure 2, respectively. We estimate that the four measures together would reduce Furlong Field House's annual energy usage by about 5.3% overall.

A boiler replacement measure was evaluated, but was not recommended for implementation at this time due to the measure's long payback period. If the school district chooses to upgrade the main boiler as well, then that measure could increase overall energy savings by another 5%, but it would likely increase the overall payback period of the project to about 7.5 years.

Figure 1 – Previous 12 Month Utility Costs

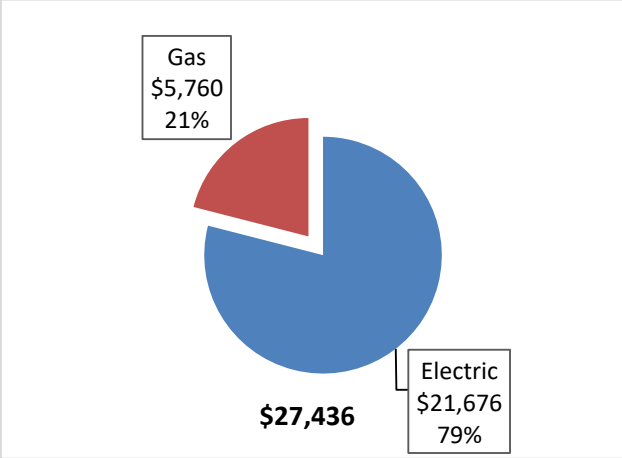
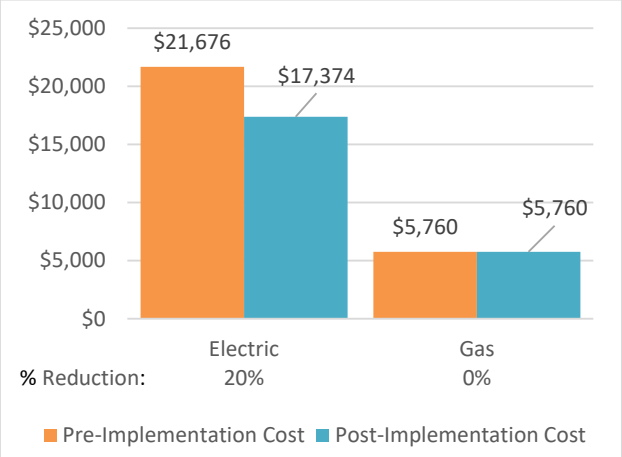


Figure 2 – Potential Post-Implementation Costs



A detailed description of Furlong Field House's existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**26,381**	**7.6**	**0.0**	**$3,916.67**	**$17,937.84**	**$1,670.00**	**$16,267.84**	**4.2**	**26,565**
ECM 1	Install LED Fixtures	Yes	6,366	1.2	0.0	$945.08	$3,257.05	$600.00	$2,657.05	2.8	6,410
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	155	0.0	0.0	$22.98	$117.00	$10.00	$107.00	4.7	156
ECM 3	Retrofit Fixtures with LED Lamps	Yes	19,860	6.3	0.0	$2,948.61	$14,563.79	$1,060.00	$13,503.79	4.6	19,999
Lighting Control Measures			**2,597**	**0.9**	**0.0**	**$385.54**	**$5,750.00**	**$695.00**	**$5,055.00**	**13.1**	**2,615**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	2,597	0.9	0.0	$385.54	$5,750.00	$695.00	$5,055.00	13.1	2,615
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**93.9**	**$394.66**	**$15,434.20**	**$1,414.60**	**$14,019.60**	**35.5**	**10,998**
	Install High Efficiency Hot Water Boilers	No	0	0.0	93.9	$394.66	$15,434.20	$1,414.60	$14,019.60	35.5	10,998
TOTAL FOR PROPOSED MEASURES			**28,977**	**8.4**	**0.0**	**$4,302.20**	**$23,687.84**	**$2,365.00**	**$21,322.84**	**5.0**	**29,180**
TOTAL FOR ALL MEASURES			**28,977**	**8.4**	**93.9**	**$4,696.86**	**$39,122.04**	**$3,779.60**	**$35,342.44**	**7.5**	**40,178**

* - 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.

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.

Energy Efficient Practices

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

- Close Doors and Windows
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

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

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy Aggregator

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

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

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

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Steve DiGeronimo	Interim Business Administrator	jdigeronimo@montclair.k12.nj.us	(973) 509-4050
Leonard Saponara	Building & Grounds Supervisor	lsaponara@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 07, 2016, TRC performed an energy audit at Furlong Field House located in Montclair, New Jersey. TRC's team met with Leonard Saponara to review the facility operations and help focus our investigation on specific energy-using systems.

The Furlong Field House at Woodman Field is a 13,184 square foot facility comprised of a main field house, plus a few smaller buildings adjacent to a large football field with running track and bleachers. The field and bleacher area has no lighting or other energy-using equipment.

The Furlong Field House consists primarily of locker rooms, restrooms, and workout areas with gym equipment. There is an adjoining building connected by a covered walkway which contains a large multipurpose room, which is used for awards ceremonies and other special events. Next to the field house is a small building which houses the Building and Grounds Office. This building has a connected garage for storage and a machine shop. There is also small concession stand building with kitchen equipment used to store and prepare food sold at athletic events.

The original date of construction is unknown for the field house and other buildings at Woodman Field. The building's main boiler was installed in 1994. The field house underwent a $5 million renovation in 2008 and was renamed the Furlong Field House.

2.3 Building Occupancy

Building occupancy varies widely. The Building and Grounds Office and garage area is usually occupied by facility staff every weekday. The field house and multipurpose room are typically open every weekday (from about 7:00 AM to 5:00 PM) during the school year, with additional hours on some evenings and weekends for sporting events or awards ceremonies. The concession stand is typically occupied only on during sporting events. The field house and multipurpose room is often occupied by just a few students and coaches during most of the day but may be occupied by hundreds of people when there are sporting events, team practices, or special events.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Furlong Field House	Weekday	7:00am - 5pm
Furlong Field House	Weekend	CLOSED

2.4 Building Envelope

Furlong Field House is a Tudor-style wood-framed building with stucco exterior. It has a sloped roof with asphalt shingles. The windows are doubled-paned with aluminum frames. It has wooden and steel doors with double-paned glass.

The smaller buildings – the Building and Grounds Office, the garages, and the concession stand - are all of similar design with wooden frames, stucco exterior, and sloped shingled roofs.

Door and window seals all appeared tight. No excessive air infiltration was noted for any of the buildings.

Image 1: Furlong Field House - Front Exterior

2.5 On-Site Generation

The Furlong Field House and adjacent buildings have no on-site power generation.

2.6 Energy-Using Systems

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

Lighting System

Interior lighting at Furlong Field House consist mostly of 2 to 4-lamp T8 fluorescent fixtures. There are also some compact fluorescent (CFL) and high intensity discharge (HID) fixtures in some areas. Building exteriors are lit mostly by HID fixtures.

Image2: Furlong Field House / Woodman Field - Typical Lighting Fixtures

Heating Ventilation and Air Conditioning (HVAC)

The Furlong Field House is heated by natural gas. It has a 643-MBh Weil-McLain hydronic boiler, which was installed in 1994. The main boiler appears to be in good condition for its age.

There are also four gas/electric rooftop units (RTUs), three Reznor units and one Carrier unit, which together supply 790 MBh of supplementary heating and 78 tons of cooling capacity, as needed.

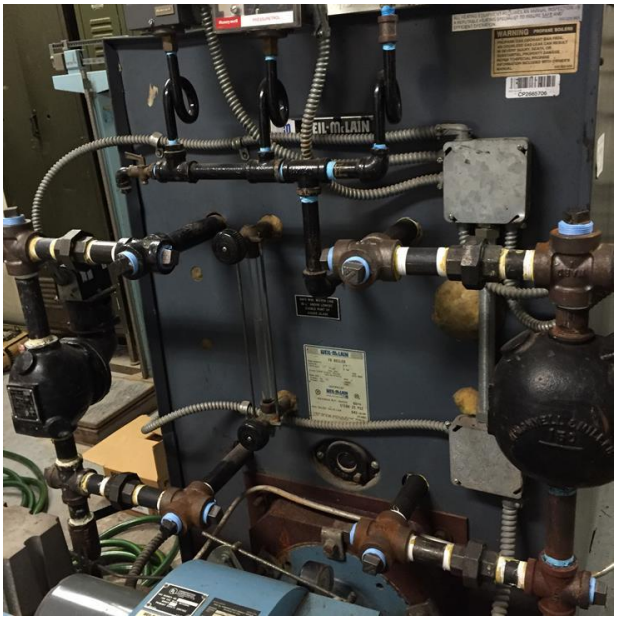
There are also small exhaust fans on the roof of the building with fractional horsepower motors.

The Building and Grounds Office and the machine shop are heated by a single electric warm air unit heater and cooled a through-the-wall air conditioning unit.

The concession stand and an adjacent storage garage have no heating or cooling.

Temperatures at Furlong Field House are setback at night when the building is closed. HVAC systems at all Montclair BOE properties are scheduled remotely through a contract with a company called Energy for America.

Image 3: Furlong Field House / Woodman Field - HVAC Equipment



Domestic Hot Water Heating System

The domestic hot water heating system at the Furlong Field House consist of two A.O. Smith gas-fired storage hot water heaters, each with 98-gallon storage tanks. These supply all restrooms and locker room showers.

Building Plug Load

Building plug load equipment is minimal, just some office equipment for a few small office spaces. There is also some gym equipment and an ice machine.

There are three refrigerators and a freezer chest to store food at the concession stand. The concession stand also has an electric stove with exhaust hood, which is used only during sporting events.

2.7 Water-Using Systems

All faucets, showerheads, toilets, and urinals appeared to be low-flow rated devices which meet or exceed current standards for water conservation in commercial buildings.

For more information on current water conservation standards for commercial buildings, see Section 5.

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

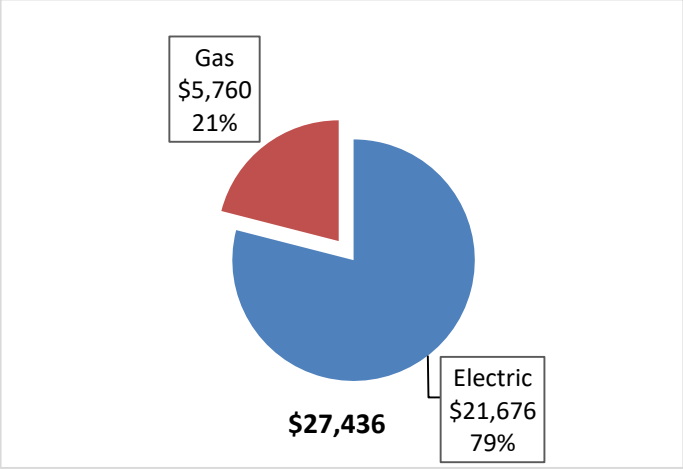
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Furlong Field House		
Fuel	**Usage**	**Cost**
Electricity	146,000 kWh	$21,676
Natural Gas	13,709 Therms	$5,760
Total		**$27,436**

The current annual energy cost for this facility is $27,436 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over a recent past 12-month period was found to be $0.148/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 8 - Electric Usage & Demand

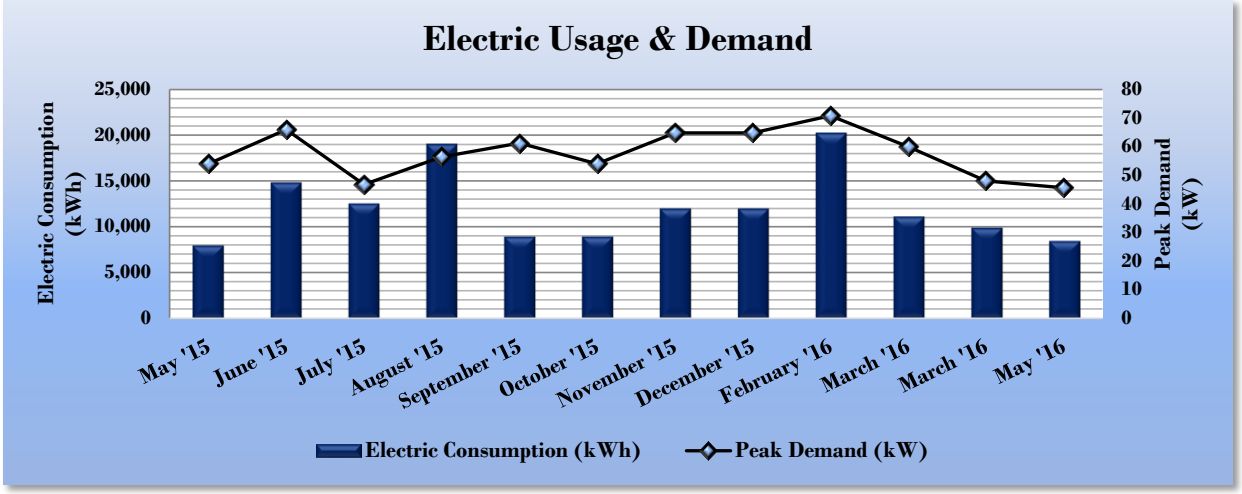


Figure 9 - Electric Usage & Demand

Electric Billing Data for Furlong Field House				
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost
6/15/15	26	7,920	54	$1,745
7/15/15	30	14,760	66	$2,814
8/13/15	29	12,480	47	$2,238
9/14/15	32	18,960	56	$3,190
10/13/15	29	8,880	61	$1,358
11/12/15	30	8,880	54	$1,358
12/15/15	33	11,940	65	$1,115
1/15/16	31	11,940	65	$1,115
2/18/16	34	20,160	71	$2,596
3/16/16	27	11,040	60	$1,527
4/15/16	30	9,840	48	$1,338
5/17/16	32	8,400	46	$1,163
Totals	**363**	**145,200**	**70.8**	**$21,558**
Annual	**365**	**146,000**	**70.8**	**$21,676**

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost over a recent 12-month period was found to be $0.420/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Please Note: The natural gas consumption appears to be adequate for a building of this size, however the billed rate seems to be way below current market averages, less than half of what it should be. We believe there are likely some third-party gas supplier bills that were missing from the utility data provided.

Figure 10 - Natural Gas Usage

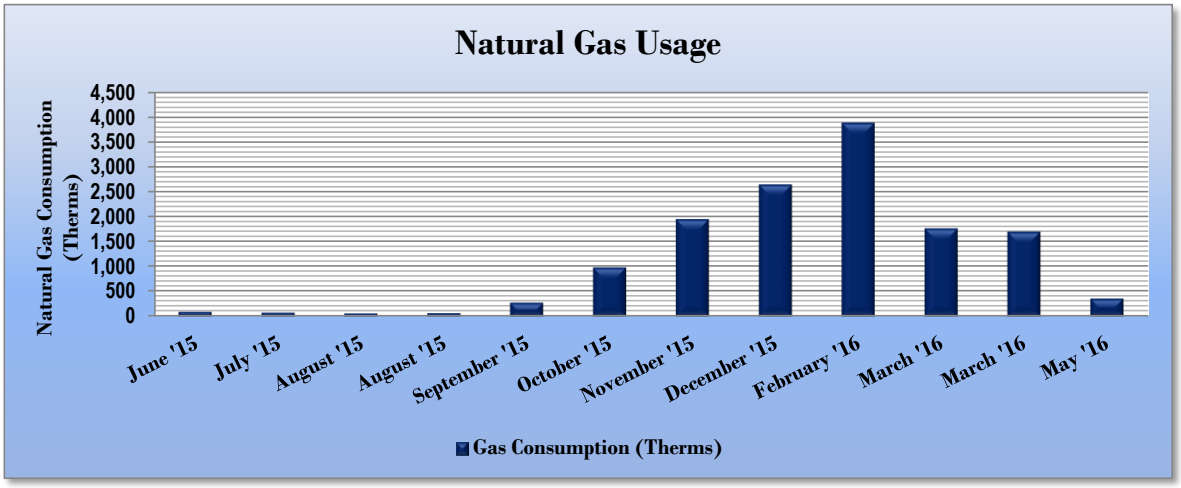


Figure 11 - Natural Gas Usage

Gas Billing Data for Furlong Field House			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
6/16/15	32	92	$112
7/20/15	34	72	$110
8/17/15	28	59	$109
9/15/15	29	62	$111
10/14/15	29	274	$132
11/12/15	29	980	$836
12/15/15	33	1,944	$979
1/15/16	31	2,641	$1,084
2/18/16	34	3,881	$1,146
3/16/16	27	1,764	$803
4/15/16	30	1,696	$247
5/17/16	32	357	$137
Totals	**368**	**13,822**	**$5,807**
Annual	**365**	**13,709**	**$5,760**

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 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Furlong Field House	National Median Building Type: Rec./Entertainment/Parks
Source Energy Use Intensity (kBtu/ft^2)	227.8	96.8
Site Energy Use Intensity (kBtu/ft^2)	141.8	41.2

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

Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Furlong Field House	National Median Building Type: Rec./Entertainment/Parks
Source Energy Use Intensity (kBtu/ft^2)	204.3	96.8
Site Energy Use Intensity (kBtu/ft^2)	134.3	41.2

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 building does not belong to one of the building categories that are currently eligible to receive an ENERGY STAR® score.

The EUI scores appear to be higher than the median for this building category, though the discrepancy might be due simply to the broad range of different building types and activities included for that particular building category. However, it might also indicate that there may be additional opportunities to save energy for these buildings through more precise scheduling of HVAC equipment and lighting controls, so that energy usage is kept to a minimum when spaces are unoccupied.

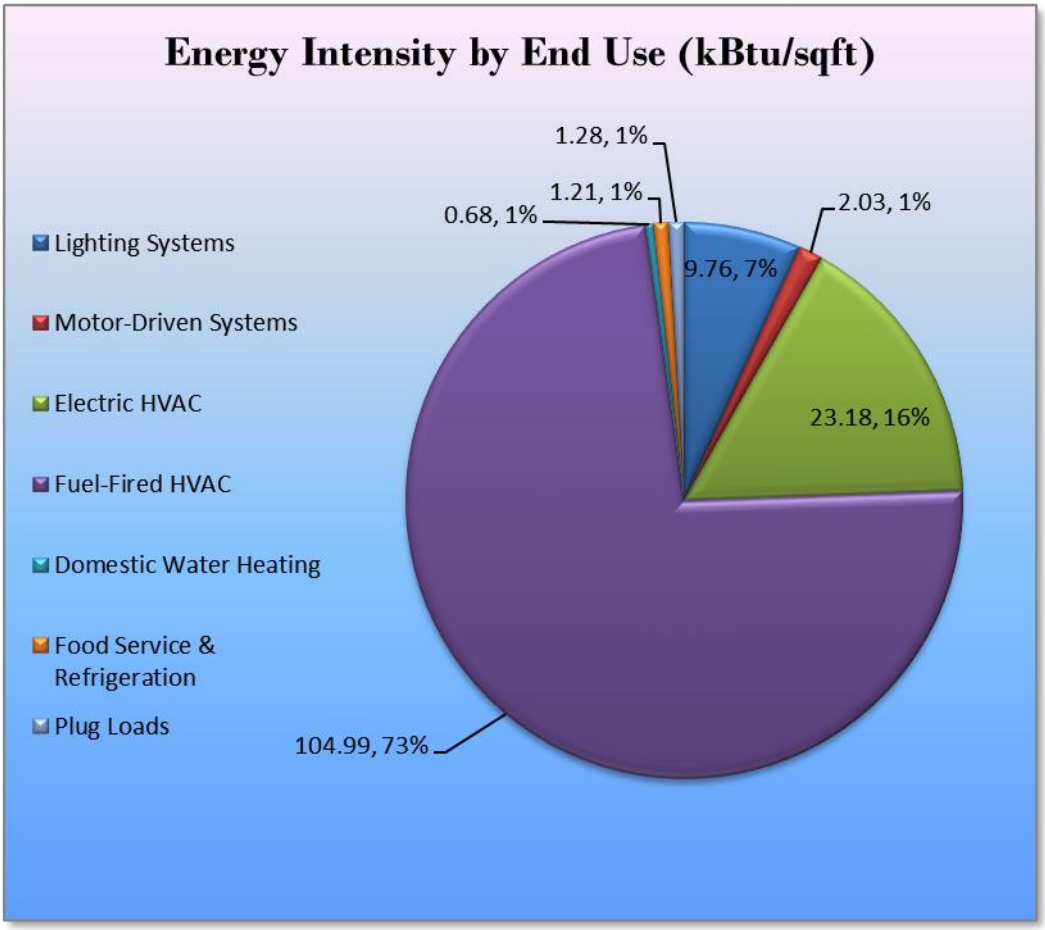
For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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 14 - Energy Balance (kBtu/ft² and %)



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 Furlong Field House 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 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**26,381**	**7.6**	**0.0**	**$3,916.67**	**$17,937.84**	**$1,670.00**	**$16,267.84**	**4.2**	**26,565**
ECM 1	Install LED Fixtures	6,366	1.2	0.0	$945.08	$3,257.05	$600.00	$2,657.05	2.8	6,410
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	155	0.0	0.0	$22.98	$117.00	$10.00	$107.00	4.7	156
ECM 3	Retrofit Fixtures with LED Lamps	19,860	6.3	0.0	$2,948.61	$14,563.79	$1,060.00	$13,503.79	4.6	19,999
Lighting Control Measures		**2,597**	**0.9**	**0.0**	**$385.54**	**$5,750.00**	**$695.00**	**$5,055.00**	**13.1**	**2,615**
ECM 4	Install Occupancy Sensor Lighting Controls	2,597	0.9	0.0	$385.54	$5,750.00	$695.00	$5,055.00	13.1	2,615
TOTALS		**28,977**	**8.4**	**0.0**	**$4,302.20**	**$23,687.84**	**$2,365.00**	**$21,322.84**	**5.0**	**29,180**

* - 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 16 below.

Figure 16 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**26,381**	**7.6**	**0.0**	**$3,916.67**	**$17,937.84**	**$1,670.00**	**$16,267.84**	**4.2**	**26,565**
ECM 1	Install LED Fixtures	6,366	1.2	0.0	$945.08	$3,257.05	$600.00	$2,657.05	2.8	6,410
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	155	0.0	0.0	$22.98	$117.00	$10.00	$107.00	4.7	156
ECM 3	Retrofit Fixtures with LED Lamps	19,860	6.3	0.0	$2,948.61	$14,563.79	$1,060.00	$13,503.79	4.6	19,999

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

ECM 1: Install LED Fixtures

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	1,273	0.4	0.0	$188.94	$1,003.85	$0.00	$1,003.85	5.3	1,281
Exterior	5,093	0.8	0.0	$756.14	$2,253.20	$600.00	$1,653.20	2.2	5,129

Measure Description

We recommend replacing most existing HID fixtures with new high-performance LED light fixtures. Although most HID fixtures can now be simply retrofitted with compatible LED lamps instead, many customers prefer to replace the whole HID fixture with an LED fixture instead.

This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes and more than 10 times longer than many incandescent lamps.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	155	0.0	0.0	$22.98	$117.00	$10.00	$107.00	4.7	156
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.0	0

Measure Description

For older, inefficient T12 linear fluorescent fixtures recommend retrofitting existing fixtures with new LED lamps and replacing ballasts with LED drivers as well. T12 fixtures often contain older, inefficient magnetic ballasts, instead of modern electronic ballasts.

This measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

ECM 3: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	19,370	6.2	0.0	$2,875.86	$14,388.29	$1,030.00	$13,358.29	4.6	19,506
Exterior	490	0.1	0.0	$72.75	$175.50	$30.00	$145.50	2.0	493

Measure Description

We recommend replacing all existing fixtures containing linear fluorescent and compact florescent lamps with new high-performance LED lamps. Decorative exterior wall sconces with HID lamps near the field house's main entrances were also recommended for retrofit with compatible LED lamps, rather than full fixture replacement.

This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of fluorescent tubes and more than ten times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**2,597**	**0.9**	**0.0**	**$385.54**	**$5,750.00**	**$695.00**	**$5,055.00**	**13.1**	**2,615**
ECM 4	Install Occupancy Sensor Lighting Controls	2,597	0.9	0.0	$385.54	$5,750.00	$695.00	$5,055.00	13.1	2,615

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

ECM 4: Install Occupancy Sensor Lighting Controls

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
2,597	0.9	0.0	$385.54	$5,750.00	$695.00	$5,055.00	13.1	2,615

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, locker rooms, storage rooms, classrooms, offices areas, and other area where occupancy often varies throughout the day, in order prevent unneeded lights from operating after all occupants have left the room.

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.

4.2 ECM Evaluated, But Not Recommended

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

Figure 18 – 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_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**119.6**	**$502.66**	**$15,434.20**	**$1,414.60**	**$14,019.60**	**27.9**	**14,008**
Install High Efficiency Hot Water Boilers	0	0.0	119.6	$502.66	$15,434.20	$1,414.60	$14,019.60	27.9	14,008
TOTALS	**0**	**0.0**	**119.6**	**$502.66**	**$15,434.20**	**$1,414.60**	**$14,019.60**	**27.9**	**14,008**

* - 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

Measure Description

We considered recommending replacement of the field house's main boiler with a new high-efficiency condensing 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. Therefore, condensing hydronic boilers were only evaluated when the return water temperature is less than 130°F during most of the operating hours. As a result, condensing hydronic boilers are recommended for this site, if the hot water heating system can operate at those temperature.

Further study may be necessary to determine feasibility of switching to a high-efficiency condensing boiler. If feasible, a condensing boiler system would provide the most energy savings over the existing unit. If not, then the boiler must be replaced with a less efficient non-condensing model.

Reasons for not Recommending

We chose not to recommend main boiler replacement at this time due the measure's long payback period (~27.9 yrs).

However, the school district may choose to include this upgrade, along with the other recommended ECMs, rather than wait until boiler replacement becomes more necessary. If the school district chooses to include this optional measure, then we estimate that the energy savings for the total payback of measures would increase to 10.3%, though the payback period would increase to 7.5 years (or longer if the existing unit is replaced with a non-condensing boiler).

Note: The payback period for this measure might improve, if the gas rate is revised (see Section 3.3) and/or if the assumed incentive amount is increased, possibly through qualification and participation in the Direct Install program (see Section 8.2).

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.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

For buildings where occupancy varies widely, making sure that heating or cooling is setback or turned off in unoccupied areas is often the most cost-effective way to achieve energy savings.

Plug Load Controls

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

Water Conservation

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

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

6 On-Site Generation Measures

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

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

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

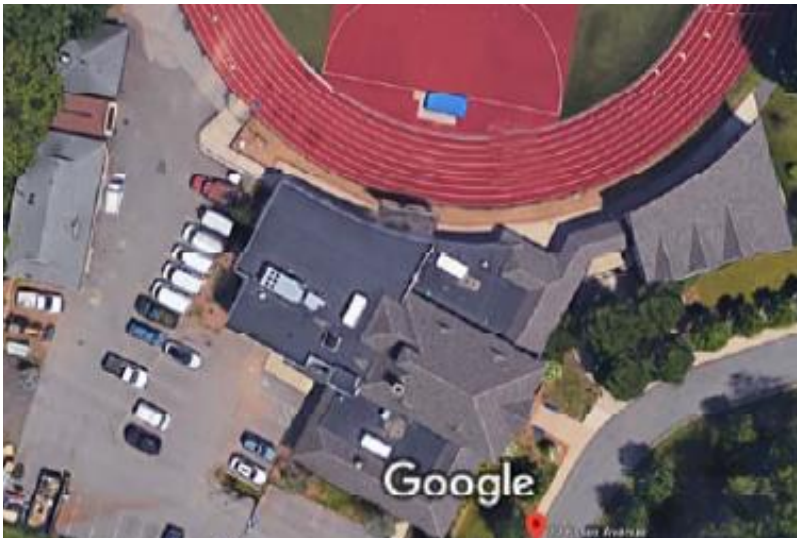
6.1 Photovoltaic

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

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the potential for PV at the site.

Image 4: Aerial View of the Facility

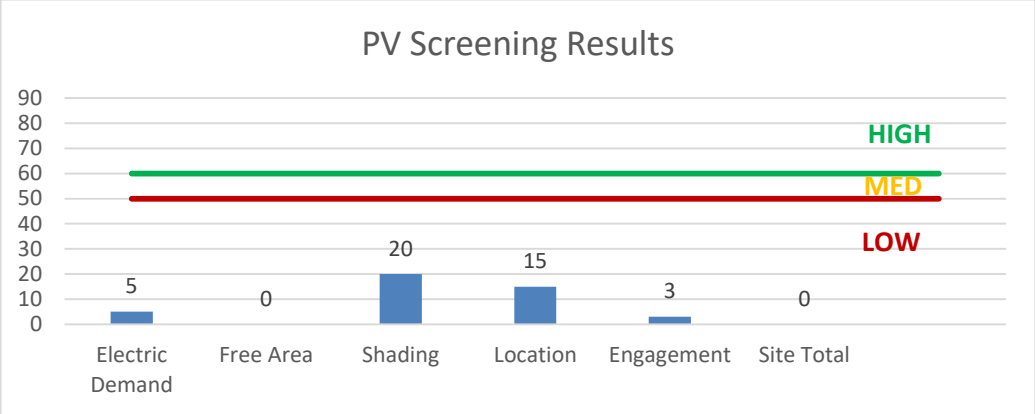


In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels.

Most of the building rooftop areas are sloped. Flat roofs are easier for PV installation, but as the image below shows only a relatively small section of roof is flat and unobstructed. In our opinion, the facility does appear not meet these minimum criteria for cost-effective PV installation.

We estimate that the potentially usable area is only about 3,100 ft^2, which might be enough for a small array, but other Montclair BOE properties would probably be more cost-effective to develop for PV solar electric generation.

Figure 19 - Photovoltaic Screening



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

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

6.2 Combined Heat and Power

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

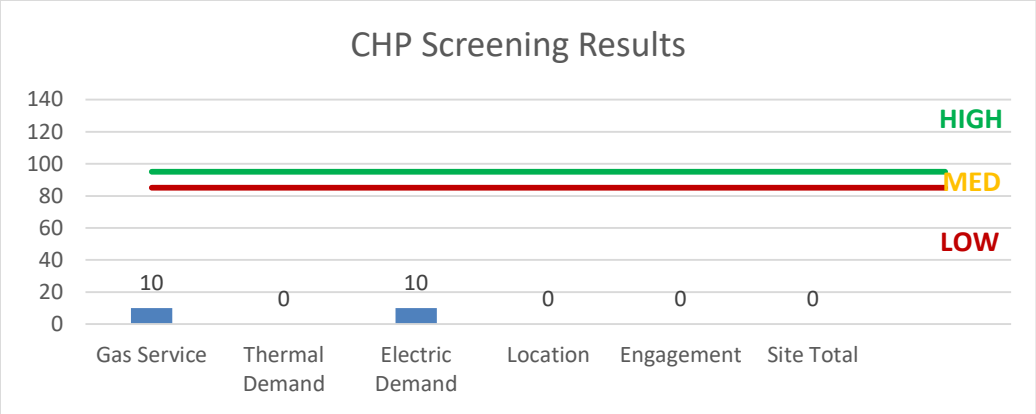
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

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

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

Figure 20 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

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

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 21 for a list of the eligible programs identified for each recommended ECM.

Figure 21 - 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 Occupancy Sensor Lighting Controls	X		X	

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

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

Incentives

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

How to Participate

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

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

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

8.4 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (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 program information.

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

See Section 7 for additional information.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Front Exterior	2	Metal Halide: (1) 175W Lamp	None	215	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	40	4,380	0.28	1,732	0.0	$257.19	$667.58	$200.00	1.82
Rear Door Exterior	1	Metal Halide: (1) 175W Lamp	None	215	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	40	4,380	0.14	866	0.0	$128.60	$333.79	$100.00	1.82
Boiler Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.08	260	0.0	$38.57	$175.50	$30.00	3.77
Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.13	433	0.0	$64.28	$292.50	$50.00	3.77
Office / Elec Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,322	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,625	0.10	328	0.0	$48.73	$266.40	$50.00	4.44
Office / Elec Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.03	109	0.0	$16.24	$58.50	$30.00	1.75
Weight Rm	15	Metal Halide: (1) 70W Lamp	Wall Switch	95	2,322	Relamp	No	15	LED Screw-In Lamps: 18W Screw-in Corncob Bulbs	Wall Switch	18	2,322	0.94	3,031	0.0	$449.94	$1,405.65	$0.00	3.12
Men's Locker Rm	5	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	5	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.11	352	0.0	$52.20	$717.05	$35.00	13.07
Men's Locker Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.03	109	0.0	$16.24	$58.50	$45.00	0.83
Women's Locker Rm	5	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	5	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.11	352	0.0	$52.20	$717.05	$35.00	13.07
Women's Locker Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.03	109	0.0	$16.24	$58.50	$45.00	0.83
2nd Flr Weight Rm	20	Metal Halide: (1) 70W Lamp	Wall Switch	95	2,322	Relamp	No	20	LED Screw-In Lamps: 18W Screw-in Corncob Bulbs	Wall Switch	18	2,322	1.25	4,041	0.0	$599.92	$1,874.20	$0.00	3.12
Coach's Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,322	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,625	0.10	328	0.0	$48.73	$266.40	$50.00	4.44
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.03	75	0.0	$11.19	$174.50	$10.00	14.70
2nd Flr Foyer	2	Metal Halide: (1) 70W Lamp	Wall Switch	95	2,322	Relamp	No	2	LED Screw-In Lamps: 18W Screw-in Corncob Bulbs	Wall Switch	18	2,322	0.13	404	0.0	$59.99	$187.42	$0.00	3.12
Stairwell	3	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,322	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.08	244	0.0	$36.23	$175.50	$30.00	4.02
Football Locker Rm	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,625	0.19	612	0.0	$90.92	$919.20	$70.00	9.34
Football Locker Rm	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,322	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.06	208	0.0	$30.93	$117.00	$55.00	2.00
Football Locker Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.03	109	0.0	$16.24	$58.50	$45.00	0.83
Football Locker Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,322	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,625	0.05	164	0.0	$24.37	$75.20	$50.00	1.03
Front Stairwell	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.08	260	0.0	$38.57	$175.50	$30.00	3.77
Football Locker Rm 2	10	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	10	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,625	0.32	1,021	0.0	$151.54	$1,172.00	$70.00	7.27
Laundry Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.07	219	0.0	$32.49	$233.00	$40.00	5.94
Front Hall	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,322	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.03	81	0.0	$12.08	$58.50	$10.00	4.02
Trainer's Rm	8	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	8	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.17	563	0.0	$83.52	$985.28	$35.00	11.38

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Trainer's Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,322	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,625	0.18	578	0.0	$85.78	$285.40	$95.00	2.22
Trainer's Rm	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,322	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.03	104	0.0	$15.47	$58.50	$45.00	0.87
Boys' Locker Rm	8	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	8	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.17	563	0.0	$83.52	$985.28	$35.00	11.38
Back Hall	5	Compact Fluorescent: 2x 26W CFL Recessed Cans	Wall Switch	52	2,322	LED Retrofit	No	5	LED - Fixtures: Downlight Recessed	Wall Switch	21	2,322	0.13	407	0.0	$60.38	$296.90	$0.00	4.92
Boys' Shower	3	Compact Fluorescent: 2x 17W CFL Recessed Cans	Wall Switch	34	2,322	LED Retrofit	No	3	LED - Fixtures: Downlight Recessed	Wall Switch	17	2,322	0.04	134	0.0	$19.87	$172.53	$0.00	8.68
Front Hall	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,322	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.10	325	0.0	$48.31	$234.00	$40.00	4.02
Men's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,200	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	840	0.05	85	0.0	$12.59	$191.20	$15.00	13.99
Women's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,200	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	840	0.05	85	0.0	$12.59	$191.20	$15.00	13.99
Exit Signs (Field House)	9	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	9	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Outside (Between Bldgs)	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	4,380	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	None	29	4,380	0.08	490	0.0	$72.75	$175.50	$30.00	2.00
Main Rm (Multi-Purpose Bldg)	9	Compact Fluorescent: 2x 26W CFL Recessed Cans	Wall Switch	52	2,322	LED Retrofit	Yes	9	LED - Fixtures: Downlight Recessed	Occupancy Sensor	21	1,625	0.27	881	0.0	$130.78	$804.42	$35.00	5.88
Server Rm	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	600	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.03	21	0.0	$3.12	$58.50	$10.00	15.54
Men's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,322	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,625	0.05	164	0.0	$24.37	$191.20	$15.00	7.23
Men's Rm	4	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	4	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.09	281	0.0	$41.76	$627.64	$35.00	14.19
Women's Rm	4	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	4	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.09	281	0.0	$41.76	$627.64	$35.00	14.19
Mop Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	800	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	800	0.01	16	0.0	$2.35	$35.90	$5.00	13.16
Girls' Locker Rm	7	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	7	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.15	492	0.0	$73.08	$895.87	$35.00	11.78
Girls' Locker Rm 2	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.37	1,204	0.0	$178.69	$1,183.50	$180.00	5.62
Girls' Locker Rm 2	4	Compact Fluorescent: 38W 4-pin plug-in CFL	Wall Switch	38	2,322	Relamp	Yes	4	LED - Fixtures: Downlight Surface Mount	Occupancy Sensor	16	1,625	0.09	281	0.0	$41.76	$357.64	$35.00	7.73
Girls' Coach Locker Rm	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,322	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.03	104	0.0	$15.47	$58.50	$30.00	1.84
Girls' Coach Locker Rm	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	2,322	Relamp & Reballast	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.06	178	0.0	$26.37	$233.00	$30.00	7.70
Front Door (Multi-Purpose Bldg)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.03	87	0.0	$12.86	$58.50	$10.00	3.77
Exit Signs (Multi-Purpose Bldg)	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Building & Grounds Dept. Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,322	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,625	0.12	385	0.0	$57.19	$306.27	$60.00	4.31
Building & Grounds Dept. Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,322	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,625	0.05	164	0.0	$24.37	$75.20	$35.00	1.65

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Garage	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,625	0.51	1,641	0.0	$243.67	$1,417.50	$220.00	4.91
Garage	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
B&G Dept. Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	840	0.03	53	0.0	$7.83	$179.20	$0.00	22.88
Machine Shop	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.24	779	0.0	$115.70	$526.50	$90.00	3.77
Machine Shop	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,322	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,322	0.03	92	0.0	$13.63	$71.80	$10.00	4.53
Concession Stand	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	700	0.31	424	0.0	$62.96	$796.50	$125.00	10.66
Concession Stand	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Concession Stand Exterior	6	Compact Fluorescent: 23W Recessed Cans	None	23	4,380	LED Retrofit	No	6	LED - Fixtures: Downlight Recessed	None	17	4,380	0.03	178	0.0	$26.45	$345.06	$0.00	13.04
Garage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,322	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,322	0.05	173	0.0	$25.71	$117.00	$20.00	3.77
Grounds Office Exterior	2	Metal Halide: (1) 175W Lamp	None	215	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	40	4,380	0.28	1,732	0.0	$257.19	$667.58	$200.00	1.82
Grounds Office Exterior	1	High-Pressure Sodium: (1) 100W Lamp	None	138	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	20	4,380	0.10	584	0.0	$86.71	$239.19	$100.00	1.61

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Concession Stand	Range Hood	2	Kitchen Hood Exhaust Fan	0.5	78.0%	No	100	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Field House	Ventilation Fans	6	Supply Fan	0.5	78.0%	No	1,800	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Field House	Ventilation Fans	6	Return Fan	0.5	78.0%	No	1,800	No	78.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Multi-Purpose Bldg	1	Split-System AC	12.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Field House	2	Packaged AC	20.83		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Field House	1	Packaged AC	25.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Field House	1	Packaged AC	20.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
B&G Office & Garage	B&G Office & Garage	1	Through-The-Wall AC	0.83		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
B&G Office & Garage	B&G Office & Garage	1	Electric Resistance Heat		17.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm	Field House	1	Non-Condensing Hot Water Boiler	643.00	Yes	1	Condensing Hot Water Boiler	643.00	94.00%	Et	0.00	0	119.6	$502.66	$15,434.20	$1,414.60	27.89
Roof	Field House	2	Furnace	250.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Field House	1	Furnace	300.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Field House	1	Furnace	240.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Field House	2	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

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

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions			Proposed Cond	Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker 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
Trainer's Rm	1	Ice Making Head (<450 lbs/day), Batch	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Field House / B&G Office	5	Desktop Computer + Monitor	150.0	Yes
Multi-Purpose	1	TVs (42", LED)	80.0	Yes
Field House / B&G Office	1	Printers (sm.)	80.0	Yes
Field House / B&G Office	1	Copy Machine	240.0	Yes
Server Rm	1	Server Rack	360.0	Yes

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Woodman / Furlong Field House

Primary Property Type: Fitness Center/Health Club/Gym
Gross Floor Area (ft²): 13,184
Built: 1925

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	Property Owner	Primary Contact
Woodman / Furlong Field House 28 Essex Avenue Montclair, New Jersey 07042	Montclair Board of Education 22 Valley Road Montclair, NJ 07042 (973) 509-4050	Steve DiGeronimo 22 Valley Road Montclair, NJ 07042 (973) 509-4050 bfleischer@montclair.k12.nj.us

Property ID: 5724948

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
152.6 kBtu/ft²

Source EUI
259.2 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	624,375 (31%)
Natural Gas (kBtu)	1,387,841 (69%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	57
National Median Source EUI (kBtu/ft²)	96.8
% Diff from National Median Source EUI	168%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	143

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)